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May 2023

[CONTENTS]

TIME TO LET GO OF THE BUTTER KNIFE

Although network slicing presents potential for new monetisation opportunities and efficiencies, its complexity and sprawl still pose challenges

TLF 2023

INDUSTRY SPEAK

TELECOM TALK

BROADBAND BYTES

INTERVIEW

Asif Khan

VM Manu

REPORT

REGULARS

[NEXT ISSUE]

APRIL 2023

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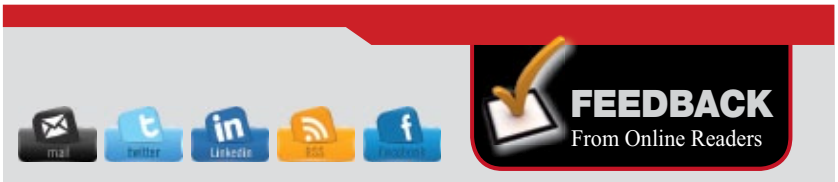

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SHUBHENDU
PARTH

[OPENING NOTE]

Leverage FM, mobile-based technologies for disaster warnings

In 2016, during my stay in Tokyo, I recall a startling moment that shook me from my slumber. As I lay in bed, I was jolted awake by a deafening hooter-like alert from my mobile phone followed by an announcement in Japanese. Feeling groggy, disoriented, and momentarily dazed, I was unsure whether I had wrongly set the alarm or had a nightmare when my mobile phone beeped again in that same loud tone. And while I was still trying to figure out what had happened, I heard some announcements being made in Japanese over the condominium's public address system.

Still confused, I decided to check what was happening and opened my door, only to find residents rushing out. I followed, assuming that there must be some emergency. Later, a colleague at the intergovernmental agency that I worked for, explained to me that the alerts on my phone were for an approaching earthquake.

My experience in Tokyo reminds me of the importance of FM and mobile-based technologies in early disaster warnings. A recent communication from India's Ministry of Electronics and Information Technology (MeitY) requesting mobile phone manufacturers to include FM Radio receiver capabilities in their devices, is crucial for efficient emergency communication and saving lives.

Similar situations have occurred worldwide, emphasising the importance of FM Radio in crisis management. During Hurricane Katrina in the United States, FM stations provided critical updates and evacuation instructions. In Japan, FM stations played a vital role in guiding citizens to safety during earthquakes. These accounts demonstrate the power of FM broadcasts in relaying urgent warnings and alerts.

In India, where natural disasters are frequent, widespread accessibility to FM Radio services is crucial. FM stations act as links between authorities and the public, providing timely information during emergencies. The International Telecommunication Union has also recognised radio broadcasting as a reliable method for conveying critical messages in crises. Integrating FM Radio into mobile phones allows the government to extend the reach of warnings and enhance emergency preparedness.

MeitY's advisory emphasises the need to keep the FM Radio receiver feature enabled and activated on mobile phones. This ensures swift information dissemination during emergencies and benefits the underprivileged, who may lack access to standalone radios. Mobile phone manufacturers are also encouraged to incorporate FM Radio functionalities in their devices to restore widespread access to FM Radio services.

The availability of FM Radio on mobile phones has broader societal benefits as well. During the COVID-19 pandemic, FM Radio played a significant role in disseminating health information to communities across India. Enabling FM Radio on mobile phones empowers the public with timely updates, contributing to the nation's efforts in combating crises.

MeitY's call to action for handset manufacturers to enable FM Radio features is a step in the right direction that can make a big difference in saving lives and mitigating the impact of disasters.

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[INDUSTRY SPEAK]
CYBERSECURITY

Demystifying the concept of zero trust security

Cyber security is a risk management function and organisations need to make decisions on trade-offs or risk acceptance when they implement controls

BY VISHAL SALVI

The Cybersecurity hazard is at an all-time high due to several changes in the business environment. The proliferation of personal devices and the adoption of the hybrid work model and digital technologies are creating multiple vulnerable nodes that are exposed to security breaches.

Organisations and their CISOs are challenged by the evolving threat landscape. The need for strategic thinking and rehashing the fundamental security architecture construct is much higher than ever. In this context, the Zero Trust Security Architecture is one approach that's increasingly getting a lot of traction. At a higher level, Zero Trust assumes that your business is continuously compromised, and the architecture aims to mitigate that.

SECURITY FROM A DIFFERENT PERSPECTIVE

Fundamentally, cyber security is a risk management function where we need to make decisions on trade-offs or risk acceptance when we implement controls. It is difficult to imagine a world where we would only have absolute control. Another important factor to note is that trust is contextual. The security world has built various models and solutions for adaptive controls or transparent controls. These models are based on answering questions about who, where, why, when and what of a transaction before any verification, approval or denial is made.

Security architecture has always relied on trust models. There are many technical controls that we trust before we grant or deny access to resources. For all this to work properly, security teams must ensure the highest degree of integrity to handshakes or trust.

The Zero Trust model challenges the risk management principles, adaptive nature of controls, defence in depth and trust relations across entities in security management. Essentially, it assumes that an organisation is constantly under attack and therefore controls and responses are built based on that assumption. It does not assume any trust across the controls and therefore subjects the transaction to the maximum level of scrutiny that's possible. The traditional model of perimeter-based security is replaced with continuous security practices

> The Zero Trust model challenges the risk management principles, adaptive nature of controls, defence in depth and trust relations across entities.

built across people, devices, networks, data, and the cloud within as well as outside the organisation.

This does not mean that one can make each control self-sufficient. The concept of defence in depth, and building trust across entities will remain, however, this approach helps in designing and building strong multi-dimensional and comprehensive controls.

We must not view Zero Trust as a replacement for the existing security architecture but as a complementary approach. Zero Trust focuses on deciphering the context by understanding user behaviour and expectations based on IP addresses, locations, access devices, time of day and more. For this to work, organisations must implement security controls within and outside the external perimeter. It can be achieved by a combination of strategies including strong identification, authentication, authorisation, isolation, segregation, encryption, obfuscation, and automation tools.

THE KEY CONSTRUCT OF ZERO TRUST

Zero Trust security needs to be enforced across all the five fundamental pillars of the enterprise fabric. These include identity, device, network, application workload and data. The Zero Trust framework must be applied to each of the five pillars and minor improvements over time can lead to a fully optimised security architecture.

Identity: Being the latest and the most important perimeter for the enterprise, an identity-centric zero-trust strategy is becoming mainstream. Organisations must lay down the policies to define what is a trusted user identity and what are the accesses associated with that identity. There are solutions such as Identity and Access Management as well as Identity Governance Application Controls which establish trust between users or devices and enterprise resources.

Security controls should include aspects such as single sign-on, multi-factor authentication, biometrics, password-less authentication and more. Security needs to recognise that apart from employees, users could also be contractors and vendors. Therefore, the security protocols need to be extended beyond just traditional business perimeters.

Devices: It is no longer just company-issued laptops that are used as workplaces become dynamic. Zero trust applies security controls to every device and keeps real-time watch to ensure compliance with security mandates.

Networks: Cloud-first strategies and remote working have made Zero Trust in network security critical. Here again, micro-segmentation and trust level definition help. Secure Access Service Edge (SASE) solutions play an important role here. SASE is a cloud-first network architecture framework which brings together native cloud security technologies and wide area network capabilities to securely connect not just users but also systems, application endpoints and services.

Data: It must be identified, classified, and encrypted for zero trust security to be successful. Preventing data loss or leakage, providing secure storage, and building the capability to recover information in real time are essential steps. Data must be made available irrespective of where it is stored or what state it is in.

Application workload: These include computer programs and services that execute on-premise and cloud environments. Zero Trust security must be applied to the workload and applications within the core of the business. Security controls such as Host AV/EDR, vulnerability management, cloud access security broker, app security, and DevSecOps among others can be employed in the software development life cycle process.

Organisations are already embarked on the journey to enforce zero trust security by implementing identity security for employees, business partners and contractors, customers, and even non-human devices. With the Zero Trust framework, defence-in-depth is applied technically across all the pillars of the enterprise. When adopting zero trust, perhaps there is a need to define a standard taxonomy in the context of information security and cyber security since trust is not absolute but contextual.

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LT GEN DR S P KOCHHAR

ENABLING THE 5G REVOLUTION AND BEYOND IN INDIA

The fifth generation of telecom networks will lay the foundation of a successful 6G that can meet the needs of a hyper-connected future

5G technology is expected to be a game-changer with its unprecedented data speed and capacity, and the ability to enable massive machine-to-machine (M2M) connectivity, thus creating a more seamless digital experience for users across the enterprise and retail segments. However, its widespread adoption requires significant investments in infrastructure, spectrum allocation, and affordable network equipment, among others.

While we have embarked on the 5G journey in India, the efforts for making it accessible as well as affordable, will be an ongoing process, and involve a lot of learnings with trials and errors. The world is still hunting for the 'killer app' and until such decisive use cases be established to reassure profitability and sustenance for the sector, it is equally important to ensure that the financial health and viability of the sector are safeguarded to enable continuity to that phase.

FACILITATING FINANCIAL VIABILITY

To make 5G more accessible as well as affordable, the most fundamental step would be to provide some relief to this heavily debt-ridden sector, on priority. The first quarter of FY22 witnessed a gross income of Rs 64,801

> The 5G experience will help us set up more readily for 6G, which is essentially an incremental advancement to 5G.

The 6 GHz band provides a balance of coverage and capacity with less power consumption than other bands, which would help optimise the use of 5G.

crore (USD 8.74 billion) in the telecom sector in India, while at the same time, the total debt of the industry stood at approximately Rs 4.73 lakh crore, as of 31 March 2022. This amply depicts the sector's dire financial straits, which is hampering its growth potential.

As has been requested by the industry for some time now, the reduction in levies like license fees and USOF contribution, etc. would be crucial for re-invigorating the sector and will leave more funds with TSPs for expansion, increasing liquidity and facilitating the investments required to complete the Digital India vision and 5G roll-outs. Further, subsidies to reduce the cost of 5G infrastructure and devices can help make 5G more accessible to the general population.

ADDRESSING SPECTRUM REQUIREMENTS

Spectrum, being the most essential component for any telecom technology, would be crucial for the successful functioning of 5G as well. Given that 5G will enable massive M2M connectivity with a widespread sensor-based network, besides retail use cases, additional spectrum is imperative to augment the 5G performance and experience. More spectrum, made available at reasonable prices, will help free up additional capital for the TSPs, which can be allocated for subsequent investments in network deployments.

India's significantly higher population density of 464 persons per square km, compared to 36 in the USA and 25 in Brazil necessitates that spectrum loading happens to the tune of ~96%, as compared to 40-50% in the two countries. The average population served by each antenna in India is roughly 8x that of these countries, putting a requirement of almost 4-5 MHz of spectrum per person. Licensed 6 GHz is ideal for commercial success and deployment of 5G NR, 5.5 G, and 6G in the future. Therefore, a more affordable spectrum, especially in the 6 GHz band is needed to satisfy IMT-2020 user-experienced data rates.

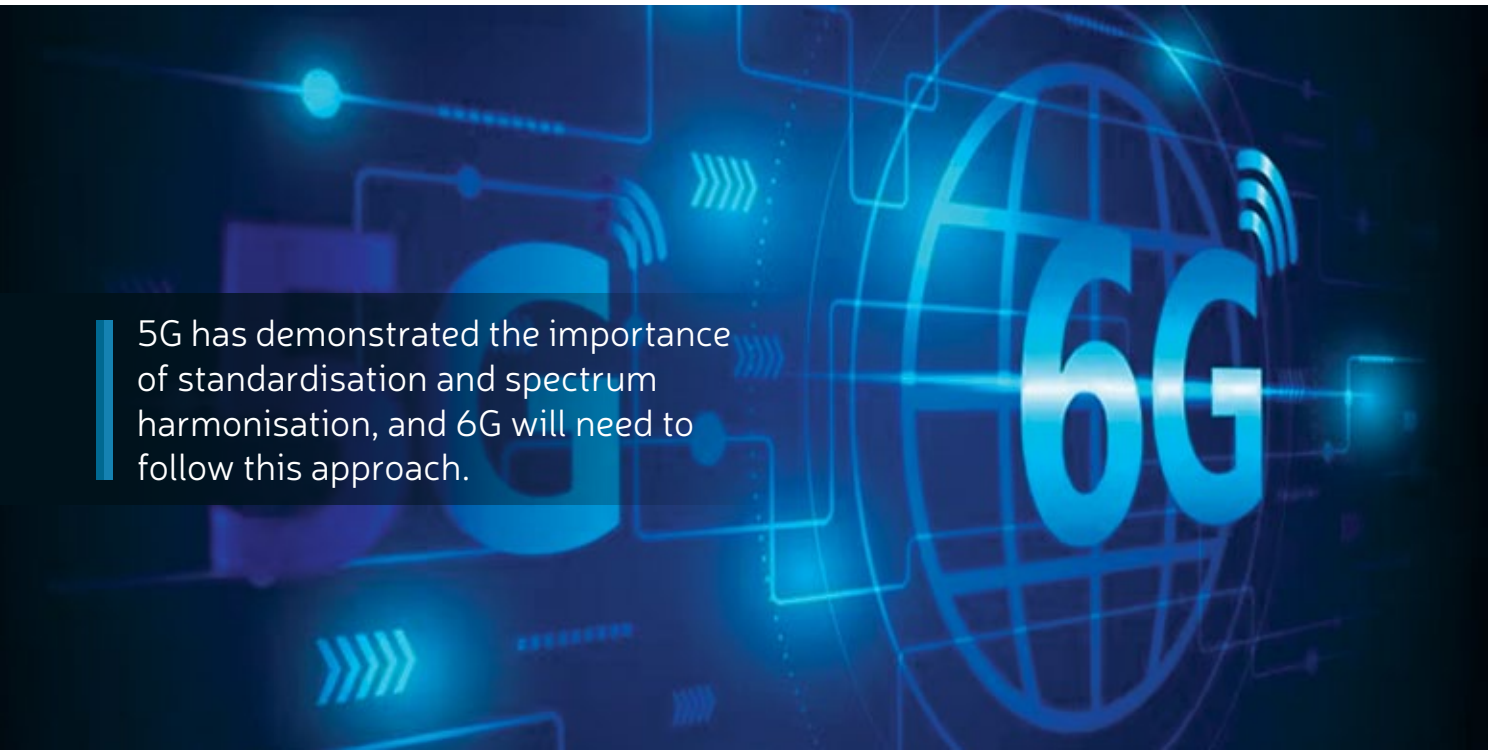
The 6 GHz band provides a balance of coverage and capacity with less power consumption than other bands, which would help optimise the use of 5G. By reducing congestion and interference in other bands, the 6 GHz frequency can lower 5G network cost per bit and spectral efficiency. In fact, according to a GSMA survey, India can save over USD 10 billion annually on network expenditures by utilising the mid-band spectrum for 5G services, such as the 6 GHz band.

On the other hand, a shortage of 6 GHz spectrum would compel TSPs to densify networks to meet the IMT-2020 5G performance requirements, leading to 60% higher annual costs. Without densification, 5G download speeds may be reduced to 50% if less spectrum is allocated in the 6 GHz band. So, licensed 6 GHz is ideal for commercial success and deployment of 5G NR, 5.5 G, and even 6G in the future.

There are some arguments favouring delicensing of the 6 GHz band though, chiefly to support Wi-Fi services. However, Wi-Fi services in India already have sufficient spectrum in the 2.4 GHz and 5 GHz bands (totalling 688 MHz) to meet the demand for Wi-Fi access in the 2025-2030 period. The TRAI, in its Recommendations on Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed (31 August 2021), had clearly stated that "... in India, the existing spectrum bands for Wi-Fi, i.e., 2.4 GHz and 5 GHz have still not been fully utilised". Moreover, Wi-Fi services have negligible data offload from IMT mobile to Wi-Fi because India is a mobile-first nation with more than 95% of Internet users accessing mobile broadband data.

ENSURING DEVICE AND SERVICE AFFORDABILITY

5G adoption rates are also affected by equipment affordability, multi-band compatibility and awareness. 5G's adoption pace can expedite technological cost reduction. The affordability of 5G equipment can expedite and expand the adoption of 5G services. It can also stimulate the domestic manufacturing sector and generate new jobs and skills for India's vast labour population.



5G has demonstrated the importance of standardisation and spectrum harmonisation, and 6G will need to follow this approach.

In consumer devices, affordability will be key to propel uptake in the price-sensitive Indian market. The cost of 5G devices, such as smartphones and routers, is still relatively high. Currently, about 30-35% of the ~150-170 million smartphones shipped in India annually are 5G enabled, according to CRISIL. The low initial value proposition and high price compared to 4G phones will restrict overall 5G adoption to ~300 million users by fiscal 2025.

The need for multi-band compatibility in 5G adds to the cost of handsets. Therefore, one solution could be to adopt software filters to develop handsets working only in low bands for rural areas, and mid bands for urban areas. The advancement of networks in 5G and beyond, with growing provision for the edge-computing and storage, and leveraging facilities like Cloud, Fog and Mist are also expected to help lessen the need for local storage and computation requirements in smartphones, thus helping reduce costs.

Sharing the cost of building and maintaining infrastructure among multiple service providers can further result in lower costs for everyone. Educating the public about the benefits of 5G and how to use it can help increase adoption rates and usage. More people using 5G can help drive down the cost of the technology over time.

ADDRESSING CRITICAL HURDLES

The challenges to deploying efficient 5G services in India include the fibreisation of towers, which is currently at 35% and needs to at least double to achieve desired results. The government has introduced amended Right of Way (RoW) rules to help facilitate faster deployments of telecom infrastructure, but implementation at the ground level continues to face difficulties.

States and local authorities must adopt the central RoW rules quickly. They also impose exorbitant charges for deploying telecom infrastructure on street furniture, which can be reduced by adopting the latest amendment in RoW rules. State electricity regulatory commissions must provide electricity connections to telecom sites at industrial/utility rates, and small cells should be exempt from any minimum connected load requirements under the Open Access policy to make use of renewable power sources. These measures can help create a robust 5G infrastructure in India expeditiously.

ENABLING A CONNECTED FUTURE

5G is not simply a faster version of 4G, but a fundamentally different network architecture. The widely heterogeneous requirements of 5G users need to be catered to dynamically, with a deeper understanding of each scenario. This requires a new way of planning and

> One of the significant shifts that 5G has brought is bringing part of the network to the device, and 6G aims to bring the entire network to devices.

deploying, with a 'business-first' approach that identifies specific use cases and customer segments that can benefit from 5G's capabilities, instead of the 'technology-first' approach taken for the earlier 4G, where every device got the same service.

This approach entails designing customised solutions that meet their needs and expectations, and optimising network resources and performance accordingly. This would also enable more energy efficiency and sustainability for both carriers and devices, as well as more innovation and value creation for various industries and sectors.

To fully realise the potential of 5G, technical advancements are necessary, including creating new radio access technologies that can function in higher frequency bands (such as mmWave) and support massive MIMO, beamforming and full duplex approaches. It also requires developing flexible and scalable network designs to accommodate service-based interactions, Network Function Virtualisation, Software-defined Networking, and Edge computing. It also requires adopting network slicing methods that can dynamically assign network resources and functionalities to various types of services and customers based on their Quality-of-Service needs and improving the linkage of Internet Exchange Points (IXPs) and adopting prudent traffic management practices.

These advancements will facilitate peering between ISP customers, improve data exchange and encourage connectivity to IXPs. Businesses need to prepare for the future by embracing the changes required for 5G and investing in the necessary technical advancements.

LEVERAGING 5G FOR 6G ADOPTION

The 5G experience will help us set up more readily for the next generation of communication technology – 6G, which is essentially an incremental advancement to 5G. The lessons we learn from the deployment of 5G can provide a roadmap for the early adoption and more successful implementation of 6G. One of the most significant shifts that 5G has brought is bringing part of the network to the device, and 6G aims to bring the entire network to our devices.

This change will require a shift in the role of computation and storage, moving them from devices to the network, with Edge computing, Cloud, Mist, and Fog technologies playing an enhanced role. To achieve global interoperability and compatibility of networks and devices, 5G has demonstrated the importance of standardisation and spectrum harmonisation. 6G will need to follow this approach and leverage existing 5G standards and spectrum bands while exploring new ones such as terahertz and visible light.

Another essential lesson from 5G is the ability to cater to the different needs of humans and machines with enhanced features like eMBB, uRLLC and mMTC. 6G is expected to build on these traits and provide more advanced capabilities such as holographic communications, tactile Internet and quantum communications. While 5G has leveraged the power of Artificial Intelligence (AI) to optimise network performance, enhance user experience and enable new services such as network slicing, 6G will need to integrate AI more deeply into the network architecture and operations, and explore new AI applications such as holographic telepresence, brain-computer interfaces and cognitive networks.

Despite its potential, 5G faces several challenges in deployment, including high costs, complex network installation, and security risks, among others. To overcome these challenges, 6G will need to adopt more cost-effective, flexible, secure and sustainable solutions such as network slicing, open RAN, Edge computing, AI, Blockchain, and green technologies. With these lessons, we can lay the foundation for 6G and ensure its successful deployment to meet the needs of a hyper-connected future.

Lt Gen Dr Kochhar is the Director General of COAI.

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TV RAMACHANDRAN

INDIA'S EPIC VOYAGE TO 6G THROUGH 2G TO 5G

With the Bharat 6G Vision Document, India is ready for setting the pace globally in the realm of a new generation of mobile technology

Having convincingly demonstrated the ability to develop and produce India Stacks for 4G and 5G, and having achieved the fastest rollout of 5G globally (both service providers reaching 3,000 cities and towns by 27th April 2023), India has raised full power for moving at top speed towards 6G R&D, standards and manufacturing.

With the launch of the Bharat 6G Vision document by the Prime Minister on 23rd March 2023, India has displayed foresight and started serious R&D preparation for a technology that is 7 to 10 years ahead. What this means is that, unlike technologies from 2G to 5G, where the country has been a mere adopter and user, in the case of 6G, India is aiming at "setting the future before it gets set" and is endeavouring to "find a high seat at the table of suppliers of gear and solutions".

It is common knowledge that, in the early years, standards of new technologies get developed and set and that is what decides the players who will dominate the manufacturing as the technology starts to roll out. India is now all set to capture that prime spot.

THE STORY OF THE GS

By far, 2G or GSM has undoubtedly been the most

Evolution of Communication from 2G to 5G

	2G GSM	2.7G EDGE	3G WCDMA	3.5 HSPA,HSPA+	4G LTE	4G LTE-Advance	4.5G LTE-A Pro	5G
3GPP Release	Rel. 97	Rel. 98	Rel. 99	Rel. 5,6,7	Rel. 8,9	Rel. 10,11,12	Rel. 13,14	Rel 15,16
Use Cases	Digital Voice & Messsaging	Enhanced 2G	Voice, Data & Video Signals	Enhanced 3G	Data and Voice over IP	Enhanced 4G	4G Evolution towards 5G	eMBB, critical MTC, massive MTC
	Digital Fidelity Cellular Phones	Higher Data Rates	Video Telephony/ Internet Surfing	Higher Data Rates	Wireless Broadband	Higher Peak Rates	+IoT and Public Safety	4th Industrial Revolution
Channel Access	TDMA/FDMS	TDMA/FDMA	WCDMA	WCDMA	WCDMA	OFDMA	OFDMA	Modified OFDMA
Bandwidth	200 kHz	200 kHz	5 MHz	5 MHz	20 MHz	100 MHz	640 MHz	Upto 2 GHz
Service	CS	CS/PS	CS/PS	PS	PS	Ps	PS	PS
Architecture	Controller	Controller	Controller	Controller	Distributed	HetNet	Cloud	Cloud, co-existence slicing
DL Speed	40 Kbps	500 Kbps	384 Kbps	14-84 Mbps	150-300 Mbps	1 Gbps	3 Gbps	>10 Gbps
Latency	~500 ms	~300 ms	~150 ms	~50 ms	~10 ms	~10 ms	~5 ms	<1ms
1982								
1G	1991	1997	2000	2004	2007	2012	2016	2020

Source: Cafetele/Voice&Data, August 2019

> For India to meet full success in the great initiative, as Alexander Pope would have advised, we must first drink deep of the Pierian springs of 4G and 5G.

successful of the technologies since it is still used by a significant fraction of the population. In India, judging by the number of feature phones still going strong in the market, it is estimated that 2G and 3G are still being used by about 300 to 350 million users, of which the predominant fraction is on 2G, mostly in rural and remote areas, and possibly only about 100 million on 3G. The concerned operators are not having any plans yet for shutting down 2G. Hence, it is expected that 2G would continue for at least a couple of years more which would still mean over 30 years of a successful run in India, giving good returns to the operators while still delivering benefits to the consumers.

4G can be reckoned to be a very close rival to 2G in its display of success till now. It entered India rather quietly in 2016 but with outstanding success as India's first taste of reasonable quality mobile broadband, made available to consumers at extremely affordable rates. The runaway success of 4G has been achieved without any fanfare or heavy promotion and merely on the back of quality levels delivered. This is in contrast to 3G which was probably over-hyped before commercialisation and failed to live up to the high expectations built up.

Progressing from 4G, it is noted that 5G is not an incremental technology but a big technological leap. Six months since the launch of 5G in India, it is worthwhile to pause and evaluate whether the country has extracted at least a major chunk of the possible benefit from the 4G technology. To do this, it would be useful to consider the evolution of communication from 2G to 5G, through the various 3GPP Releases, in respect of key parameters, as given in the table Evolution of Communication from 2G to 5G.

4G has also necessitated huge investment but seems to be set for a long good run. Even a cursory glance at the above table of properties, as well as the latest actual speed-test results given below, indicate that there is surely a need to extract much more out of 4G in India. This is extremely important also for the reason that our telecom operators need to get a reasonable return for their large investments.

Successful 4G countries have adequately deployed critical supporting technologies like Optic Fiber Cable (OFC) and Wi-Fi to leverage the full potential of 4G. For example, it is well known that about 60% to 80% of towers have to be fibreised to effectively support 4G. However, in India, we are still struggling with only around 35% tower fibreisation. This affects the quality (speed of download and upload) of the 4G delivered to the users. Similar is the effect of supporting Wi-Fi technology.

India has only about five lakh public Wi-Fi hotspots which are less than 5% of the global norms. It may be noted that National Digital Communications Policy 2018 had set a target of 10 million public Wi-Fi hotspots by 2022 and this has been heavily underscored by the country's 6G Vision Document which calls for 50 million public Wi-Fi hotspots by 2030. And, it is not merely the inadequate availability but also the lack of modern versions of Wi-Fi technology.

An Indian manufacturer, HFCL, has successfully developed and is exporting a large number of the most advanced Wi-Fi popularly referred to as WiFi 7, which is a virtual match for 5G in terms of capabilities. However, in India itself, we are not even using WiFi 6 or WiFi 6E which are powerful versions that can handle today's data-rich and sophisticated applications with 4G, delivering vastly superior user experience.

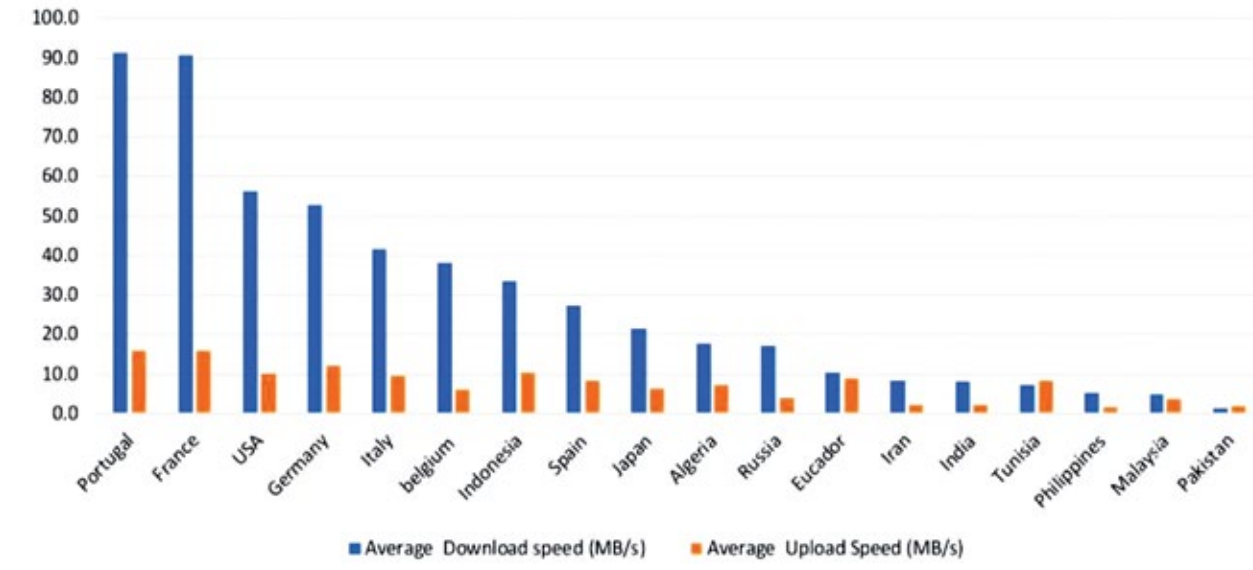
It should be appreciated that with the improvements possible in 4G of higher speeds in line with global norms, superior customer experience is ensured and there would be no compromise for the user vis-a-vis his or her experience with 5G. After all, the common retail market customer is hardly looking for ultra-low latency or ultra-high bandwidth and speed. Most users would find it difficult to discriminate experience between, say, a 50 Mbps with 4G and a 5G speed of 200-300 Mbps. It is only the niche segment of highly sophisticated professional users or the category of enterprise users who will need to urgently adopt 5G service.

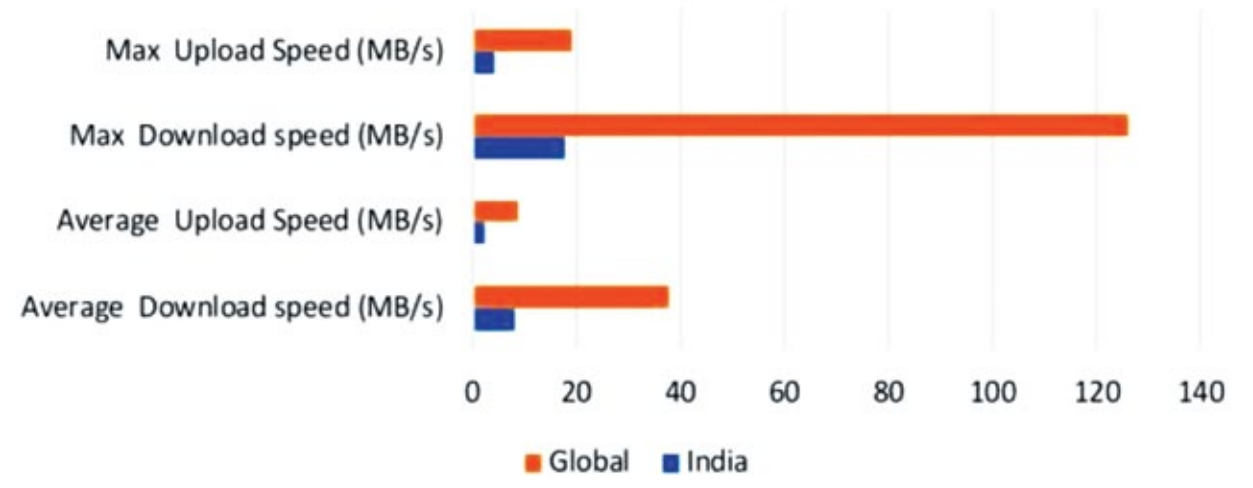
It is not that we should slow down on 5G or delay its rollout. On the contrary, the adoption of 5G by the concerned segments should be pushed to the maximum.

> This is the first time that India is ready for setting the pace globally in the realm of a new generation of mobile technology, the 6G.

However, it would be vastly beneficial both to operators as well as customers if concurrently 4G is strengthened and improved in quality. As mentioned earlier, OFC rollout and tower fibreisation should be doubled or trebled. Wi-Fi hotspots need to be rolled out to 50 million numbers as indicated in the 6G Vision Document. For remote and difficult-to-reach regions and locations, 4G and 5G satellites, the Non-Terrestrial Networks should be deployed. All these technologies and solutions are ripe, mature and available.

Average 4G Speed by Country





Source: 4G Mark, March 2023

> India is not using WiFi 6 or WiFi 6E that can handle today's data-rich and sophisticated applications with 4G, to deliver a vastly superior user experience.

While India can truly pride itself on its extremely fast rollout of 5G, at the same time, it must be appreciated that, due to the vast geography and the huge and dispersed population, we have, as yet, probably covered only a small fraction of the market. This can be appreciated when we note the distribution of the base stations (see box Distribution of Base Stations).

It is, therefore, clear from the above that the 5G coverage would be less than 10% of what we have with 4G. Of course, this would be a rough estimate since there are differences in spectrum bands, efficiency characteristics, etc. However, it is given to indicate that we have quite a long haul ahead for 5G to catch up with 4G although even the latter has not reached complete rural coverage and adoption.

There are, of course, some naysayers who tend to deflate the enthusiasts by pointing to the billions of dollars invested in 5G with inadequate impact on telcos sales or profits. However, history has shown time and again that development or progress cannot be retarded or stopped for long. Inexorably, consumer interest and excitement would prevail. Moreover, the much higher efficiency of 5G is not in doubt and has helped significantly to control operating costs. Finally, the critical role of private 5G in taking enterprises to Industry 4.0 is indisputable.

BEGINNING OF THE 6G STORY

Given the above, while 4G and 5G are racing ahead, it is worthwhile to start doing some crystal ball gazing about 6G. The highest priority is to be involved in and contribute to the development of global 6G standards. It is encouraging to note that serious work has already commenced in the concerned ministries and departments. As pointed out by NG Subramaniam, Chair – TSDSI and Chair, PCG Committee of 3GPP global apex body for 5G and 6G, and ED and COO of TCS, "Imagining 6G is not about speed or latency but experience. It is about going beyond the obvious and visualising an entwined future of digital twins of people, assets, processes, and systems coming together at scale."

It would be about an immersive experience where the physical and the digital worlds merge and become indistinguishable whole. Also, as predicted by Dr RK Upadhyay, CEO, C-DoT, "... by 2030, society's demands would have increased considerably. With data-hungry applications in all verticals, billions of connected devices with latency requirements better than one millisecond, and zettabytes of digital information getting generated, the limits of the 5G network would have already been reached. Seamless tactile Internet with intelligent ubiquitous coverage extending the sky, the sea and the space, will be available with the integration of terrestrial and non-terrestrial networks."

After its entry into mobile telecommunications with GSM 2G in 1995, this is the first time that India is ready for setting the pace globally in the realm of a new generation of mobile technology, the 6G. However, for India to meet with full success in this great initiative, as Alexander Pope would have advised, we must first drink deep of the Pierian springs of 4G and 5G.

Distribution of Base Stations

Total number of 5G base stations	=	1.44 lakh
Total number of 4G base stations	=	16.00 lakh
Total number of 2G and 3G base stations	=	7.5 lakh
Overall Total of all base stations	=	24.94 lakh (25 lakh when rounded off)

TVR is Hon. FIET (London) and President of Broadband India Forum.

Views are personal)

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Asif Khan
Channel Director – Middle East and Africa, Mitel

VM Manu
General Manager, Avientek

"India needs a strong communications platform"

Avientek FZCO, based in Dubai Silicon Oasis (DSO), is a leading value-added distributor of audio-visual solutions and unified communications in the Middle East, Africa, and the Indian subcontinent. It recently partnered with Mitel, the Canada-based global leader in business communications, founded in 1973. The two companies hosted a four-city roadshow in India, across Bangalore, Chennai, New Delhi, and Mumbai in February 2023. ***Asif Khan,*** *Channel Director for Middle East and Africa, Mitel, and* ***VM Manu,*** *GM, Avientek, spoke about their collaboration in an interview with* ***Pradeep Chakraborty****. Excerpts:*

Tell us more about this partnership between Mitel and Avientek.

Asif Khan (AK): Mitel was looking for a strategic partnership for distribution when we started the India operation. We had the objective to find the right partner, who can also add value.

We wanted a partner with good knowledge of the channel model, pre-sales support, operations and logistics efficiency, and credit and financing. We analysed several potential partners in India, looking at their models and value proposition. The partner had to represent Mitel in India. Avientek had all the necessary ingredients for driving the regional strategy with a global mindset.

VM Manu (VMM): Avientek is well-known in the distribution industry, especially in the AV and extended segments. We have partnered with many companies across the region. Today, differentiation among AV, telecom, and IT, is getting blurred, and moving onto a single platform.

Mitel is in the AV industry. We are getting into collaboration and communication. They come with a strong product lineup. They also have different deployment options – on-premise, cloud, and hybrid, etc. Mitel is a global leader in business communication with a stronghold in call centres.

India is also a preferred location for back offices for several industries. Many people are now working in the hybrid mode, especially after COVID-19. There is a need for a strong communications platform – with unified communication, call centres, and collaboration. Mitel has been among the world's strongest players. The partnership can be successful in India.

How is Mitel meeting the needs of organisations in India?

AK: We have the complete product portfolio for all of India. We have UC solutions, contact centre solutions, etc. We feel that UC had been missing. Earlier, it was traditional PBX technology that was being used. India is the hub for IT and ITeS and we are empowering the end users with these solutions. You can get everything in a single window.

Elaborate on the geographical parameter of this partnership.

VMM: We have signed an agreement with the pan-India mindset. Avientek has a sales team across the region, that covers nearly the whole of India. We have teams in Delhi, Chennai, and Kolkata. Our office and experience centres are in Bangalore and Mumbai. We will be focusing primarily on the telecom industry. We are also focusing on good AV companies to bring them to our side of the telecom and collaboration segment.

Mitel hired teams in Bangalore, Kolkata, and Mumbai. What about North India?

AK: We have planned this in two phases. We first got three people and went forward with that strategy. South India has many more addressable markets, such as Bangalore, Chennai, and Hyderabad. In Kolkata, a lot of government work is going on, especially in the railways.

Now, Mitel and Avientek are going to split resources. At places where Mitel's resources are available, Avientek will work with its local team. At places where Mitel's resources are unavailable, Avientek will have a dedicated team. We will gradually build larger teams.

> At places where Mitel has resources, Avientek will work with its team, while it will put in place a dedicated team where Mitel's resources are not available.

> South India has more addressable markets, such as Bangalore, Chennai, and Hyderabad, while in Kolkata, a lot of government work is going on.

How was Mitel managing India earlier?

AK: Mitel is working across over 100 countries. The Indian market was being managed by the Apac regional team, based out of Singapore. The Apac team managed the Australia and New Zealand (ANZ), and Singapore regions, as well. We realised that we can utilise the Middle East resources, strengths and experience in India. We moved the APAC team and connected them with the Middle East. Now, we are here today in India.

What are the benefits that you all are seeking out of the alliance?

AK: The benefits are three-fold. First comes revenue. Mitel has been growing in double digits YoY. We now need to replicate that in India. Second, we are looking at customer acquisition across various segments. Third, we are looking at verticalisation. We see vertical as the way forward — and would want to enter hospitality, government, healthcare etc.

The trio of verticalisation, customer acquisition and revenue are what we are looking at. Here, distribution is going to play a very important role in getting this strategy.

VMM: Avientek has been one of the youngest and fast-growing distribution companies in India. We are now looking at a 360-degree approach. We are now getting into telecom. The next step would be the IT industry. Later, we can also distribute any product across India, as we would have developed a good reach. We are also hoping for an aggressive push to our revenue. We can double the numbers for the next three to five years.

Mitel is a stable company. We can increase our credibility in the market by aligning with another stable company.

So, what are the products and solutions that you are going to distribute in India?

AK: Mitel has a complete portfolio of products addressing the horizontal and vertical needs of customers. In the horizontal segment, we have a platform for SMBs to very large corporations. In vertical, we have solutions fit for all purposes—hospitality, government, etc. For technology verticals, there are contact centres, banks, and related segments. Avientek is going to distribute all our products and end-to-end solutions. We are planning to add new products for the Indian market, such as some cloud offerings.

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TIME TO LET GO OF THE BUTTER KNIFE

Although network slicing presents potential for new monetisation opportunities and efficiencies, its complexity and sprawl still pose challenges

BY PRATIMA HARIGUNANI

It may not be the next big thing after Bread Slices but it is a market worth USD 1909.5 million revenue by 2030 and could touch USD 3 billion by 2032. In 2021 alone, network slicing clocked USD 261.2 million in revenues as per ReportsandData estimates, while Future Market Insights pegs it at USD 370 million in 2022.

Put simply, network slicing happens when you start building several distinct virtualised and logical networks over a shared multi-domain infrastructure. The physical infrastructure need not be expanded but with slicing you can abstract it, slice it, and provision it for various areas as needed. The basic components are shared between networks but each slice is isolated for specific purposes.

Depending on the kind of use, latency, capacity, coverage, and throughput can be determined and dedicated for each slice. Every slice gets managed independently. Resources like computing power, storage, and bandwidth can be shared and dedicated among networks as required. You can use several tools and approaches for this to happen, like network function virtualisation, software-defined networking, automation, and orchestration. Once you can create independent logical mobile networks – network slices – on the same physical mobile network infrastructure, each slice can work like an isolated end-to-end network that can be purpose-designed for diverse requirements required by specific applications or customers.

Telcos can create several offerings, thanks to network slicing. Like an area-wide use case where slice service is enabled in an area like a factory or a campus or an airport, which would require multiple sites to be configured with specific slice configurations. It is like a time-based slice where a slice service can be created for a limited

"The potential of network slicing in monetising 5G is well understood and recognised by CSPs that have launched commercial 5G networks."

Manoj Gurnani
Chief Technology Officer and Head – Strategy, Nokia India

A BUSINESS CASE FOR TELCOS

- Enables telecom service providers to offer more customised services based on the specific needs and requirements of the customers.
- Helps increase efficiency and reduce costs by allowing multiple virtual networks to share a common physical infrastructure.
- Facilitates the deployment of new services and applications, such as IoT and 5G, by providing dedicated slices optimised for their unique requirements.
- Enables service providers to monetise their networks more effectively by offering differentiated service levels and charging customers based on usage.
- Helps to improve network resilience and security by isolating slices from each other and allowing for easier monitoring and management of network traffic.

> Slicing can allow 5G networks to truly dance well on applications like machine-type communication, URLLC, and enhanced mobile broadband delivery.

duration, to be destroyed at the end of the offering. Like Subscription-based slicing where one slice is established (for each of the DNNs the device is using) based on the subscription profile (DNN and NSSAI combinations). Like application-based slicing where policy-based slicing is put into play to match individual applications and route them to specific slices.

Nitin M Jadhav, EVP and Head – Network Services, Yotta Data Services explains that it has been demonstrated that network slicing via virtualisation is a successful method for offering adaptable and effective network services. "Virtualisation allows network functions to be implemented as software rather than hardware. This makes it easier to deploy and manage network services since they can be managed in a more agile and dynamic way. This helps and enables faster service delivery, minimal network maintenance, and lower costs since the network services can be easily deployed, managed, and updated without the need for specialised hardware changes.

WHY DOES IT WORK?

A lot is going in the favour of network slicing, according to these reports. There is a heightened need to improve mobile broadband coverage, high adoption of wireless autonomous machines to reduce business overhead costs, and the impetus to support the appropriate adoption of the Internet of Things (IoT) and other advanced technologies. Now network operators can offer differentiated services to users in user access layers near radio access networks. They can create tailor-made solutions for different clients as per their needs, network, and latency parameters. They can also tap automation and orchestration for diverse product catalogues.

Manoj Gurnani, Chief Technology Officer and Head – Strategy, Nokia India weighs in on how worldwide many Communication Service Providers (CSPs) have been piloting early use cases of network slicing. "It assures network quality for fixed wireless access (FWA) at home and specific applications like gaming, etc. The potential of network slicing in monetising 5G is well understood and

"Network slicing can fundamentally alter how network services are offered and used, giving service providers more flexibility, efficiency, and agility."

Nitin M Jadhav
EVP and Head – Network Services, Yotta Data Services

recognised by CSPs that have launched commercial 5G networks. We expect the deployment scale as well as use cases to grow in coming months."

Network slicing is of interest to most telcos, at least, to all those who are looking at growth through enterprise segments or are expanding into industry verticals, reckons Amresh Nandan, VP Analyst, Gartner. "We noted several proof-of-concept projects and trials during 2021 and 2022 by telcos in North America, Europe, and APAC regions. Since then, several telcos have started implementing network slicing in their technology stack. Some telcos such as Chinese CSPs, Vodafone, and Telia have launched network slicing-based offerings with varying degrees of applicability."

He further points out that leading telcos are investing in infrastructure and operational readiness. "At the same time, they are also working out the right productisation mechanisms for commercial readiness. As 5G SA networks get ready, we can expect more product launches," he says.

Jadhav believes that network slicing has the potential to fundamentally alter how network services are offered and used, giving service providers more flexibility, efficiency, and agility while opening up new business models and revenue streams.

"Network slices can be tailored to specific needs, such as delivering low latency, enhanced quality of service (QoS), and low data rates for one slice, while another slice is designed to provide high throughput. This ensures that the resources are used effectively, maximising the network's capabilities while delivering the desired service levels to customers. Increased flexibility and agility, better resource utilisation, and lower costs are some advantages of network slicing. With network slicing, operators can provide customised services with varying levels of service quality, dynamically allocate network resources based on demand, and optimise network performance for various business requirements."

In a report by 5G Americas 'Commercialising 5G Network Slicing' industry analysts affirm that network slicing could be a key factor in monetising 5G investments. Especially with the introduction of slicing capabilities in 5G Standalone networks. With this, CSPs can create new services and applications that will be enabled by these new capabilities. This, particularly, leverages the capability of 5G networks to deliver connectivity across the vastly different QoS requirements required by modern applications.

This is where the 'one size fits all' network model of previous generations of mobile networks will go out of relevance. Slicing can allow 5G networks to truly dance well on specific applications like machine-type communication, ultra-reliable low latency communication (URLLC), and enhanced mobile broadband delivery.

Some examples have already started showing the adoption and interest in this new paradigm. In June 2021, Orange and Nokia tried the deployment of 4G and 5G private networks with network slicing functionality. This happened at Schneider Electric's factory in Le Vaudreuil, France and, according to the companies, enabled full slice connectivity through domain controller software in the Radio Access Network (RAN), core, and transport layers.

Ericsson, Deutsche Telekom, and Samsung collaborated to deliver what they call the world's first 5G end-to-end network slicing trial. Done at Deutsche Telekom's lab in Bonn for a VR streaming game use case, the trial used two independent network slices; one with the default mobile broadband slice and an optimised slice for cloud VR gaming. The optimised slice delivers higher throughput and lower latency and demonstrated an enhanced experience on the gaming slice – even with network congestion around – as claimed.

Gurnani explains why Nokia believes that network slicing has a crucial role to play in 5G monetisation. With its now well-understood capabilities of high speed, low latency, and CUSP architecture, 5G networks are

THE MONETISATION GAME

- Enables CSPs and telcos to offer customised services to customers with specific requirements.
- Provide differentiated service levels for different use cases, such as low latency for autonomous vehicles or high bandwidth for video streaming.
- Helps telecom service providers utilise network slicing to offer virtual private network (VPN) services to businesses.
- Enables TSPs and CSPs to charge premium prices for higher quality, lower latency, or higher bandwidth services.
- Supports collaboration with other service providers to offer end-to-end network slicing solutions, such as from the core to the edge of the network.

> Specifications related to network slicing provide mechanisms to develop and evolve telcos' technology stack in a manner that remains vendor-agnostic.

designed to facilitate network slicing use cases like guaranteed FWA, URLLC, Industrial, and Enterprise guaranteed and assured services, etc. that would be key to 5G monetisation.

MONEY VS. CHALLENGES

Network slicing has the potential to be a highly profitable solution if planned and executed properly. Whether and when it can convert the technology into powerful monetisation is, however, dependent on several variables and what-ifs that can come into play.

Nandan maintains that theoretically, network slicing offers interesting opportunities to telcos and enterprises. "If done well, it can offer customer-led connectivity products which are on-demand, highly automated, and 'fit for purpose'. Therefore, it does offer opportunities to monetise differently and possibly charge for premium/enhanced services. It can become a basis for specialised connectivity products for enterprises, specific use cases in various industry verticals, greater adoption of specialised IoT use cases, etc."

"If done well, it can offer customer-led connectivity products which are on-demand, highly automated, and fit-for-purpose," says Nandan, adding that it does offer telcos and enterprises the opportunity to monetise differently and possibly charge for premium and enhanced services. "It can become a basis for specialised connectivity products for enterprises, specific use cases in various industry verticals, and greater adoption of specialised IoT use cases, etc."

Agrees Jadhav: "Network slicing delivers a powerful ability to take a portion of the physical network, perform logical isolation along with strong security, and provide a guaranteed quality of service to businesses."

But realising network slicing for enhanced monetisation is a complex task, Nandan does not dismiss the tricky parts here. "Starting with infrastructure-readiness to operational-readiness to commercial-readiness, changes are needed across most of the layers

"Network slicing is of interest to most telcos who are looking at growth through enterprise segments or are expanding into industry verticals."

Amresh Nandan
VP Analyst, Gartner

of the technology stack. At the same time, products based on network slicing would need a high degree of visibility and enhanced assurance. Making all these changes in already complex BSS and OSS stacks of telcos add to the complexity. Management issue is also about the complexity of BSS and lack of a strong service management platform for B2B and B2B2X models."

Industry reports show that slicing the RANs can be the most difficult part of deploying network slices, especially dividing and allocating a spectrum of resources called resource blocks to the Mobile Virtual Network Operators. Being designed according to the policy of slicing, and ensuring ortho-gonality among each RAN slice, those are tough areas to handle. Restricted interference from other networks can also raise issues in point-to-point connectivity with an excess of networks.

Maheswaran Shamugasundaram, Country Manager – India, Varonis puts the spotlight on some security questions that need to be tackled with the increased use of network slicing. "While network slicing offers tremendous potential, it also has its own set of hurdles, network slicing as you would agree increases network complexity thereby resulting in security implications. Every network slice based on the traffic it handles and the data it holds require unique security measures. Some of the most prevalent threat vectors in terms of network slicing are denial of service attacks, data overexposure and exfiltration risks, and a high configuration attack surface. Data isolation and protection of information used on one network by being modified by another on the same infrastructure could be a challenge."

At the same time, there are many on-ground issues like sprawl, complexity, and management problems that pop their heads only when one starts to use network slicing in reality.

Network slicing poses numerous challenges to service providers and developers due to compatibility and integration between hardware and software, avers Jadhav. "The industry is making strides towards standardisation. It, however, has to reach a common consensus with complete architectural elements. The addition of more networks over the same physical infrastructure leads to additional challenges for operators. Difficulty in maintaining SLA, QoS, and security assurance for each slice and managing the spectrum slicing and allocation for highly dynamic scenarios are among the common challenges."

Addressing the problems of sprawl, complexity, and management issues Gurnani argues that 3GPP defines a central Orchestration Centre and Assurance Centre for central management control and assurance of end-to-end slicing service across network layers. "Nokia Digital Operations (DO) Centre platform provides the central orchestration and assurance control for our end-to-end network slicing implementations."

Naresh Singh, Senior Director Analyst in Gartner Research and Advisory reasons that network slicing has not delivered the gains that were expected of it. "Just slicing anything will not help unless you can create a strong solution and a premium use-case with that slice. This solution has to come either from the Telco or the vendors. It is still early days to comment on the impact of network slicing."

He has a point. And that is not all. There are factors like vendor neutrality and multi-tenancy that are very crucial to check whether network slicing has any pragmatic ease or not, especially in the area of vendor neutrality.

"If network slices are not correctly isolated, an attack can disrupt the whole system by just infiltrating one network, and attacks on the central infrastructure can hamper multiple slices at the same time. Also, data isolation and protection of information used on one network by being modified by another on the same infrastructure could be a challenge." Shamugasundaram also reminds us that the configuration attack surface would be high considering the complexities involved

"Maintaining SLA, QoS, and security assurance for each slice and managing the allocation for highly dynamic scenarios are common challenges."

Maheswaran Shamugasundaram
Country Manager – India, Varonis

CAUSES OF CONCERN

- Vendor dominance
- Sprawl
- Complexity of management
- Visibility and control issue
- Security vulnerabilities
- Inability to tap specific slice-based opportunities
- BSS-OSS Stack complexity
- Allocation issues
- SLA, QoS, and security assurance for each slice

and lack of skills and this could result in the disablement of critical security features or system monitoring services, putting the whole system at risk.

Ask Jadhav and he argues that network slicing, in theory, is vendor-agnostic. "Network slicing is a method of creating multiple unique logical and virtualised networks over a common multi-domain infrastructure. The idea behind network slicing is to layer various virtual networks – each with its own distinct set of features and capabilities – on top of a single physical infrastructure which is achieved using Software Defined Networking (SDN) and Network Function Virtualisation (NFV) technologies."

The primary benefit of this strategy, as he translates, is that it enables network administrators to deploy and oversee numerous network slices from various vendors that are all running on a common underlying physical infrastructure. "This can reduce vendor lock-in, boost flexibility, and ease the creation of new network services. That said, in practice, network slicing may not always be completely vendor-agnostic as some vendors' proprietary SDN and NFV implementations might make it difficult to integrate their products with those of other vendors. Determining the interoperability and compatibility of various vendor solutions is crucial when designing and deploying a network-slicing architecture, even though network slicing has the potential to be vendor-agnostic.

Unravelling the vendor-agnostic challenge, Gurnani observes that network slicing standards are defined in 3GPP. "All standard implementations of Network Slicing work across vendor ecosystems. Nokia has successfully integrated our RAN, Core, and Transport slicing solutions in the multi-vendor ecosystems of CSP partners. Network slicing solutions are agnostic to single or multi-tenancy networks, as long as the underlying nodes and network architecture follow the standards."

If you mean network equipment vendor-agnostic, yes, at least theoretically, as Nandan sees it. "Network slicing-related specifications provide mechanisms to develop and evolve telcos' technology stack in a manner that remains vendor-agnostic. However, it is not a straightforward change in reality. Operational readiness demands quite a bit of change in OSS and BSS. Vendors supplying OSS and BSS solutions enable network slicing quite differently.

> Network slicing gives various tenants who share the same physical infrastructure more flexibility, performance, and security.

Network slicing-related specifications are not rigid in the way network slicing functions are implemented, which means telcos need to find the best architecture suited for their future business models."

Nandan unravels how this is the first point of complication as several telcos lack clarity on business models. "Further, the business model decision also impacts changes in BSS, for example, to enable B2B2X models. Most telcos are still grappling with automation of order management down to fulfilment. These factors have acted as impediments to faster implementation and roll out."

Multi-tenancy is a big lever for network slicing.

As Jadhav notes, in cases where it is vendor-agnostic, and multiple users or tenants share a common physical infrastructure, network slicing is better suited. "Network slicing in a multi-tenant environment enables the creation of numerous virtual networks that can be tailored to each tenant's particular needs while sharing the same physical resources. Each tenant can have their virtual network with dedicated resources and quality of service (QoS) parameters, thanks to network slicing, which can be allocated and managed dynamically in response to changing needs. This gives tenants more control over their network performance and how they deploy and manage their services and applications."

CAN AI HELP, OR NOT?

A new bright spot in this space is that of on-demand, AI-driven, or dynamic network slicing. Perhaps these new ways can underline the advantages of network slicing while erasing the cumbersome parts of it.

Network resources can be allocated and changed in real-time to meet the varying needs of various users and applications, thanks to on-demand, AI-driven, or dynamic network slicing- echoes Jadhav. "This may contribute to a more seamless and reliable user experience while lowering latency and enhancing network performance. Additionally, by automatically reallocating resources based on shifting traffic patterns and user demands, dynamic network slicing can aid in optimising network utilisation. This may help to lessen network sluggishness, increase its effectiveness, and cut down on running expenses."

However, as he warns, on-demand, AI-driven or dynamic network slicing also comes with several difficulties. "There is a need for real-time data processing and analysis, as well as for advanced analytics and machine learning algorithms. In a dynamic and ever-changing network environment, it might also be difficult to guarantee the security and privacy of network data."

In Nandan's assessment, these are the features and mechanisms to mature and evolve the operations of network slicing. We should see them as differentiating mechanisms as telcos achieve commercial success and start competing with network slicing.

WHY NOT LOSE HOPE OR ONE'S BEARINGS?

Anything new and disruptive takes time to find its footing. Telcos will need both foresight and patience to make network slicing work. They will have to watch out for the slippery ground with as much prudence as creativity they would need to unlock the true power of these slices.

As Shamugasundaram cautions, it is mandatory for the service providers who leverage network slicing to closely coordinate with enterprises and customers to maintain secure communication across different network slices and the customers should extend their data protection controls to these network slices. This will ensure the protection of the privacy of users and their critical information assets while enhancing the quality of service.

By creating isolation between various virtual networks, network slicing can also aid in enhancing security in multi-tenant environments, reminds Jadhav. "This gives better visibility and control over network traffic as well as helps to prevent unauthorised access or interference between tenants."

Once these areas are ironed out, then network slices can start enjoying the new revenue jam-and-butter that can be spread well on them. Without any pills inside.

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V&D forum highlights the future of the mobile economy

The TLF was attended by 250+ technology and business decision-makers and policymakers across the communication and broadcasting sectors.

BY V&D BUREAU

Lighting the lamp (from L to R): TR Dua, Director-General, Digital Infrastructure Providers Association; Ravi Gandhi, President and Chief Public Policy & Regulatory Officer, Reliance Jio and Retail; Akhil Gupta, Vice Chairman, Bharti Enterprises; P Balaji, Chief Regulatory & Corporate Affairs Officer, Vodafone Idea; Uma Shanker Pandey, Member (Services) of the Department of Telecom, Government of India; and Pradeep Gupta, Chairman, CyberMedia Group.

Voice&Data, India's leading communication magazine, held its 22nd Telecom Leadership Forum (TLF) on 19 April 2023 in New Delhi. Over 250 policymakers, business decision-makers, and technology professionals from telecommunications, start-ups, academia, enterprises, and the influencer ecosystem participated in the one-day conference.

Delivering the keynote address, Uma Shanker Pandey, Member (Services) of the Department of Telecom, Government of India, spoke about the immense growth of mobile technology in India and its impact on businesses, employment, and the challenges it faces. He also talked about the steps taken by the government to promote connectivity, security, and job creation while emphasising the rise of mobile commerce and digital payments in India.

Acknowledging India's challenges in terms of connectivity, especially in rural areas, the Member (Services) pointed out that access to high-speed broadband in India is limited, creating a digital divide. He further informed that the government is taking steps to meet these challenges by launching a project to provide 4G services to 25,000 villages that currently have no network and upgrading 2G/3G networks to 4G. The government is also extending mobile connectivity by adding 2,000+ towers to cover the North-East region, he added.

TELECOM LEADERSHIP FORUM

The 22nd TLF featured the presentation of the V&D Telecom Leadership Award and the V&D Excellence Awards for the year 2022.

The TLF, with the theme Future of the Mobile Economy, saw industry veterans such as Bharti Enterprises Vice Chairman Akhil Gupta, Vodafone Idea Chief Regulatory and Corporate Affairs Officer P Balaji, and Reliance Jio and Retail President and Chief Public Policy and Regulatory Officer Ravi Gandhi share insights into the trends in communication and connectivity, including 5G, satellite communications, and enterprise connectivity.

The speakers highlighted the importance of increasing average revenue per user (ARPU), collaboration on partnerships to improve the return on capital employed, and sharing infrastructure, particularly in fibre and edge datacentres. They also emphasised the need to upskill human skills to create better use cases for driving industry growth.

Other topics discussed at the conference included opportunities for the mobile ecosystem, reinventing business communication, and redefining telcos' enterprise customer experience. The forum also talked about the growth of broadband infrastructure in the 5G Era, the need to transform enterprises with Edge and private 5G, the challenges of creating the infrastructure for 5G, and Aatmanirbhar Bharat 3.0. Speakers also deliberated on satellite-based communication networks, the hype and reality around satcom, the role of the mid-band spectrum in augmenting 5G, and the challenges of creating the infrastructure for 5G.

Several prominent speakers attended the TLF, including Dr R S Sharma, Former Chairman, TRAI and Former CEO, NHA; Dr Kumar Sivarajan, Co-founder and CTO, Tejas Networks; Mayank Bidawatka, Co-Founder, Koo; Dr RK Upadhyay, CEO, C-DOT; Shivaji Chatterjee, Executive Vice President, Enterprise and Government Business Hughes Communications India; Prateek Pashine, President-Enterprise Business, Reliance Jio; Arun Karna, Managing Director and CEO, AT&T India; Himanshu Gupta, Country Manager – Telecom, Media, and Entertainment (CME), HPE; Anil Jain, CEO, NIXI; P Balaji, Chief Regulatory and Corporate Affairs Officer, Vodafone Idea; Pankaj Kitchlu, Systems Engineering Director, Juniper Networks; and Aveek Roy, Vice President of International Sales – IMEA, Sangoma.

The list also includes Dharmender Khajuria, National head, Network Partnership, Airtel; Sheena Joseph, National Head-Customer, Enterprise Business, Vi; Rashim Kapoor, Head Core and Hub CTO, Airtel; Lt. General AK Bhatt (Retd), Director General, ISpA; Tilak Raj Dua, Director General, DIPA; Arvind Bali, CEO, TSSC; Prof NK Goyal, President, CMAI Association of India & Chairman Emeritus, TEMA; Rajat Mukarji, Director-General, BIF; Arpita Paul – Managing Director, Communications, Media and Technology, Accenture India; Aditya Khaitan, Partner, Deloitte India; Jaideep Ghosh, COO, Shardul Amarchand Mangaldas & Co; Dr SN Gupta, Chairman of the Board, Bluetown India and BIMSTEC, South Asia; Umang Das, Chairman, FIIF and Advisor, RANext; and Ashish Garg, Senior Manager – Spectrum and Policy, South Asia and APAC, GSMA

THE V&D AWARDS

The highlights of the event included the presentation of the Telecom Leadership Awards and the V&D Excellence Award for the year 2022. The Telecom Person of the Awards for 2022 was conferred upon the enablers of Made in India 4G Stack, jointly to TCS, C-DOT, Tejas Networks, and BSNL. The Pathbreaker of the Year was given to Made in India social media platform Koo while the Lifetime Achievement Award was conferred upon former NHA CEO Dr RS Sharma.

The V&D Excellence Award is an industry recognition based on nomination and through an internal evaluation process of the V&D team. The awards were presented to 19 companies for their initiatives and excellence in different aspects of business, including processes, infrastructure, networking, customer service, security, skilling, enterprise solutions, and innovation.

The TLF was powered by HPE and PC Solutions, and supported by Gold Partners Juniper Networks and Sangoma, Telecom partner Vodafone Idea Limited, Digital Partner NIXI, Connectivity Partner AT&T Business, Academia Partner Apeejay Education, Research Partner CyberMedia Research, and Media Partner Dataquest. It was also supported by the Broadband India Forum, CMAI, Digital Infrastructure Providers Association, Indian Space Association, TEMA, and Telecom Sector Skill Council of India.

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V&D Excellence Awards 2022

Reliance Jio Infocomm Limited
For deploying the world's largest 5G SA core network, supporting 120 million customers and 88 Tbps of user traffic across India.

Himanshu Gupta, Country Manager – Telecom, Media & Entertainment (CME), HPE (in the centre) presenting the V&D Excellence Award to the team from Reliance Jio Infocomm Limited. (From L to R) Adityakar Jha AVP – 5G Core & R&D; Deepak L Gupta, AVP – Product Development; Ashish Bhatnagar, Sr. Product Manager; and Narender Kumar – AVP, 5G Radio Solutions.

Himanshu Gupta, Country Manager – Telecom, Media & Entertainment (CME), HPE (in the centre) presenting the V&D Excellence Award to the team from Reliance Jio Infocomm Limited. (From L to R) Adityakar Jha AVP – 5G Core & R&D; Deepak L Gupta, AVP – Product Development; Ashish Bhatnagar, Sr. Product Manager; and Narender Kumar – AVP, 5G Radio Solutions.

Reliance Jio Infocomm Limited
For its innovative E2E 5G software stack, including 5G/4G Combo Core, software-defined radios, and cloud-native OSS/BSS to powered Jio's 5G roll out in India.

Bharti Airtel
For rolling out 5G services in over 600+ cities, culminating in the largest and most comprehensive footprint of 5G in urban India.

Sawan Gupta, SVP – Wireless Strategy & Head – 5G Experience, Bharti Airtel Limited (right) receiving the V&D Excellence Award on behalf of his company from Himanshu Gupta, Country Manager – Telecom, Media & Entertainment (CME), HPE.

ENTERPRISE BUSINESS SOLUTION

Vodafone Idea Limited
For cloud-based Vi Business Hub, which transformed the way Vi Business services interact with customers, improving speed to market, CX, and analytics.

Ashish Bhat, Cluster Solutions Head, Vodafone Idea Limited (right) receiving the V&D Excellence Award on behalf of his company from Himanshu Gupta, Country Manager – Telecom, Media & Entertainment (CME), HPE.

NETWORK INFRA

Reliance Jio Infocomm Limited
For creating a massive infrastructure comprising an 11-lakh km fibre network, 2.95 lakh+ towers, and 3 lakh+ NBIoT-enabled base stations.

Dhiraj Sharma, Senior VP – Technology & Automation, Reliance Jio Infocomm Limited (right) receiving the V&D Excellence Award on behalf of his company from Himanshu Gupta, Country Manager – Telecom, Media & Entertainment (CME), HPE.

SKILLING

Telecom Sector Skill Council (TSSC)
For setting up a CoE at NIT Patna to provide high-end courses in IoT technology, passive infrastructure, and network-managed services.

(From L to R) Himanshu Gupta, Country Manager – Telecom, Media & Entertainment (CME), HPE presenting the V&D Excellence Award to the team from Telecom Sector Skill Council (TSSC); Arvind Bali, CEO; Astha Katyayan, Manager; and Gaurav Sharma, General Manager.

IoT SERVICES

Vodafone Idea Limited
For setting up a state-of-the-art Internet of Things (IoT) lab to test and certify IoT devices, modules, SIMs, and applications using common standards.

Raunak Bhagwani, AGM, Vodafone Idea Limited (right) receiving the V&D Excellence Award on behalf of his company from Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India.

DATACENTRE SERVICES

NTT GDC & CI Pvt. Ltd
For deploying Liquid Immersion Cooling technology at its Navi Mumbai datacentre, a first in India, to boost thermal efficiency and provide green services.

Shekhar Sharma, CEO – NTT GDC & Cloud Infrastructure India Private Limited (right) receiving the V&D Excellence Award on behalf of his company from Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India.

NETWORK SOLUTION

AT&T Global Network Services India Private Limited
For developing vendor-agnostic VNF Service Chaining capability to enable ease of consumption and provide self-service capabilitiesfor enterprise users.

Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India (left) presenting the V&D Excellence Award to the team of AT&T Global Network Services India Private Limited led by Arun Karna MD & CEO (right) and Sukhjit Singh, CTO & Technical Director (in the centre).

BUSINESS PROCESS INNOVATION

Vodafone Idea Limited
For Project Bill of Entry (BOE) that created a repository of 79K+ mandatory import documents to handle custom-relate DRI Audit requirements.

Amrin Aziz Desai – SCM Compliance Specialist, Vodafone Idea Limited (right) receiving the V&D Excellence Award on behalf of her company from Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India.

IoT PLATFORM

Reliance Jio Infocomm Limited
For developing a hyper-scalable IoT platform with AI-powered operational insights, remote diagnostics, predictive maintenance, and compliance.

Ritu Mandal, Business Development Manager, Reliance Jio Infocomm Limited (right) receiving the V&D Excellence Award on behalf of her company from Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India.

NETWORK SERVICES

SANGOMA
For its innovative and effective contact centre solutions, and helping the Indian defence forces to maintain their agility by providing them a platform which can connect to the modern IP network enabling connectivity directly to the field of operations.

Aveek Roy, VP International Sales – IMEA & ASEAN, Sangoma (right) receiving the V&D Excellence Award on behalf of his company from Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India.

Vodafone Idea Limited
For Vi-business – Mobility, an enterprise digital self-help platform that enables customers directly manage their telecom experience and increases employee productivity.

(From L to R) Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India presenting the V&D Excellence Award to the team from Vodafone Idea Limited; Avni Malaviya, VP – Service Capability, Enterprise and Sunaina Sehgal, GM, Service Assurance.

Digital Infrastructure Providers Association (DIPA)
For its relentless efforts and coordination with the government to streamline the implementation of DoT RoW Rules across states in India.

TR Dua, Director-General, Digital Infrastructure Providers Association (right) receiving the V&D Excellence Award on behalf of DIPA from Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India.

Tata Communications
For project MPowered to facilitate digital, social, and financial inclusion of 1,800 ultra-poor women from four districts in Odisha and Jharkhand.

Shaurya Patel, CSR Manager & Advocacy and Inclusion Lead, Tata Communications (right) receiving the V&D Excellence Award on behalf of his company from Sanjay Sharma, Senior VP, Sales, Accolite Digital.

Reliance Jio Infocomm Limited
For JioRaksha managed security services portfolio that mitigates sophisticated cyber-attacks across on-premises and multi-cloud environments.

Salil Mittal, Head- Cybersecurity, Reliance Jio Infocomm Limited (right) receiving the V&D Excellence Award on behalf of his company from Sanjay Sharma, Senior VP, Sales, Accolite Digital.

Infinity Labs Ltd
For InfiBharat encryption protocol using Poly1305 and Chacha20 designed especially to meet security needs of high throughputs and low latency of 5G.

(From L to R) Sanjay Sharma, Senior VP, Sales, Accolite Digital presenting the V&D Excellence Award to the team from Infinity Labs Ltd; Ajay Sharma, VP – CX and Yougender Grover, CDO.

Genie Networks
For enabling carrier-grade anti-DDoS solution adoption by Service Providers to ensure cost-effective, network-wide protection of their networks

Sameer Baweja, Director – Sales (India, SAARC & MEA), Genie Networks Limited (right) receiving the V&D Excellence Award on behalf of his company from Sanjay Sharma, Senior VP, Sales, Accolite Digital.

SKILLING

Vodafone Idea Limited
For V! Maitree initiative to train and empower 147 female employees of third-party logistics partners through upskilling and capacity building.

Kalrav Patel, Training Specialist – SCM, Vodafone Idea Limited (right) receiving the V&D Excellence Award on behalf of her company from Sanjay Sharma, Senior VP, Sales, Accolite Digital.

ENTERPRISE BUSINESS SERVICES

Tata Tele Business Services
For enabling the digital transformation of SMBs through product and process innovations across ICT, including connectivity, collaboration, cloud, and security solutions.

(From L to R) Sanjay Sharma, Senior VP, Sales, Accolite Digital presenting the V&D Excellence Award to the team from Tata Tele Business Services; Sumeet Pahwa, GM – Brand Marketing; Ravi Nagpal, GM – Contact Experience; and Harpreet Bhinder, Head Customer Services.

BUSINESS PROCESS SOLUTION

Tata Tele Business Services
For eNXT, an auto-routing and ticket generation platform, that enables quick response and faster turn-around time to address customers' requests.

(From L to R) Sanjay Sharma, Senior VP, Sales, Accolite Digital presenting the V&D Excellence Award to the team from Tata Tele Business Services; Ravi Nagpal, GM – Contact Experience; Harpreet Bhinder, Head Customer Services; and Sumeet Pahwa, GM – Brand Marketing.

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[REPORT]
TLF 2023

LEO, 5G-SA, and AI are shaping the TMT sectors

Emerging markets and cutting-edge technologies are changing the technology, media, and telecommunications sectors. Here is how

BY JOSUN JN

Deloitte India's Aditya Khaitan provided valuable insights into the latest trends and forecasts shaping the technology, media, and telecommunications (TMT) sectors during a keynote address at the Voice&Data Telecom Leadership Forum. With his extensive consulting experience in the telecommunications industry, Khaitan shared his expertise on emerging markets and cutting-edge technologies, offering key predictions for the industry.

One of the trends discussed was the growth of Low Earth Orbit (LEO) satellites globally. Khaitan projected that the number of LEO satellites would exceed 5,000 by the end of 2023, with expectations of 7 to 10 networks operating 40,000 to 50,000 satellites by 2030. In India, the broadband satellite market is predicted to reach USD 1.9 billion by the end of 2023, attracting multiple players vying for licenses. He emphasised the importance of enhanced license approval frameworks, faster spectrum allocation, cybersecurity measures, and space situational awareness to ensure the success and safety of satellite operations.

THE RISE OF 5G STANDALONE NETWORKS

Another significant topic discussed was the deployment of 5G standalone networks. While non-standalone networks offer a cost-effective and faster deployment option for telcos with existing legacy networks, Khaitan

> By the end of 2023, nearly 200 operators are expected to invest in standalone networks, offering network slicing and unlocking additional use cases.

highlighted the increasing prevalence of standalone networks globally. By the end of 2023, approximately 200 operators are expected to invest in standalone networks, offering network slicing and unlocking additional use cases, particularly in the enterprise sector. In India, there is an ambitious roadmap for 5G deployment, with over 4,000 cities targeted to be covered by March 2024 and an estimated capital expenditure of over USD 10 billion by telcos.

AI DRIVES THE SEMICONDUCTOR SPACE

Khaitan also touched on the role played by Artificial Intelligence (AI) in revolutionising semiconductor technology. He emphasised the use of AI tools by semiconductor providers to optimise chip design, allowing for more transistors to fit into smaller spaces. Spending on AI tools by semiconductor manufacturers is projected to reach USD 300 million in 2023, doubling to USD 500 million by 2026.

These advancements have led to accelerated chip flow designs and reduced chip sizes while maintaining performance levels. In India, the semiconductor market is expected to reach USD 55 billion by 2026, driven by the demand for smartphones, wearables, automotive applications, and data storage.

CONVERGENCE OF CLOUD AND EDGE COMPUTING

The convergence of Cloud and Edge Computing was another key topic discussed. With the exponential growth of connected devices and data, Khaitan predicted 150 billion connected devices transferring 175 zettabytes of data by the end of 2026. To address the challenges of transmitting such vast amounts of data to the cloud, the convergence of cloud computing and edge computing is becoming crucial.

The strategy, Khaitan, pointed out involves bringing the Cloud closer to end-users, leveraging Edge Computing to deliver enhanced performance and cater to specific use case requirements. The enterprise edge market has experienced a 20% global growth rate, surpassing network equipment spending and IT spending. Telecom service providers, original equipment manufacturers, and hyper scalars are collaborating to harness this opportunity and develop use cases.

Aditya Khaitan's keynote address provided industry professionals with valuable insights into the latest trends and forecasts in the TMT sectors. His expertise in emerging markets and cutting-edge technologies shed light on the growth of LEO satellites, the deployment of 5G standalone networks, advancements in semiconductor technology, and the convergence of cloud and edge computing. These trends are set to shape the future of the telecommunications industry in India and globally.

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Gearing up for the future mobile economy

With a focus on connectivity, infrastructure, security, and skill development, India is poised to unlock the full potential of the mobile economy

BY JOSUN JN

Acknowledging India's challenges in terms of connectivity, especially in rural areas, Uma Shankar Pandey, Member (Services), Department of Telecom, Government of India said that access to high-speed broadband in India is limited and is creating a digital divide. Speaking at the 22nd Voice&Data Telecom Leadership Forum (TLF) recently, he further informed that the government is taking steps to meet these challenges by launching a project to provide 4G services to 25,000 villages that currently have no network and upgrading 2G/3G networks to 4G. "The government is also extending mobile connectivity by adding 2,000+ towers to cover the North-East region," he added.

The Member (Services) also spoke about the immense growth of mobile technology in India and its impact on businesses, employment, and the challenges it faces. He also shed light on the driving factors behind this growth, the challenges faced, and the government initiatives taken to bridge the digital divide and support the industry's development.

Pandey began by discussing the current state of the mobile economy in India, emphasising its significance as the world's second-largest mobile market. With over 1.14 billion mobile phone customers and approximately 816 million people having access to mobile broadband, the mobile economy has become a critical driver of growth and development in the country. It has enabled access to various services like banking, healthcare, and education, particularly in remote areas. According to GSMA, the mobile ecosystem contributes around 5% to India's GDP and supports millions of skilled jobs, while also generating substantial tax revenue.

DRIVING FACTORS OF THE MOBILE ECONOMY

The growth of the Internet, coupled with the increased availability of affordable smartphones and cheaper data plans, has been instrumental in driving the mobile economy in India. The rise of mobile commerce, digital payments, and mobile-first business operations has transformed the way businesses operate and engage with their customers.

> The growth of the Internet, availability of affordable smartphones, and cheaper data plans have been driving the mobile economy in India.

The growth of the app industry and the adoption of emerging technologies like Edge Computing, sensor-based ecosystems, and Industry 4.0 are further fuelling the mobile economy's expansion and generating new opportunities for entrepreneurs and businesses.

OPPORTUNITIES AND CHALLENGES

Pandey highlighted the vast array of opportunities that lie ahead in the mobile economy. He emphasised the potential for innovations in areas such as health monitoring, telemedicine, mobile commerce, and mobile-first business models. However, he also acknowledged the challenges that need to be addressed, including limited mobile connectivity in rural areas, infrastructure requirements, security and piracy concerns, and the digital divide between urban and rural populations.

The Member (Services) also talked about the initiatives taken up by the Government of India to overcome these challenges and support the growth of the mobile economy. He shared key initiatives, such as the Universal Service Obligation Fund projects, aimed at providing connectivity to underserved areas and villages. These projects involve the establishment of thousands of mobile towers and the provision of 4G mobile services to over 25,000 villages, with additional upgrades in several districts.

Pandey also highlighted the government's focus on job creation and skill development in the mobile sector. Through collaboration with state governments and the Telecom Sector Skill Council, the government is providing training programs tailored to the specific needs of each district. This initiative aims to train thousands of individuals and create employment opportunities in the rollout of 4G and 5G technologies.

Additionally, the government has introduced policies to expedite the Right-of-Way clearance process for setting up mobile towers, reducing the time required for approvals. Pandey shared a successful case from Madhya Pradesh, where a state-specific policy streamlined the clearance process for towers located in forest areas, ensuring faster implementation.

The keynote address shed light on the remarkable growth of the mobile economy in India and the government's initiatives to bridge the digital divide and support its expansion. With the government's focus on connectivity, infrastructure, security, and skill development, India is poised to unlock the full potential of its mobile economy, contributing to the nation's GDP.

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What is next for the telcos?

What should the telcos do to make the most of 5G and digitalisation while cutting down costs and collaborating with the competition? New questions. New answers

BY PRATIMA HARIGUNANI

(From L to R): Ravi Gandhi, President and Chief Public Policy & Regulatory Officer, Reliance Jio and Retail; P Balaji, Chief Regulatory & Corporate Affairs Officer, Vodafone Idea; Akhil Gupta, Vice Chairman, Bharti Enterprises; and Pradeep Gupta, Chairman, CyberMedia Group.

Where do we go from here and what new turns and potholes await us? This fireside chat at TLF 2023 tried to find exactly that. It was moderated with a new GPS acumen by Pradeep Gupta, Chairman, CyberMedia Group. He steered the panel into some bold questions and tangents.

He asked Akhil Gupta, Vice Chairman, Bharti Enterprises to dig into the aspect of Satellite Communications – as an evolutionary turn for the industry. Akhil Gupta explained, "I am astounded at the way lower-orbit constellations are developing, especially how the costs here are significantly lower than those in the Western economies. It's a big race between terrestrial and satellite as we move from 4G to 6G. But as we go forward, a lot of complimentary equations will come with satellite as a backup. This will be good for far-flung, low-density areas like the mountainous and rural regions."

P Balaji, Chief Regulatory and Corporate Affairs Officer, Vodafone Idea unravelled the enterprise side of the industry next. "A lot of solutions and revenue streams have come in. We are getting an understanding with many pilots in factory automation, education and customer intimacy drivers. With virtualisation and digitalisation, there is a significant growth in opportunities in the last few years and it will grow very strongly in the next five to seven years. On customer dimensions, 5G has not given revenues yet anywhere in the world but on the

> To survive, the industry needs higher ARPUs, lower per GB price, strong use cases, sufficient investments and robust returns on capital employed.

enterprise side, revenue jumps and cost reductions are both promising."

THERE ARE NO BOUNDARIES

Ravi Gandhi, President and Chief Public Policy and Regulatory Officer, Reliance Jio and Retail admitted that 5G use cases are yet to shape up well. "With low-latency, edge computing and network slicing, it can support a lot of possibilities across verticals. It's like we have created the highway and now we are waiting for users to come. That will lead to revenue."

Gandhi also highlighted that while 4G use cases were e-commerce and aggregation, which pushed the ecosystem five-seven years back, 5G, will see different use cases and a lot of start-ups in the Internet of Things, Machine Learning, and Artificial Learning space. "One phenomenon worth noting is the convergence, both at the network layer and service layer. Old-generation networks were different and in the next few years, we will see the death of boundaries. We will see boundaryless networks and the driver for the economy would be the device in a person's hand."

He also stressed that India's rural penetration is way better than other regions in the world. India is also very well-seated on digital infrastructure, other panellists averred. The panel also talked about structural and policy reforms and the government's role in the industry. There were also musings on how all four players need to survive together and help in the country's vision collaboratively. "We don't need to just survive but thrive," the panellists agreed.

And for that to happen, the industry needs higher ARPUs, a reduction in price per GB, strong use cases with rich monetisation, sufficient investments and robust returns on capital employed. Reduction of costs can come from sharing of infrastructure, leveraging fibre, and policy changes like spectrum charges, and reduction in taxes. The industry also needs new skills and competencies as well as using AI, ML etc. in the right way. Indians have demonstrated the ability to unlearn and relearn- that's the strength of our nation, underlined Balaji.

Innovative start-ups, customer intimacy strides, collaborations, and new enterprise revenue streams are the way forward.

As a panellist rightly said, it is about time.

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Satellite communication to bridge India's digital divide

India needs active collaboration between the space and telecom sectors to become a truly digital economy

BY JOSUN JN

"The satellite-based communication networks have a huge potential that can transform India into a truly digital and developed economy," said Lt Gen AK Bhatt, Director General of Indian Space Association (IsPA), adding that the space and the telecom sectors need to collaborate to tap the opportunity. He was speaking at the recently held Voice&Data Telecom Leadership Forum in New Delhi.

Delivering the Industry Keynote, Lt Gen Bhatt highlighted the current state of the space industry in India, drawing parallels to the mobile communication sector 25 years ago. He stressed the importance of catching up with the advancements in space technology and expressed his belief in the power of satellite communication to bridge India's digital divide.

Established on the Prime Minister's directive in 2021, the IsPA serves as the unified voice of the Indian space industry and Lt Gen Bhatt outlined the association's focus areas, including fostering international partnerships, building capacity and knowledge, and facilitating industry collaboration with the strategic sector. He also highlighted the close collaboration between the Indian Space Research Organisation (ISRO), the recently established Indian Space Regulatory Agency, and Newspace India Limited, a public sector company responsible for commercial space activities under ISRO.

One of the key challenges addressed by Lt Gen Bhatt was the lack of connectivity in remote areas, with 63% of India still remaining unconnected or experiencing poor connectivity. He underscored the role of satellite communication in providing connectivity to these underserved regions, thereby enabling the digital transformation of the entire country. Citing a World Bank study, he emphasised that a 10% increase in broadband penetration could result in a substantial boost to India's

> By retaining the 28 gigahertz spectrum for satellite communication, India could align itself with international standards and promote global cooperation.

GDP. According to the study, for every 10% increase in broadband penetration, the GDP would grow by 0.8 to 1.5%.

To make satellite communication a viable enabler for India's digital growth, Lt Gen Bhatt proposed several essential measures. Firstly, he suggested the extension of Universal Service Obligation funds, currently allocated for the telecom sector, to also support satellite companies. Secondly, he emphasised the significance of globally harmonised policies, particularly in terms of spectrum allocation. By retaining the 28 gigahertz spectrum for satellite communication, India could align itself with international standards and promote global cooperation in this burgeoning sector.

He also shed light on the forthcoming Indian Space Policy 2023, which aims to foster the promotion and development of the space industry in India. The policy will create opportunities for non-government entities, including industry and startups, to engage in space activities. It will establish clear roles and responsibilities for various stakeholders, including the Indian Space Association and the Indian Space Regulatory Agency. The policy will encompass satellite-based communication, remote sensing, navigation services, space situational awareness, and more.

Addressing the ongoing discussions surrounding spectrum allocation, Lt Gen Bhatt emphasised the necessity of administrative authorisation rather than auctioning, considering the unique characteristics of satellite communication. With multiple users sharing the same spectrum, an auction-based approach would be challenging to implement effectively. Administrative authorisation, on the other hand, would provide the necessary support for the space industry to thrive and ensure long-term benefits for the nation.

Concluding his Keynote, Lt Gen Bhatt called for the telecom industry's support in nurturing the space domain as a co-traveller. He emphasised that India's robust space programme positions the country as a global leader, offering commercial opportunities for satellite communication. "By leveraging this advantage and increasing its share of the global space economy, India can achieve greater digital inclusivity and reinforce its position as a global player in the space sector," he summed up.

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Reinventing Business Communication

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Mid-band Spectrum to Augment 5G and beyond

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Redefining communication for the next-gen business

Enterprises need to reinvent communication with new solutions and tailored tools to help the business adapt and thrive in the evolving digital era

BY PRATIMA HARIGUNANI

With 14 years of responsibility in strategic positions, Aveek Roy, Vice President of International Sales – IMEA, Sangoma has a unique view of the ever-changing landscape of this industry. He used it well as he outlined his keynote at TLF 2023 with a thought-provoking big picture on how the business is being 'redefined'.

"The world is changing. Previously, travel was a common phenomenon, but now everything is moving to WFH and hybrid work models. We are allocating our resources in a different manner, as per a new work culture. Technology has to connect people sitting in villages, hill stations, and big cities, irrespective of geography," he said highlighting the changing role of technology.

He also pointed out that while size mattered earlier, like big phones, the digital era has brought in a change. "As the screen size gets bigger, the device gets smaller," he explained adding that even as the average cost per MB is becoming lower, the telcos' ARPU cannot become lower. "We need to find ways to increase consumption – like we see how video consumption is increasing," he stressed.

Roy spelt out how to go about these new shifts.

DATA IS THE TRUMP CARD

"We should make communication so transparent and easy so that people get rid of friction. Gradually all the bandwidth is becoming a pipe. Data is the new revenue,"

> Businesses need a robust infrastructure to fully enable cloud telephony and benefit from complete cloud solutions.

he explained. Further highlighting the significance of data as the new revenue source he outlined several key components for the future of business communication. "These components include VoIP, remote extensions, video and presence capabilities, workflow availability, bots, contact centres, and enhanced customer relationship management or CRM integrations. Roy acknowledged the transition from traditional PBX systems to a complex world with new capabilities, where more complexities are being added over time.

Moreover, Roy discussed the changing needs of customers in this evolving landscape. He emphasised the importance of security, SD-WAN, and tailored solutions for different locations. Different enterprises require different tools and services such as DaaS, contact centres, and collaboration applications.

He highlighted the benefits of soft clients, video meetings, CRM connectors, multiple application stores, and DaaS. However, he noted that these services may not be available to enterprises still relying on old telephony systems. As businesses migrate to IP-based solutions, their consumption patterns change and their bandwidth requirements evolve. "It is important to make the right choice based on the unique needs. Today, there are multiple options including Cloud, VoIP, and UCaaS and one needs to plan as per the future goals of the organisation."

While discussing the advantages of VoIP and cloud solutions, Roy also acknowledged potential challenges such as limited bandwidth availability and data security concerns. He emphasised the need for a robust infrastructure to fully enable cloud telephony and highlighted the importance of choosing between on-premise and complete cloud solutions based on the criticality and security requirements of the work.

He emphasised the goal of fast-tracking the transition of enterprises to IP-based solutions and providing them with tools that were previously limited to a select few due to cost or access factors. He emphasised the need to support all enterprises in leveraging technology to increase consumption and drive their businesses forward.

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Fuelling the growth of 5G and beyond

India can harness the power of 5G and unlock its economic benefits by addressing the spectrum requirements and nurturing the ecosystem

BY JOSUN JN

"There is a need for additional spectrum to meet the increasing demands of the mobile sector in India," said Ashish Garg, Senior Manager – Spectrum and Policy, South Asia and APAC, GSMA. Speaking at the Voice&Data Telecom Leadership Forum, he highlighted the importance of the mid-band spectrum in augmenting 5G and beyond. He also shared insights and experiences from the GSM Association (GSMA).

GROWING ADOPTION OF 5G

Garg began by highlighting the rapid global adoption of 5G technology. As of December 2022, around 237 operators in 91 markets had already launched 5G services. While North America and Europe are expected to witness the highest percentage of adoption, the Asia Pacific region, particularly India, will lead in terms of the number of 5G connections. Garg emphasised that India, despite being the 88th country to launch 5G services, is catching up quickly and is poised to make significant strides in 5G adoption.

Garg shed light on the status of low-band, mid-band, and high-band spectrums and their respective roles in supporting 5G. While the low-band spectrum provides coverage and the high-band spectrum offers high capacity, the mid-band spectrum stands out as the hero of 5G. Its unique characteristics make it ideal for 5G rollouts,

With extensive trials and launches demonstrating its unique characteristics and effectiveness, the mid-band spectrum is ideal for 5G rollout.

with extensive trials and launches already demonstrating its effectiveness. Garg stressed the importance of the mid-band spectrum in achieving the economic impact projected for 5G technology.

To cater to the future needs of 5G, Garg highlighted the requirement for an additional mid-band spectrum. According to a study conducted by GSMA intelligence, each market will need 2 GHz of mid-band spectrum by 2030. This spectrum allocation is crucial to unlocking the full potential of 5G and realising its economic benefits. "However, without the allocation of this additional spectrum, the expected benefits of 5G to the economy could be significantly reduced," he stressed.

ROLE OF THE 6 GHZ BAND

Garg emphasised the significance of the 6 GHz band in meeting the spectrum needs for 5G. With its vast capacity and similarities to the already allocated 3.5 GHz band, the 6 GHz band is well-suited for faster and cost-effective 5G rollouts. Garg advocated for its availability, citing its potential to boost the development of the 5G ecosystem, including device manufacturers and infrastructure providers.

Talking about the challenges and the market outlook, he pointed out that while some markets have already accounted for the required mid-band spectrum, there were challenges in making it available universally. "In the case of India, the coexistence of 4G and 5G connections until 2030 poses difficulties in reassigning existing spectrum bands," he said. He also emphasised the importance of accessing the 6 GHz band to fulfil the mid-band spectrum needs effectively.

Garg's keynote shed light on the crucial role of the mid-band spectrum in augmenting 5G and beyond. As 5G adoption continues to grow globally, it becomes imperative for governments and regulatory bodies to allocate additional spectrum to support the evolving needs of the mobile sector. The availability of the 6 GHz band, in particular, holds tremendous potential in facilitating faster and cost-effective 5G rollouts. By addressing the spectrum requirements and nurturing the 5G ecosystem, countries can harness the transformative power of 5G technology and unlock its substantial economic benefits.

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The Rx for transformation is CX

Telcos need to understand the changing enterprise business landscape and come up with new products and services to stay relevant in the market

BY PRATIMA HARIGUNANI

(From L to R): Anil Chopra, VP and Head, CyberMedia Research; Arun Karna, Managing Director & CEO, AT&T India; Dharmender Khajuria, National head, Network Partnership, Bharti Airtel; Himanshu Gupta, Country Manager – Telecom, Media & Entertainment (CME), HPE; Sheena Joseph, National Head-Customer, Enterprise Business, Vodafone Idea; and Tilak Raj Dua, Director General, DIPA.

A panel at TLF 2023 dissected many new-age factors like creating the foundation of secure, agile, and adaptable networks; adoption of multi-access edge computing; use of automation and AI, analytics, and programmable software capabilities; and providing an immersive experience.

Moderator Anil Chopra, VP and Head, CyberMedia Research set the ball rolling on a lot of these issues. He asked the most important question first – What does the customer want, especially after the changes in the last 2-3 years, with an explosion of data volume, and new possibilities with the 5G?

SPEED OF RETAIL, CLASS OF ENTERPRISE

Arun Karna, Managing Director and CEO, AT&T India answered that first by painting a picture; thanks to the rapid adoption of digital technologies, enterprises have got more distributed and expanded to the edge. "The WFH environments have also increased the need to provide secure and reliable access for enterprise applications. And these applications reside mostly in the Cloud. So, there is a push towards multi-cloud environments and SaaS-based apps, which is creating a new complexity and dynamic scenario," he said.

"This is the perfect storm with some fall-out effects like rampant security concerns, a vast threat surface, rising customer expectations, and the need for instant access in enterprise scenarios. Cloud providers, collaborative providers and hyper-scalers are the new competition for telcos. Hence, telcos have to frame their strategies differently, as a network-centric technology solutions provider."

> There is a push towards multi-cloud environments and SaaS-based apps, which is creating a new complexity and dynamic scenario.

He explained how telcos need to come up with a different set of product and service mixes and rethink customer and supplier relationships, invest more and more in innovation, upskill technology function, invest in platform-centric businesses – and make the customer experience better, simpler and more intuitive.

This could call for the opening of APIs while making services and networks compliant and secure. This could also mean adding more value-addition and integrated services, he stressed.

In the reckoning of Himanshu Gupta, Country Manager – Telecom, Media and Entertainment, HPE, digital transformation in the telco space can be explained better with what HPE did. "Our CEO in 2018 announced an as-a-service or aaS paradigm for our solutions. We moved towards a hybrid world with a lot of confidence and vision. Today, we can offer everything on a well-executed model," he said.

"We have been making many acquisitions at a great pace in the last few years. We saw three big waves coming: Edge, data and Cloud. We have tried to build the right data fabric and Green Lake journey in light of the new imperatives. Telcos are good at providing connectivity, security, cost optimisation etc. but they need a simplified Cloud experience to empower them. There is a huge wave coming up on data, Cloud and Edge, and every element has to be very smartly managed with that mindset," Gupta pointed out.

NEW WORLD, NEW PROBLEMS

Just the sheer availability of data is so vast that a lot of solutions can be built just on data- strongly offering insights to customers, as Sheena Joseph, National Head – Customer, Enterprise Business, Vi pointed out. "Like proactive solutions with analytics on networks, optimising networks, building products and solutions for weekend-rollover data, one can also use 'mean time before failures' to suggest better options. From a solution and product proposition also, Cloud has become very intrinsic and analytics can help in making on-demand solutions. Customising solutions as per a client's requirements is a key differentiator now."

She also highlighted that there are several solutions available in a huge variety, from SIM-card-based traffic tracking to Cloud-based answers to various mining solutions. "It all depends on how we build use cases for different needs."

Customer segmentation can help a company decide on what solutions will work. "Data points can help a lot in engaging and retaining customers, especially with usage patterns and analytics, seconded Dharmender Khajuria, National Head, Network Partnership, Airtel. He also outlined how the company is partnering with hyper-scalers and new technologies to create integrated solutions.

Khajuria also addressed the issue of rising network complexity in this panel. "Enterprises today are of different kinds – from a bank branch to a mining firm – and this adds to the complexity. Connectivity, whether 4G, 5G, or 6G has to be reliable. Then comes the question of cost. In this dynamic world, no one wants to see costs rise. This adds to the challenges of a telco. At the same time, security has to be kept intact."

He pointed out that for a telecom service provider, it is important to scale as per the demand. "Getting fibre to new locations is a huge challenge, particularly while abiding by the existing rules and regulations. It is not easy for telcos to serve enterprise customers that have high expectations and support needs. In the case of an enterprise, any small flip can mean a lot for the business of the enterprise. Giving integrated solutions, instead of piecemeal answers, can be complex but a positive opportunity if a telco can partner with the right experts," he explained.

Chopra then spurred the panel to dwell on new trends like multi-access edge computing.

"Multi-access Edge computing is a subset of edge computing and is a specific standard framework. Hence, it should not be loosely used. It is a very robust framework. For the last eight years, new phases are being developed to make it all easy and lucid for the industry," Gupta pointed out.

> TSPs are good at providing connectivity, security, and cost optimisation but they need a simplified Cloud experience to empower them.

"This model can be deployed as a local model or as a hybrid model or with hyperscalers. If telcos put their act together and address technical and operational challenges as well as privacy and data concerns and monetisation de-risking, they can get strong here. A lot of good examples are seen in North America and South Korea. It is an evolving field and not every telco has taken it as a key step. There are roadblocks to be crossed but also a great opportunity," he further said.

Karna added how integration with 5G and ecosystem play can work wonders here. Should 5G be the chicken or the egg here with the MEC opportunity? It is a good debate, but for some other day, the panel concurred.

CUSTOMER-CENTRICITY IS THE LITMUS TEST

Tilak Raj Dua, Director General, DIPA zoomed the lens on customer experience as the discussion segued well to the big picture. "It takes 20 years to build a customer and five minutes to shake it all up. That is why it is important to constantly monitor what the customer wants. Also, end-to-end – from front desk to billing – has to be alert about what a customer's needs and feedback are. AI or any other technology- should work backwards to achieve the ultimate goal of customer experience. To continue to engage customers with new technologies like low latency services and edge computing is required as technologies evolve continuously."

Dua encouraged everyone to look back at where the industry was in the pre-Covid era and the changes after that. "Just look at how fast-track everything has been," he said.

As Karna weighed it all in – a successful transformation journey has to be an ecosystem play. "No one is closer to the customer than the telco and they should be the leading point for co-ordinating the transformation," he said. Gupta averred that and explained how they have all the understanding and real estate for that proximity with the customer. "Unless they monetise these strengths quickly, it will be wasted.

Overall, the panel stressed that the industry needs to remember that the customer is the king. "We should not take feedback for granted, especially negative feedback, because it helps a company improve and move ahead," Dua underlined and summed it up.

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Time to think of communication as public goods

Growth of broadband infrastructure in the 5G era can be viewed through the lens of a co-opetition model – as this panel debates

BY PRATIMA HARIGUNANI

(From L to R): Rajat Mukarji, Director-General, BIF; Umang Das, Chairman, FIIF & Advisor, RANext; Dr. S N Gupta, Chairman of the Board, Bluetown India & BIMSTEC, South Asia; Pankaj Kitchlu, Systems Engineering Director, Juniper Networks; Rashim Kapoor, Executive Vice President and Hub CTO, Airtel; and Anil Jain, CEO, NIXI.

At TLF 2023, an interesting spectrum of experts got together in a huddle where they discussed the changing needs of businesses and end-user, the impact of technology change including enhanced mobile broadband, laying the infrastructure for 5G and broadband and driving the rural broadband market. The discussion had a new perspective.

Moderator Rajat Mukarji, Director-General, BIF spurred these minds by asking about how to improve the quality of broadband and accelerate transformation across the country.

BROADBAND: STOP LOOKING AT IT NARROWLY

The first aspect that matters here is how the infrastructure is connected. Instead of customers getting connected to an Exchange, an ISP and content delivery networks like Google get connected, explained Anil Jain, CEO, NIXI. This has two advantages: reduction of latency of information to end-customer and cost savings for infrastructure providers. And these can be passed back to the customer.

Jain stressed the need for making digital education and health available in remote corners of India. "For that to happen a data superhighway is crucial. That way every citizen can take advantage of digital growth in the country."

Without mincing any words, Pankaj Kitchlu, Systems Engineering Director, Juniper Networks addressed the elephant in the room. "There is a culture of free discounts and cashback in India that needs to be stopped. As to the socioeconomic impetus of broadband, the recent times of economic flux and geo-political situation have fast-tracked the need for digitalisation," he said.

Responding to the question of how to build the network of the future, he said that technologists should not sway from the centre of what the customer wants. "If we could blend customer experience and assurance with software or AI-driven thought leadership, we can get to

> Once we call telecom services a Public Digital Good, everything from datacentres to towers to Wi-Fi can be pooled and upgraded cooperatively.

what we are looking for. These are not easy things to be done." He also noted how broadband has kept up with new data sizes and demands. "Broadband is a utility. We should take it seriously."

With that argument, the panel moved into a deeper discussion on the utility aspect of communication.

TELCO AND WATER: IN THE SAME BUCKET

The proliferation of content in today's era is also driving broadband in a new way. Dr SN Gupta, Chairman of the Board, Bluetown India and BIMSTEC, South Asia sifted through some priorities for broadband evolution, including restoration of financial health, incentivisation of pan-India fibreisation, the rollout of public Wi-Fi hotspots, speeding up of right-of-way clearances and conferring an infrastructure status to the telco industry.

"All of them are important. Fibreisation, for instance, started in 2011 and it is yet to be delivered well. Just setting priorities will not help. Execution is more important. Getting it done is very vital," he highlighted.

The experts were vocal and objective about granting infrastructure status to the telecom industry. And they offered new ways of looking at this idea. "That does not solve everything. It is a peanut contribution to interest rates and loan prioritisation. Just calling it infrastructure will not help. Public Digital Good is a better approach. Then every state and user has ownership. Everyone controls it. Like water. We should be strongly advocating this. Once we call it a Public Digital Good, everything from datacentres to towers to Wi-Fi can be pooled and upgraded cooperatively. Users can be owners too in this scenario."

Dr Gupta unlocked a new window of possibilities here. He underlined how the political will is right at this hour to make this concept work.

Umang Das, Chairman, FIIF and Advisor, RANext helped to quantitatively understand these shifts' infrastructure requirements and investment side. "The buzzword is implementation. And not by being at loggerheads with each other but with cooperation. If we define digital infrastructure in a new way, we have about five lakh towers and four lakh Wi-Fi hotspots. If we look at the national broadband mission, the intent is to make fibres double to 50 lakh kilometres and the same for towers and hotspots," he said.

Das also pointed out that the country needs to accelerate fibreisation massively. "It is a huge task that needs a lot of investment. From 1995 to now, the telecom sector has been largely driven by the private sector. We should understand that digital infrastructure is the bedrock of the New India vision. Infrastructure and service layers should be separated. A National Fibre authority can monitor this development along with a national portal for roll-outs etc." He advised. He also suggested setting up a National Digital Infrastructure Funding entity. "We also have several funding models. International sources and PPP models can be considered here as well."

COSTS AND AFFORDABILITY: THE LAST MILE MATTERS

Many other topics were touched upon during the panel, like how a data superhighway will not just bring infrastructure but also make it affordable for everyone. Internet protocol addresses are also crucial for this ecosystem. The adoption of IPV6 was also discussed in the panel.

Rashim Kapoor, Head Core and Hub CTO, Airtel dissected areas like reducing the cost of infra development. "Use of green energy helps to reduce both cost and carbon footprint. Technology intervention, automation and operational measures are key pillars to reduce costs. SDN, technology for spectrum efficiencies, infrastructure-sharing on the fibre side, last mile optimisation, self-healing networks, virtualisation etc. are some ways that are helping us to reduce costs. Overall costs will never reduce but the cost per GB reduction can help a lot."

The panel also argued about buckets like desirable experiences to customers and social impact. If the infrastructure has to grow, then a symbiotic relationship between efficient use of technology, development of a financial model and creation of a regulatory framework would be the way to go forward in these directions, concluded Mukarji.

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Unleashing the satellite communications revolution

It is time for India to maximise the potential of satellite broadband to bridge the digital divide and bring reliable connectivity to its citizens

BY JOSUN JN

In an industry keynote address at the recently held Voice&Data Telecom Leadership Forum, Shivaji Chatterjee, Executive Vice President of Enterprise and Government Business at Hughes Communications India, shed light on the transformative power of satellite communications (Satcom).

Chatterjee drew attention to the growing worldwide interest in Satcom, emphasising how it has transitioned from being a complex technology to becoming a practical and broadly applicable service. The industry is currently experiencing the emergence of prominent figures like Elon Musk, Sunil Mittal, and Jeff Bezos, as they introduce satellite constellations that offer extensive coverage and unprecedented capacity. He also delved into the implications of these advancements in Satcom for both the enterprise and government sectors.

CHANGING LANDSCAPE OF SATCOM

In the past, Satcom was known for its high costs, limited bandwidth, and significant latency. However, according to Chatterjee, these traditional characteristics are rapidly changing. The industry has been revolutionised by the emergence of satellite constellations, which consist of numerous satellites in low Earth orbit (LEO). By positioning satellites at closer distances, approximately

> The improvements in Satcom now rival terrestrial networks, ensuring consistent and reliable connectivity, regardless of the location.

600-1,200 Kms, latency has been significantly reduced, resulting in end-to-end latencies of under 50 milliseconds. This improvement now rivals terrestrial networks, ensuring consistent and reliable connectivity regardless of location, whether it be in rural or urban areas.

Furthermore, the scalability of satellite constellations is a significant advantage. Instead of relying on a single large satellite, constellations allow for the continual addition of satellites to enhance capacity. This scalability, coupled with the ability to provide uniform coverage across land, air, and water, makes satellite technology increasingly appealing for a wide range of applications.

Chatterjee underscored the substantial investment required to establish satellite constellations. Companies such as Starlink, OneWeb, and Amazon Kuiper have entered the satellite business, injecting billions of dollars into the industry, and gaining global recognition. This influx of capital has not only generated excitement but also accelerated the development of satellite constellations.

HIGH-THROUGHPUT SATELLITES AND FREQUENCY REUSE

The advancements in Satcom extend beyond constellation technology. Chatterjee highlighted the advancements in constellation technology and also emphasised the introduction of high-throughput satellite (HTS) technology. HTS incorporates frequency reuse, similar to the cellular industry, to maximise capacity. This concept allows each user to have their unique content and dedicated frequency, resulting in a significant increase in overall capacity. The combination of HTS and very high throughput satellites (VHDS) provides multi-terabytes of capacity per satellite, opening the doors for data-intensive services and applications.

The evolution of Satcom brings numerous benefits to users and stakeholders. The proximity of LEO satellites to Earth enables the use of smaller and more portable terminals, ranging from laptop-sized devices to small aperture terminals. Furthermore, the implementation of software-defined networks on satellites enables the dynamic configuration of beams and capacity allocation. This flexibility optimises service delivery based on demand, leading to efficient resource utilisation. It also allows for customised solutions tailored to specific applications, such as disaster management and defence.

DIRECT SATELLITE-TO-DEVICE CONNECTIVITY

Chatterjee drew attention to the convergence of satellite and terrestrial technologies within the 5G ecosystem. A major milestone in this convergence is the inclusion of Satcom in the 3GPP Release 17 standard and the integration of satellite chips into default phones by manufacturers such as Qualcomm and MediaTek. This integration allows for direct satellite-to-device connectivity, bringing satellite communication capabilities to mainstream consumer devices. Through partnerships between satellite operators and major manufacturers, the potential for global coverage and alternative connectivity solutions gains momentum.

He acknowledged that India has faced challenges with a lack of reliable and affordable broadband capacity, making it accessible only to those who can afford it. This limited availability, coupled with subpar pricing, has hindered widespread adoption. However, with the emergence of advanced technologies like HTS, the situation is beginning to change. The growing demand for faster connectivity, driven by initiatives like Digital India, telehealth, and rural network connectivity programs, presents a significant market opportunity for satellite broadband providers.

ADDRESSING CONNECTIVITY CHALLENGES

The Indian government has made significant efforts to expand connectivity in rural areas, primarily focusing on fibre connectivity to homes and villages, as well as the provision of 4G mobile broadband services. While these initiatives have achieved impressive reach, especially through terrestrial networks like Jio, Airtel, and BSNL, there are still areas that lack sufficient coverage. Satellite broadband can play a crucial role in bridging this gap and ensuring connectivity even in the most remote regions. However, it is crucial to address the issue of affordability, as broadband services need to be priced reasonably to accommodate the diverse economic conditions in India.

> The proximity of LEO satellites to Earth enables the use of smaller and more portable terminals – from laptop-sized devices to small aperture terminals.

Nevertheless, Chatterjee highlights several challenges that must be addressed. One significant challenge is the competition posed by terrestrial networks, which are continuously expanding and improving their services. While satellite broadband offers its advantages, it faces tough competition from well-established players in the telecommunications industry. Additionally, capacity constraints and the lack of robust reforms in the satellite and space sector have hindered the growth of satellite broadband in recent years.

Affordability remains a critical concern, especially in a country where mobile internet prices have significantly dropped and Wi-Fi is widely available for free. To gain traction, satellite broadband services must offer value for money, ensuring that prices are competitive and affordable for consumers. Additionally, market access and spectrum allocation should be carefully regulated to create a level playing field and promote fair competition.

BALANCING HYPE AND REALITY

In India, satellite broadband offers a substantial opportunity to address the digital divide and provide connectivity to underserved rural areas. However, it is important to maintain a balanced perspective and approach the situation with realism. Chatterjee advises against setting unrealistic expectations and emphasises the importance of innovation, a solid business model, and a deep understanding of the Indian market. Success in the industry will depend on effectively navigating the evolving landscape and leveraging technological advancements.

While there is excitement surrounding the potential of satellite broadband in India, it is crucial to recognise and tackle the challenges that lie ahead. Competition and affordability are significant concerns that need to be addressed. Creating a level playing field and ensuring fair market access and spectrum allocation are key factors for the success of satellite broadband in the country. By approaching the industry with the right strategies, innovative solutions, and a thorough understanding of market dynamics, satellite broadband has the potential to empower millions of Indians with reliable and affordable connectivity, paving the way for a new era of digital inclusion.

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Being on the edge of the future feels great

5G will enable a fibre experience in every part of the country, bringing SMEs on common ground with large enterprises

BY PRATIMA HARIGUNANI

(From L to R): Prateek Pashine, President-Enterprise Business, Reliance Jio in conversation with Ibrahim Ahmed, Group Consulting Editor, CyberMedia.

Prateek Pashine, President-Enterprise Business, Reliance Jio sat down with Ibrahim Ahmed, Group Consulting Editor, CyberMedia at the TLF to unfold what is happening in the industry with the advent of Edge. In a session on Transforming Enterprises with Edge and Private 5G, these two veterans discussed some pragmatic issues around 5G's and Edge's on-ground impact in India.

5G TO THE LAST MILE

Ahmed started the chat by asking about how small, and government, enterprises are being affected by the force called 5G. "Customers who have been there and done that, having already adopted 5G in other parts of the world, already know the use cases well. They are, hence, the first ones to roll out commercial orders and do the proof of concept," he stated.

Kickstarting the discussion, he further pointed out that there are enterprises that see the promise of 5G and are engaging in active conversations. "These companies are concerned about the cost of labour and the cost of automation. Government organisations are on a different trajectory altogether. Their level of awareness, their effort on testbeds and their progress are simply amazing. They are on steroids," he pointed out.

"SMEs have not got there but will soon board this wagon. With high-speed connectivity, the entire digitisation will come alive," he hoped. Ahmed also

> SMEs have not got there but will soon board the 5G wagon and with high-speed connectivity, the entire digitisation will come alive.

addressed the elephant in the room as he argued about the hesitation that is still in the air in some enterprises.

5G ON THE ROAD

Pashine explained how there is significant traction in areas like mining, utilities, logistics etc. The experience centre in Mumbai gets some delegates every day and we are showcasing the possibilities of 5G in problems like perimeter security, government applications, massive M2M solutions etc. The Prime Minister's office has been encouraging a lot of 5G applications too.

These experts also addressed audience questions like the role of 5G in expressways. Pashine said, "We connect the biggest organisation possible, Railways. One of the conditions of their expectations is that 90% of their tracks should be connected with 4G and must be ready for 5G. We will do that with highways as well. We are already in 400+ cities and making great progress in spreading 5G. We have also enabled an offshore rig. Now those employees can do immersive video calls with their families on the mainland. So, it is not restricted to land."

5G AS THE ENGINE

As to what else is exciting, Pashine said, "5G is a great unifier. It addresses the digital divide, especially the one between large and small enterprises, as SMEs are not in high-end clusters but everywhere. 5G will enable a fibre experience in every part of the country. SMEs will come on common ground with large enterprises."

Network-as-a-service and 5G-as-a-service will be good models to go, he weighed in while speaking of Private 5G. As to his company's differentiators, he cited advantages like standalone networks where true benefits of 5G accrue, even if deployment costs are challenging for the company. "We have invested upfront to make the true befits of 5G emerge. It is like having a good engine. Else 5G is nothing but a good-looking luxury car."

Talking about the way forward, Pashine pointed out that it was still early days but indicated that there was good traction. "We see a lot of green shoots and early adopters. There is never a killer app though. There will be no silver bullet in terms of applications. It will vary from one industry to another and country to country as per cost economics," he concluded.

A year from now you will see a significant landscape of active deployments and commercial roll-outs, he augured.

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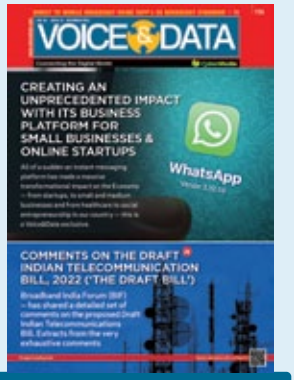

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Dialling in on a new stack and fixing jitters

As India moves towards the indigenisation of 5G, addressing challenges like skillset, security, and network quality will become more important

BY PRATIMA HARIGUNANI

(From L to R): Arpita Paul, Managing Director – Communications, Media & Technology, Accenture India; Dr R K Upadhyay, CEO, C-DOT; Jaideep Ghosh, COO, Shardul Amarchand Mangaldas & Co; Arvind Bali, CEO, TSSC; and Prof NK Goyal, President, CMAI & Chairman Emeritus, TEMA.

We are good, but we can be better, way better. A Panel at TLF 2023 dissected various layers of Opportunities for the Mobile Ecosystem, like open innovation, cloud, edge computing, Artificial Intelligence (AI), Machine Learning (ML), the Internet of Things (IoT), and sensor-based infrastructure, network technology partners, mobile platforms, apps and devices, and the society.

As moderator Jaideep Ghosh, COO, Shardul Amarchand Mangaldas & Co laid out well, with 90% of the world population having access to mobile phones, our lives are encapsulated in this six-and-half-inch shiny object that defines everything now. "But, where do we go next? What new opportunities and innovations emerge ahead," he asked the panellists.

Painting a picture from an ecosystem angle, Arpita Paul, Managing Director— Communications, Media, and Technology, Accenture India outlined some macro trends. "There is a huge growth in digital connectivity, and, thus, growth in connected devices. This leads to a huge volume of data. So is the growth in applications connected to these devices. The major game-changer in this ecosystem is 5G. With all these macro trends in play, there are both possibilities and challenges ahead."

NOT NIRBHAR ANYMORE

Dr RK Upadhyay, CEO, C-DOT added the India stack and indigenous angle to this discussion. "Somewhere in 2020, because of geo-political issues, it was decided that the country should have its strengths. The government has a larger goal with Atmanirbhar Bharat for all industries but the telecom sector becomes important as it connects a lot of industry infrastructure," he said.

Upadhyay further pointed out that the country still imports a major chunk of telecommunication components. "Should we, as a sovereign country, depend on technology from outside? These questions became important. Thus,

> The government has a larger goal with Atmanirbhar Bharat for all industries but the telecom sector becomes important as it connects industry infrastructure.

we formulated a new approach and a consortium. We started a proof of concept (PoC) which is successful and now commercial orders are in progress. Our core and radio have been developed well in the country itself, and similarly, other components required by telcos are supplied by software players like TCS," he said, talking about the successful PoC of indigenous 4G stack for BSNL.

"The government's push and schemes like DLI, PLI, PMP, electronics clusters, etc. have made sure that we become a manufacturing hub for the rest of the world and we supply telecom gear," he said.

Arvind Bali, CEO, TSSC pointed out how the first real revolution, after mobility, was SMS, followed by cameras and devices. Is the revolution over now? No. "Anything and everything that comes to our mind can be put on a hand-held device. India's population is huge. By 2030, India will have many more billion SIMs and reach a massive number by 2045. All devices will have sensors and would be communicating in some way. This will further broaden the ecosystem, especially with 5G enabling various use cases. The telecom sector is likely to play a major role in driving India's GDP. That is where skills come into the spotlight."

GAPS THAT REMAIN

Mobile has grown multi-fold during Covid and India has big success stories, from the health to education sector, added Prof NK Goyal, President, CMAI and Chairman Emeritus, TEMA. "Today if I want to punish someone in my office, all I need to do is take away the person's mobile," he quipped, underlining how life without a mobile has become unimaginable. He, however, pointed out how a lot of people are still not connected. "Why do a lot of people remain uncovered? This should be a priority area. Also, the quality of networks is a big concern area. No one wants to answer this question."

He also suggested that the country and the industry must focus on security and data privacy. "If I die today with a phone in my hand, there is no way to transfer it to my son or daughter."

Skills are also a key factor to consider. So are on-ground issues and hardware repair. As Bali explained, "The mobile ecosystem has multiple components and there is a need for two to three technicians in each village across the country. "We need resources to repair fibre, everywhere," he said adding that to help plug the skill gap, TSSC has launched village-level courses. "This will help local talents to handle repair, fibre splicing and other on-demand tasks."

Upadhyay highlighted how a lot of work is happening in the country. "We are working on facilitating the ecosystem with 5G tests, 5G labs, start-ups, telecom technology developer fund, and DCIS scheme. We are funding growth and innovation in many ways."

The panel also covered factors like the convergence of seamless experience, the issue of sustainability, connectivity, and longevity of devices; areas that the industry needs to focus on.

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Getting the feet wet for Aatmanirbhar Bharat 3.0

Hardware capabilities, IP, academia-business collaboration, and value add are critical areas to master for the country to win the Make-in-India game

BY PRATIMA HARIGUNANI

(From L to R): Dr R S Sharma, Former CEO, NHA and Former Chairman, TRAI; Dr Kumar Sivarajan, Co-founder and CTO, Tejas Networks; Mayank Bidawatka, Co-Founder, Koo; and Pradeep Gupta, Chairman, CyberMedia Group.

At Voice&Data Telecom Leadership Forum, CyberMedia Group Chairman Pradeep Gupta started a thought-provoking discussion on the pillars of self-reliance for the industry in India. He began the snowball of sharp self-reflection by introducing how Aatmanirbhar Bharat is a theme that has been shaping up for several years to develop indigenous strengths in various areas.

"We have cracked the software part quite well by now. But what about the hardware part? Are we Aatmanirbhar on that aspect of the telecom sector," he asked.

NOT JUST SOFTWARE AND LOCAL MARKETS

Drawing from experiences of country-made health stacks, biometric platforms like UIDAI, and other big-scale initiatives in the country, Dr RS Sharma, Former

> Aatmanirbhar Bharat has its way of developing a democratic architecture, with open APIs, good scalability, robustness, and interoperability.

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> India has taken several steps towards 5G standards – encouraging academia, bolstering start-ups, ecosystems and markets – learning the game now.

CEO, NHA and Former Chairman, TRAI, pointed out that the country should be self-sufficient but also make it for the world. "That would be the real success of Make-in-India. What's unique about Aatmanirbhar Bharat is that it has its way of developing a democratic architecture, with open APIs, good scalability, an impactful approach, robustness, and interoperability," he said.

Sharma also highlighted ONDC as a good example. "ONDC is in the initial stage of development, similar to CoWin which is connected to a lot of applications in the front-end. We develop frameworks around which others can plug in and connect. UHI is driven by the idea that people are not restricted by a lack of interoperability. That will unleash the entire market because then people will not have to develop vertical solutions, but can leverage potential by developing parts of the solution."

Dr Kumar Sivarajan, Co-founder and CTO, Tejas Networks shared insight on how the company focused on the development of core technology when it was still at a nascent stage. "We have been focusing on telecom products, both hardware and software. There are many initiatives in the country from 4G stack to 5G Technology capabilities. We are on a good path," he said.

"I have found this term Aatmanirbhar very insular in nature. As entrepreneurs, we build multiple businesses. We have tried to create products that can be relevant to a major part of the global market that may not speak English. Most of the things we do here at Koo are from that lens," Mayank Bidawatka, Co-Founder, Koo shared his insights as a serial entrepreneur.

"We want to start a revolution of creating Indian consumer brands from India. It is a competitive landscape but it is also a very exciting time," he said.

WHAT INDIA HAS AND WHAT IT LACKS

Addressing the pink elephant in the room, Gupta asked the panel. "We have not taken the leadership role with 5G. Also, what can we do with foreign technologies and the value-add aspect?"

Sivarajan answered that by spelling out how India played only catch-up in 4G and with 5G, we are barely there. "We have just got our foot in. India has taken several steps towards 5G standards. On encouraging academia, on bolstering start-ups, ecosystems and markets. We have learnt that game now. We can generate IP, set requirements and, then, can have companies that can design both infrastructure equipment and chips. We have the formation in place but in the next 5-6 years we will see this shape into impact."

Can we take Indian products to a global stage, Gupta wondered.

Bidawatka explained that competing with global tech in social space is a long, difficult but exciting journey. "It's not easy to crack. It will take time. India has a lot of talent. We have a great competitive edge, with low-cost structures compared to big tech companies. We are capable of creating very low-cost tech and serving the world. Growth can happen country by country with different models of partnerships and scale."

Also, what can India do to be self-reliant in this challenging future that will open up with the advent of emerging technologies like AI and VR, Gupta asked.

"India has both talent and confidence today. We are now sure that what we are building is world-class, while also being extremely good at scaling up – from what we can see with CoWIN. We have also created a lot of horizontal stacks which are building blocks for a lot of things. These blocks are foundational and will not become irrelevant when AI and ML come in," Sharma said citing India's unique efforts towards the future with language translation projects like Bhashini.

Looks like the diversity, talent and confidence of India and our ability to prepare strong building blocks will write a new narrative for India's Aatmanirbhar journey.

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India among early leaders in 6G development

Likely to be launched by 2030, the 6G is expected to deliver highly immersive augmented experiences and unprecedented levels of connectivity

BY PRADEEP CHAKRABORTY

Have you seen the movie, Agent Cody Banks? The hero, Cody Banks played by Frankie Muniz, tries to shut off the hologram image of his handler Ronica Miles played by Angie Harmon toward the end of the movie. Although this type of video conferencing technology comes closer to mimicking face-to-face interactions, there are still imperfections in human hologram technology.

As the world looks beyond 5G and towards a higher level of cyber-physical integration, like in the case of holographic communication, Stuart Cooke, the Chair of the GSA Global Spectrum Team, provided an update on evolving telecom technology standard at the 6G Global Summit 2023 in Bahrain. The 6G rollout will enhance extreme connectivity and immersive augmented experiences, with the target year of 2030.

Each generation of IMT/3GPP enriches the user experience. The 5G brought high-speed eMBB and vertical services in 2019. Likewise, 6G is expected to bring extreme connectivity and immersive augmented experiences from 2030 onwards.

Looking at IMT/3GPP spectrum requirements for 2020-2030, 5G licensing and rollouts are underway, with some countries planning 5G expansion spectrum in the timeframe of 2023/25. Globally, 6G research is also accelerating. ITU-R has planned deliverables and a work plan in place to enable IMT-2030/6G standards to be completed by 2030 in cooperation with external organisations such as 3GPP.

Many activities are planned for 6G ITU-R IMT-2030, with WRC-23 focusing on technical performance requirements, evaluation criteria and methodology, requirements, and submission templates. Under WRC-27, technology proposals for IMT-2030 will be evaluated, building consensus, and deciding on outcomes and specifications.

Globally, there are numerous 6G research frameworks and strategies being developed. These include the China Academy of ICT (CAICT), Hexa-X in Europe, Beyond 5G Promotion Consortium (B5GPC) in Japan, DoT's Bharat 6G Alliance in India, ITU in Korea, and the NextG Alliance in the USA.

For example, the UK Government announced the UK Wireless Infrastructure Strategy in April 2023, which includes an indicative roadmap for 6G. The UK plans to research, develop, and deploy 6G technologies by 2028-2030.

Regarding 6G, the essential new spectrum will be available from the 7GHz to 24GHz, up to 71GHz bands. There will be technology evolution and reuse of existing spectrum ranges, and new complementary 6G ranges should be available from 92 GHz, sub-THz, and 275 GHz bands. Frequency bands from within these ranges will need to be considered for further study, taking into account the sharing possibilities of IMT with other radiocommunication services allocated on a primary basis. Lower frequencies within the essential range are better in terms of propagation, cell size, and economic network deployments. The IMT agenda item for the WRC-27 is a key step toward a successful device ecosystem and economies of scale for 6G.

INDIA AHEAD

While India was late on its 5G journey and the country started rolling it out only in October 2022, the country has surprised many with its recently announced 6G Vision document. Another example of India's focus on sixth-generation technology is the Bharat 6G Alliance. Its mission is to design, deploy, and develop 6G network technologies that provide ubiquitous, secure, and intelligent connectivity for a high-quality living experience for people around the world. The task forces include multi-platform next-generation networks, multi-disciplinary innovative solutions, spectrum policy, financing R&D, devices, and international standards contributions.

The objectives are to facilitate and finance R&D, design, and development of 6G technologies by Indian startups, companies, research bodies, and universities. This will enable India to become a leading global supplier of IP, products, and solutions for affordable 6G telecom solutions. India can deploy 6G technologies as a powerful force multiplier for India@2030. This will enable an inclusive and significant enhancement in the quality of living experience for citizens in India and around the world.

Phase 1 will be from 2023 to 2025, during which India will explore ideas, risky pathways, and proof-of-concept tests. Phase 2 will be from 2026 to 2030. India will look to develop ideas and concepts that show promise and potential for acceptance by the global peer community. They can establish use cases and benefits, create IP, and set up test beds for commercialisation.

WIDE-AREA MOBILE 6G APPS

One important question about the development of 6G networks is how much spectrum will be necessary to support wide-area mobile applications such as immersive XR, mobile holograms, and communication and sensing technologies. Wide-area use cases will require different frequency ranges, such as XR in 1GHz, holographic communications in 1.1GHz, and sensing and communication in 0.3-0.5GHz.

According to preliminary analysis, each network will require an additional 500-750MHz of the wide-area spectrum, in addition to the re-use of the existing spectrum. However, this figure will depend on the mid-band spectrum already available for IMT and the number of networks in each country.

In conclusion, 6G research is progressing rapidly, and the IMT 2030/6G standards should be finalised by ITU-R Working Party 5D by 2030, in collaboration with external organisations such as 3GPP. The goal is to commercialise 6G around 2030 and beyond.

As mobile broadband traffic and spectrum needs continue to grow, 6G will require the combination of all frequency ranges, from low to extremely high bands, to meet coverage and capacity requirements and serve new and emerging use cases. In addition to the existing spectrum, the new spectrum from within the essential range of 7-24GHz and the complementary sub-THz range should be considered. At this early stage of 6G development and design, co-existence needs must also be considered.

Global and regional harmonisation in terms of spectrum, standards, and timing will remain critical. The GSA is ready to assist in the development of a 6G strategy and provide technical support for a potential WRC-27 IMT agenda item in cooperation with other national and regional organisations.

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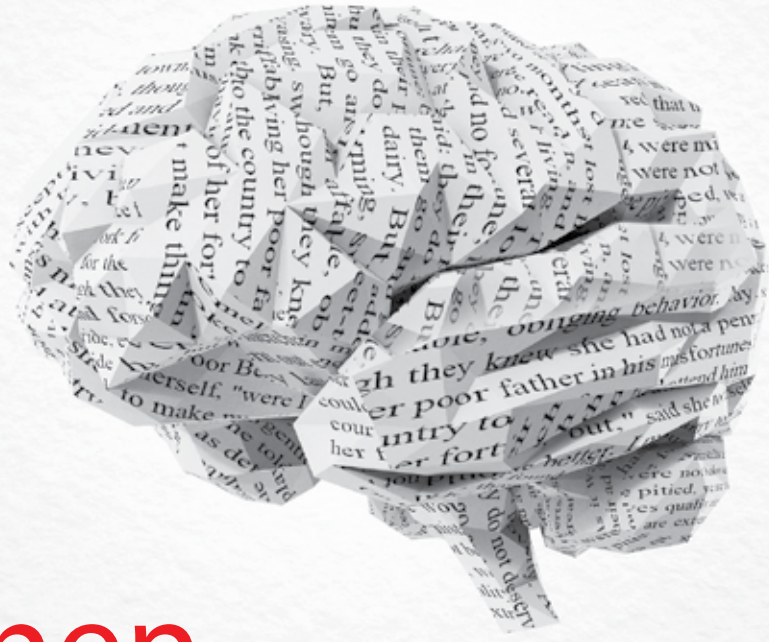

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