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THE LONG-TAIL FOR ENTERPRISES

Here's why getting curious about 5G makes sense for enterprise-scale users, and why they should take care of the known unknown

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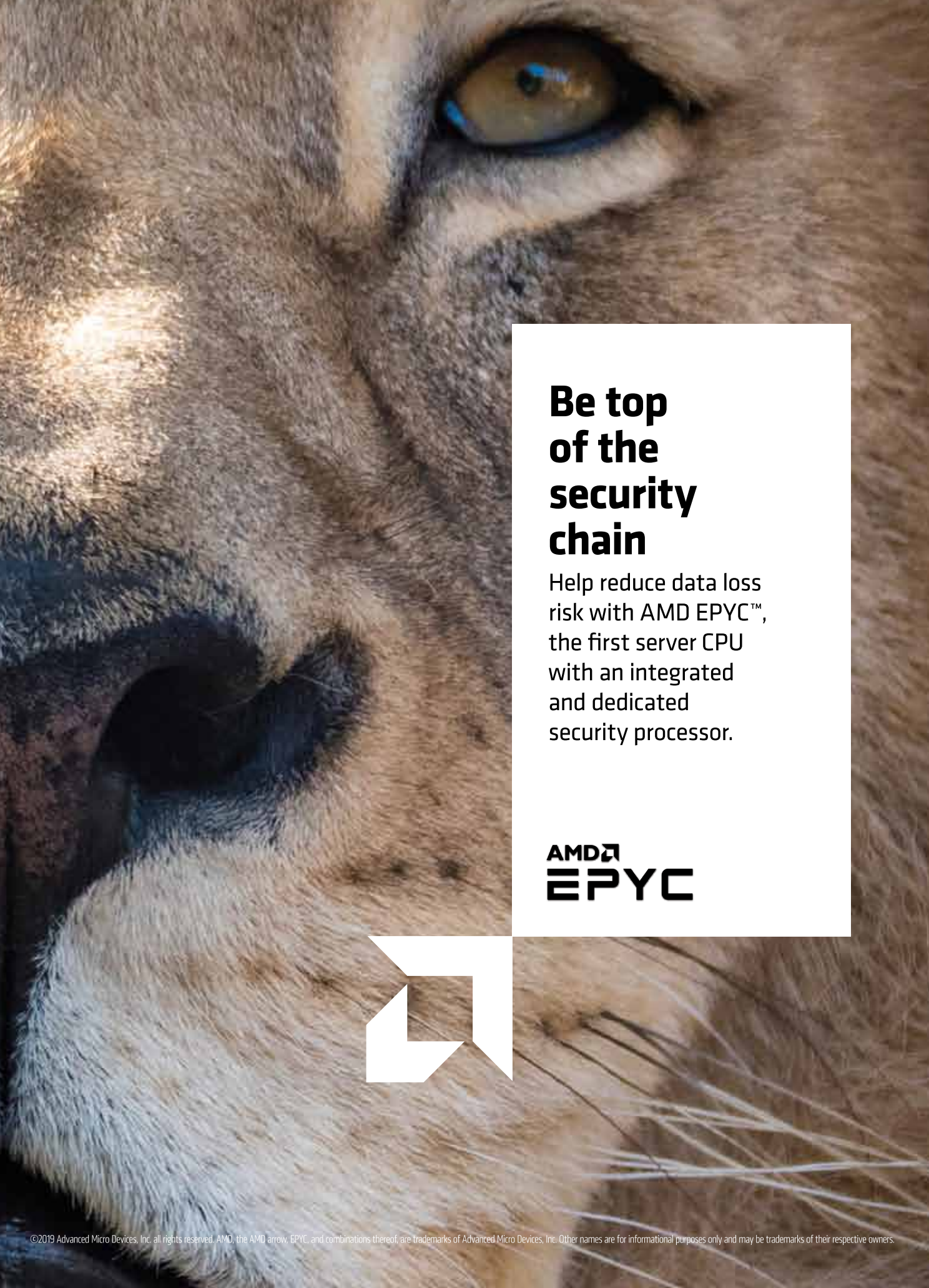

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SHUBHENDU
PARTH

[OPENING NOTE]

How Atmanirbhar can India really become?

Fifteen years ago, I was sitting with an IT secretary at Delhi airport, discussing how we can automate several government processes. One of the ideas we came up with was to use the ATM to facilitate delivery of citizen services. We left for our respective destinations but continued to work on the concept. However, we got stuck as we started to explore options to set up a pilot project.

First, it was the bureaucratic huddle, and then we ran across the technology bottleneck since we could not find a company to custom-build a machine without handing over the entire IPR to them. My friend and fellow technology enthusiast soon got a ministry posting in Delhi and I got busy with my other projects.

The developments during the past few weeks brought back memories of the failure, in the context of Atmanirbhar India. While the decision to ban 59 Chinese applications triggered a further demand to ban everything from China, it also renewed the call for self-reliant India, something that Prime Minister Modi had touched upon in his 12th May address to the nation.

The announcement of the ban was followed by a domestic product announcement. JioMeet, a Zoom lookalike video-conferencing and collaboration app was launched by Jio Platforms.

The similarities were so stark that the tech world wondered why a company that had raised Rs 102,432.45 crore from global technology investors since April could not, at the least, put together a team that could deliver a different user interface.

This was followed by Airtel BlueJeans launch by Bharti Airtel. The company has tied up with Verizon to offer enterprise-grade video conferencing solutions in India.

The weeks following the ban, we were flooded with updates on several Indian apps, from Mitron, Bolo Indya, ShareChat to JioBrowser, LudoKing, and many more. Amidst all this, the best Jio Platform could do was to come up with a copy, while Bharti Airtel decided to market a third-party service.

Worse, despite the software prowess that India basks in, it was clearly noticeable that the country did not have a single local super app like Singapore-based Grab or Jakarta-based Go-Jek, forget the mention of Chinese WeChat and Alipay.

What intrigued me during the week was also the announcement of Rs 730-crore investment by Qualcomm Ventures in Jio Platforms. "Qualcomm's world-leading capabilities in 5G and wireless technologies will bolster Jio's initiatives towards building an advanced digital platform for Indian consumers," the company press release stated.

Two questions have been constantly nagging me since these announcements. Has anything really changed in India since my failed effort, in terms of ease of business, support ecosystem to hand-hold hardware development, and in-garage innovation, or is it still the big boys' game of monopoly? And, does Atmanirbhar India mean just "anti-China"?

Hopefully, we will soon have a policy framework to define self-reliance and how the country plans to use international trade to boost domestic growth. Perhaps a lesson from "made for Japan" can be of help.

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THE LONG-TAIL FOR ENTERPRISES

Here's why getting curious about 5G makes sense for enterprise-scale users, and why they should take care of the known unknown

BY SHUBHENDU PARTH & PRATIMA HARIGUNANI

There's the bullock and then there's the horse. Then we have the bicycle, the car, the Model T, and V8. And then, there's Hyperloop.

Yes. There is 2G. Then there's 3G and 4G. And now there's 5G.

But none of the predecessors of 5G stirred up as much excitement and as many growth projections as this form of G has. This stripe of G is not just another step. It is being seen as something that will make enterprises swing to a new world altogether. It is expected to be a big inflection point and more than just another standard.

To quote Cisco India and SAARC Service Provider Business Managing Director Anand Bhaskar, if 4G was all about feeds and speeds, 5G will be all about experiences and, hence, will have far greater transformative effects. According to him, "5G is not just an incremental improvement over existing Long Term Evolution (LTE) and 4G."

It is going to be bigger and unprecedented for one more reason – Industry 4.0. That's what will make it step into factories and remote plants and new enterprise-grade applications like never before.

So let us understand that part first before we confront some not-so-exciting realities around this big wave.

Speed for upstream folks

If we ask CIOs, they share some of this excitement, but in a user-centric way, adequately flanked with pragmatic questions. When asked if 5G is just a new-fangled technology looking for problem-areas to solve, GSK's Global Application and Development Tech Director Ashish Bansal shares his personal opinion, "5G New Radio interface and access technology with lower latency and higher capacity can definitely help improve patient

Why 5G for enterprises?

- Low-latency applications
- High-bandwidth needs
- Vertically-focused solutions that need an apt underlying fabric
- Industry 4.0 deployments
- Software-defined networking advancements
- Telecom networks are being designated as 'critical infrastructure' after the pandemic experience

We need agility and rapid reconfiguration in production. 5G will deliver for manufacturing, utility, and any industry where extreme automation will be required.

and hospital applications, medical data management, and medical assistance for the healthcare industry."

As to why or why not would this huge interest shape into any investments, he points out that since healthcare is a highly regulated sector such changes are always under the radar. He, however, added that in the healthcare sector changes are executed after the available solutions to the known industry problems achieve a certain level of maturity.

"The area which holds the most promise is patient applications used outside of traditional hospital environments. Examples of use cases will include precision medicine, online consultations, and applications to monitor the health and administer medication remotely to better manage chronic ailments," Bansal said.

"Some aspects of Industry 4.0, such as quick wireless communication between devices, sensors and computers, and the ability to handle large-scale data volumes are slowly taking hold with existing technologies, but 5G will be the driving force that will unleash the potential of Industrial Internet of Things (IIoT)," Bhaskar stated.

Tech Mahindra Network Services CTO Manish Mangal explained how 5G is going to be a sweet spot for convergence. "It is going to be about infrastructure plus applications, about operational technology plus information technology (OT+IT). The defining piece would be the latency-sensitive, high-speed connectivity inside the enterprise that has been an emerging need." Also, since the sensor system is evolving, it makes a strong case for 5G. Private networks can be the intersection points here. "With a robust infrastructure for compute and storage, combined with effective 5G and LTE, enterprises can gain from solid high-latency solutions and software-defined (SD) -connectivity with vertically-focused solutions operating at the top of it," he added.

Some sectors would find a high level of readiness and relevance for 5G then. Which ones though?

"There will be a low latency key change from hundreds of milliseconds to less than ten milliseconds, resulting in a game-changing reduction in round-trip delay time. This will bring the possibilities of the edge cloud even closer for enterprises," Juniper Networks India and SAARC Systems Engineering Director Pankaj Kitchlu pointed out.

He further explained how 5G can be utilized for ultra-low latency, critical applications that can be differentiated by service assurances, Key Performance Indicators (KPI), Service Level Agreements (SLA), and based on business needs that can be served by secure and managed enterprise network slices. This includes sectors such as healthcare, manufacturing, public safety, or enterprises, where physical presence is not possible.

Ericsson Asia-Pac CTO Magnus Ewerbring is overwhelmed with the great interest of 5G in the world and pointed out that industries are really geared up on using 5G. "We find healthcare, manufacturing, energy, utilities, automotive, public safety, and media and entertainment as very dominant ones," he said talking about the early adopters.

If we drill into the 'why' here, he leads us to the concept of Ultra Reliable Low Latency Communications or URLLC. "That is where you really push the delay and latency to be minimal, down to milliseconds. But that will happen with 5G Release 17. It is not out there, but we already have a prototype software, together with one car manufacturer in Germany in a reference factory." He also informed that Ericsson is supplying 5G networks to all the major car manufacturers in Germany, manufacturers of equipment makers for tools, and for predictive maintenance that can help minimize downtime and cost. They have also been doing a number of trials for automation of healthcare and ports *(see: Early experiences)*.

Interestingly, Industry 4.0 can have a big catalytic effect on 5G adoption. According to Nokia Software business in India Vice President Samar Mittal, "We need agility and rapid reconfiguration in production. This is where 5G will deliver for manufacturing, utility, logistics,

retail, and any industry where extreme automation will be required."

But how much of all this are hype and hope?

Mangal contends that the direction is, indeed, strong for 5G as per every CIO conversation he is having – whether from the oil vertical, or healthcare or manufacturing – the level of interest is way beyond the hype. "We are getting several queries and interests on how to make it happen. There is a tremendous level of demand out there, especially for cross-functional deployments and bundled solutions."

And the solution side of the industry is vetting that hope in a big way. AWS South East Asia Head of Technology Santanu Dutt also said he has no doubt that 5G would be coming in a big way. "With offerings like Outposts and collaborative work with Telcos for new throughput requirements like AR-VR and 3D rendering, a lot is happening around 5G," he said.

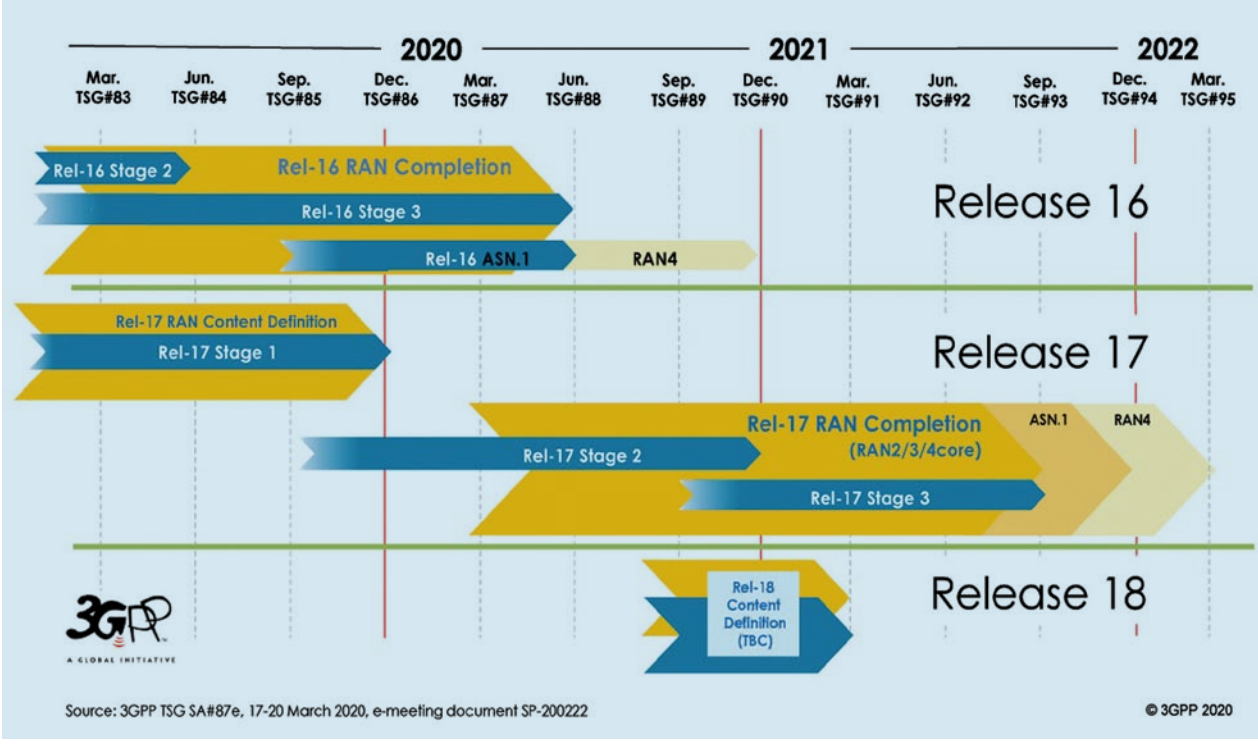
CCS Insight Consumer and Connectivity Director Kester Mann translates these views into something concrete with some projections: "Deployment of 5G networks is expected to continue in 2020 and beyond despite the macroeconomic weakness worldwide. 5G connections worldwide will reach 1.2 billion in 2022, 2.5 billion in 2024, and 3.2 billion in 2025. The most popular application supported by 5G networks throughout the forecast period will be mobile broadband." But there is a caveat: "High level of uncertainty in the world and the global economy creates risks to the forecast," he added.

But there is something else that is holding the enthusiasm behind the floodgates. What's that?

Challenges and gaps

Omdia Practice Leader Daryl Schoolar pins it down to wide-spread network coverage. He specializes in mobile technology and vendor trends around 2G, 3G, 4G (LTE), and 5G and he is clear about the on-ground bumpers. "If enterprises do not have network access, they won't adopt. Operators also have to show enterprises how they can improve their process, or grow revenues, or save costs by using a 5G-enabled service. Operators have to show enterprises how they can benefit from 5G."

So does that mean issues like network architecture, low-latency slicing, data complexity, security, geopolitics, and payback would be big things to reckon here? According to Schoolar, "Those can all be big issues depending on the need of the enterprise and the operator's country of operation. Operators and enterprises want vendor security. They want to know who they can depend on and who will be able to support them for the years to



5G USE CASES

The Port of Zeebrugge in Belgium has completed its first phase of rolling out a 5G-ready private wireless network. The network will enable private wireless connectivity to more than 100 endpoints across the port operations. With this high-performance, end-to-end, 5G-ready network Zeebrugge expects to track, analyze, and manage connected devices across multiple port-based applications in real-time.

Nokia has helped Lufthansa Technik deploy a private 5G wireless network that can support virtual inspection by providing seamless video access to the engine overhaul shop floor. At present, customers have to travel to Hamburg to carry out components inspections when engines are overhauled. It plans to conduct trial inspections of individual engine parts collaboratively over a fast, high-definition video link.

Using the 5G network along with the world's most advanced surgical robotics the researchers at the Ericsson 5G Tactile Internet Lab in King's College London have created the ability to allow the remote transfer of haptic, tactile, audio and visual technologies. This enables a surgeon or doctor to perform a diagnosis or even surgery on a patient anywhere in the world.

Ericsson and China Unicom are jointly developing a 5G smart harbor at the Port of Qingdao in China. The project includes an automated ship-to-shore (STS) crane that can lift containers over a 5G connection operated from the control center. The key findings of the field trial indicate that up to 70% of labor cost can be saved when a harbor uses the 5G automation upgrade, compared to traditional harbors with a fully automated harbor.

Siemens along with Qualcomm Technologies have implemented a private 5G standalone (SA) network in a real industrial environment using the 3.7-3.8GHz band at its Automotive Showroom and Test Center in Nuremberg. The facility is used to develop and test new manufacturing options. This allows Siemens' customers, such as automated guided vehicle manufacturers, to see the products interact live.

> **It will be about operational technology + information technology. The defining piece would be the latency-sensitive, high-speed connectivity inside the enterprise.**

come. Other things like latency, slicing, and even network speeds are very dependent on the end-user needs."

For GSK's Bansal, what could be worrisome are challenges around compatibility issues of the old devices which would need replacement. "Development of infrastructure would involve upfront heavy capex investment. Security and privacy issues need to be solved too."

Then there is the issue of interoperability and delay in standards like Release 16. But Schoolar dismisses the fear: "Release 16 deals with 5G in unlicensed spectrum and IoT. Given how immature most operator business plans are with 5G, I don't think it will have a long-term negative impact." Security, however, can have far stronger implications here than what has been envisaged so far.

That's the animal that follows on the heels of every big technology shift – security fears.

Interoperable, fast, and safe?

History has taught us well. And we mean IT and cyber-threat history here. The moment any technology has equipped anyone with something faster or easier, security ramifications pop their heads in slow, but sly, ways.

Director Palo Alto Networks India and SAARC Sales Engineering Riyaz Tambe points out some accelerators and deterrents: "The Telecom Regulatory Authority of India (TRAI) is gearing up to open the 5G spectrum in 2020. Countries like Australia, Malaysia, Singapore, Thailand, and Vietnam are all announcing plans to unveil networks in the year ahead. With telecommuting looking increasingly-likely to become the new normal for many industries even after the virus storm has been weathered, the promised lightning speed, increased reliability and low latency of 5G will be welcomed by enterprises and employees alike."

Tambe, however, underlines some punctured tyres too on this super-highway. "All this provides glimpses into the potential of 5G, and we are not quite there yet. 5G is built on the foundation of 4G, which means that the same security threats that were present in the 4G network will likely be magnified further on 5G networks – now moving at an ever-growing pace and connected to even more devices. If the existing security risks are not dealt with now and they roll over into the 5G era, mobile internet service providers could be the first point of failure during a cyber attack, pushing critical services from healthcare to banking to a grinding halt."

While 5G's faster data speeds will help augment the user experience, the 5G network infrastructure will be largely virtualized with containerized workloads, which will expand the attack surface. According to Bhaskar, "Additionally, Software Defined Networks (SDNs) will accommodate many more IoT devices, thus increasing risks at every endpoint. Furthermore, 5G will add many smaller antennas to increase data capacity. The addition of network infrastructure would mean more complex networks with an increased threat landscape."

"This needs automation and orchestration to make it error-free and reduce security threats, apart from enabling improved user experience. Here, a Zero Trust approach to security is vital," he added.

The Palo Alto Networks Unit 42 threat research team also found that more than half of all IoT devices are vulnerable to medium-or-high severity attacks. What this means is that service providers and enterprises are sitting on a 'ticking IoT time bomb'.

According to Tambe, large-scale attacks can come from anywhere, even from within the operator's own network, through a botnet comprising tens of thousands of large-scale, weaponized IoT devices. "As threats are becoming more sophisticated, service providers need to up their detection and prevention game to the same level of sophistication."

Zooming specifically on 5G areas, he points out that telecom networks have undergone a large technological

If the existing security risks roll over into the 5G era, mobile internet service providers could be the first point of failure during a cyber attack.

shift, which has radically changed the approach needed to secure them. "The physical network perimeter is rapidly disappearing. Operators are embracing a distributed telco cloud environment spanning multi-vendor, multi-site cloud infrastructures, with end-to-end automation for network operations and services, to meet the performance and scalability requirements of diverse 5G-enabled service offerings. Many operators prefer a multi-cloud strategy as the better operational model," Tambe said.

That's ok but while software-driven models help drive agility, they come at the price of serious security flaws – that's what he cautions about. "These software-driven models make networks more vulnerable to attacks introduced by the software platform, underlying OS, and the software stack, including host vulnerabilities, Linux threats, and hypervisor/container vulnerabilities. They can also be vulnerable to lateral threat movement between Virtual Network Functions (VNF) and applications."

Tambe also picks up some leaves from the company's vision of the future of the 5G digital economy that was laid out early this year, outlining key security focus areas critical for 5G transformation. "5G promises transformative mobility by offering enhanced mobile broadband experience and enabling industrial digitalization through customer value creation. It's particularly important to set high standards for connectivity, security, and targeted SLAs for 5G use cases that involve key enterprise verticals."

He argues that while in these early stages of the 5G evolution, it's natural that many stakeholders are focusing on delivering higher data speeds, latency improvements, and the overall functional redesign of mobile networks to enable greater agility, efficiency and openness – let's not forget what is equally critical. "Security should not be left out of this early stage of 5G development. While the 5G digital environment opens the door for diverse players beyond traditional cellular networks, such as managed security service providers (MSSPs), cloud providers, enterprises, and technology partners, security often falls short."

So, how close is 5G for the enterprises?

"We expect some real announcements and real action in the market in the next five months. Real-use-cases, trials, and actual customer engagements will validate the 5G force. It's for real now," Mangal said.

Yes. Experiments have begun. But it will take time and proven solutions before more enterprises hop on this new wagon. Presently, all the big projections are only showing a glimmer of reality with just a few trials on a customized basis. "Right now it is too early to say which verticals will lean towards 5G as early adopters. Most advanced 5G services are in trial," Schoolar added.

Well. There's V8. There's Hyperloop. But then, there is something called 'imagination' too..

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"BENEFITS OF 5G GO FAR BEYOND JUST HIGH SPEED AND LOW LATENCY"

ANAND BHASKAR
Managing Director, Service Provider Business, Cisco India & SAARC

Shubhendu Parth (SP): 5G SA is unlikely to hit mass adoption until 2025. Where is the industry at present on the adoption curve?

Anand Bhaskar (AB): The uncertainty created by the current crisis and the need for a reasonable return on investment could push back the deployment, which means a delay in the mass rollout of 5G as well. However, from a network implementation standpoint, all service providers are at various stages of planning and working closely with equipment providers to make the network 5G-ready.

There is no doubt that the demand for 5G will rise as enterprises see a growing uptake of use cases across IoT, private LTE, and AI-based solution offerings, which require high speed, throughput and low latency. In this new normal, as people increasingly switch to digital platforms, high-speed broadband, and 5G will become essential to our lives. But, for the mass rollout of 5G in India, one of the first challenges to address is fiberization – accelerating fiber deployment in the country will be vital in making 5G a reality.

SP: Which sectors are likely to benefit the most from 5G?

AB: The benefits of 5G go far beyond just high speeds and low latency. The applications of this technology will give rise to incredible use cases across industries. For instance, the launch of 5G-enabled technologies is expected to be transformative for the manufacturing sector, as it enables large scale machine-to-machine communications. Its faster speeds and higher capacity will give impetus to AI, AR, predictive maintenance, and collaborative robots, digitally transforming every touchpoint of the supply chain and enhancing last-mile delivery.

Telemedicine, which is witnessing escalating demand, stands to benefit significantly from a 5G. With the low latency and high capacity offered by 5G, telemedicine will have access to high-quality real-time video, allowing healthcare systems to provide remote monitoring, cater to patients across geographies and even train healthcare providers in remote locations.

Lastly, for small businesses, 5G can help in establishing an online presence, serving customers virtually, and reaching a much larger, diverse, and remote consumer base unhindered by location. Additionally, 5G will support a much broader range of applications and services in sectors like agriculture, aviation, education, finance, and more.

SP: Industry 4.0 as a concept came up way back in 2011, but the world is still far behind in terms of large-scale automation. Do we need to wait for 5G to usher in this transformation?

AB: If 4G was all about feeds and speeds, 5G will be all about experiences and hence will have far greater transformative effects. Therefore, 5G is not just an incremental improvement over existing LTE and 4G. Some aspects of Industry 4.0, such as quick wireless communication between devices, sensors and computers, and the ability to handle large-scale data volumes are slowly taking hold with existing technologies, but 5G will be the driving force that will unleash the potential of Industrial Internet of Things (IIoT).

The disruption caused by the current crisis has led to significant changes in the way businesses function, the most prominent being the mass shift to remote working to maintain business operations as (or more) efficiently as on-site operations. Here, 5G-enabled IIoT devices have the potential to redefine traditional on-site job functions. Such devices can enable quality inspections, supply chain management, generic machine control, and increase automation and process optimization.

SP: The bandwidth and data transfer capabilities of 5G are likely to change the way IT supports business

> As 5G amplifies the need for secure, reliable networks, telecom service providers also have the opportunity to evolve into network and security providers.

processes. What should organizations do to prepare for this?

AB: With network advancement we gain access to a range of new possibilities and develop ways to harness them. 5G brings in the era of seamless connectivity, and unleashing its full potential requires early and sustained nurturing.

In preparation for a 5G-enabled world, organizations must examine their goals and consider how they can re-imagine business if they weren't tethered by wires, slow bandwidth, or latency. This includes developing a comprehensive digital strategy and considering the role that 5G can play in enhancing business processes. They also need to check their existing systems and infrastructure for 5G-readiness – in other words, start transitioning services and processes to the cloud.

The possibilities of 5G are endless. Organizations need to work towards identifying the opportunities it spells for their business, and start preparing their backend now to leverage 5G in the future.

SP: What will be the impact of 5G on security and network management?

AB: This crisis has witnessed an unprecedented increase in connectivity across industries. As a result, security has emerged as a primary concern in this complex digital ecosystem. While 5G's faster data speeds will help augment the user experience, the 5G network infrastructure will be largely virtualized with containerized workloads, which will expand the attack surface. Additionally, SDNs will accommodate many more IoT devices, thus increasing risks at every endpoint.

Furthermore, 5G will add many smaller antennas to increase data capacity. The addition of network infrastructure would mean more complex networks with the increased threat landscape. This needs automation and orchestration to make it error-free and reduce security threats, apart from enabling improved user experience. Here, a Zero Trust approach to security, which focuses on protecting data and access at all points through the assumption that all environments are hostile and breached, can help service providers ensure that the network remains uncompromised.

Automation, orchestration, and security are the three foundational pillars of a robust 5G network. At Cisco, we have been focusing on developing a 5G security architecture that is automated, dynamic, and self-learning. This architecture leverages artificial intelligence and deep learning to build a network that will orchestrate both physical and virtual resources, allowing network efficiencies to be optimized.

As 5G amplifies the need for secure, reliable networks, telecom service providers also have the opportunity to evolve into network and security providers.

SP: Experts believe that CIOs who are planning for 5G should also be thinking about the impact of Wi-Fi 6. How do you look at it?

AB: 5G and Wi-Fi 6 have been built from the same foundation. Both provide higher data rates to support new applications and increased network capacity, along with the ability to connect more users and devices. It is crucial to consider leveraging 5G as well as Wi-Fi 6 for the enterprise of the future as both will co-exist to support different use cases.

Wi-Fi 6 will be the ideal choice for indoor enterprise networks considering its improvements in speed, latency, and higher density of connected devices. Wi-Fi 6 offers advancements in broadcast capacity with access points broadcasting to multiple devices at the same time. It will help businesses drive more value from their present IT infrastructure, allowing them to attain 5G-level performance more affordably. Also, Wi-Fi 6 can ensure that with its improved multiple-input and multiple-output (MIMO) antenna technology, connections are not dropped, and constant speeds between devices are sustained, eliminating lags.

The combined force of 5G and Wi-Fi 6 will allow more mission-critical IoT devices to be connected reliably through wireless while providing enhanced mobile broadband for immersive experiences, making it vital for businesses to plan for both.

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"THE INDUSTRIES ARE GEARED UP FOR USING 5G"

MAGNUS EWERBRING
CTO, Asia-Pacific, Ericsson

Shubhendu Parth (SP): What is your outlook on 5G for the enterprises?

Magnus Ewerbring (ME): I am overwhelmed with the interest that the world has for 5G. Of course, it depends on country to country and where they are in terms of licensing and roll-out, and so on. But the direction has been very clear. When compared to the other Gs, the big change now is that the industries are really geared up for using 5G. The earlier technologies –3G and 4G – introduced data for consumers and unleashed a lot of potentials. Now we are taking a step to offer networks that enterprises can embrace. On the 5G front, Ericsson is serving operators which are live in four continents now. We comprise the only 5G bands that are commercial. We have been very early here. We are also present in North America, Europe, Asia, and in the Middle East. We have 40 live networks across the world and there are more to come.

SP: So which sectors, you think, would emerge to be the early adopters? Also, where is the industry, as of now, on the adoption curve?

ME: It may be a bit hard to say who are the early adopters but I can say where the potential is based on the study we conducted to understand the value of 5G for enterprises in 2030. Starting with the largest ones, these will be healthcare, manufacturing, energy, utilities, automotive, public safety, and media and entertainment. The first five are the dominant ones.

Many global payers are starting early. For example, we are supplying 5G networks to all the major car manufacturers in Germany. We are supplying it to manufacturers of equipment makers for tools. Very quickly, they are getting in there to make production more efficient, safer, and improving the quality of the products. Many industries are eager to go ahead and learn. It is a long process and one learns by doing something. Then one becomes more and more elaborate and moves into a new way of running factories.

SP: From technology perspective, how ready is 5G for adoption?

ME: We have just started to launch it. We have these releases in the standardization group 3GPP – 16, 17, and so forth. That will be a long journey; of many years where we see it mature more and more. From that point of view, one can go into a shop today – in Seoul or Manhattan – and buy a phone, plug in your SIM-card, and off you go. It is ready to be there. Likewise, you can

> There are benefits of 5G over the previous generations, as there are benefits of 4G over the previous 2G and 3G. Every generation, we become wiser.

put it into a factory and cut the wire for different things. It is ready to go.

The question is, as we climb the ladder, what functions are there to come, and what should we prepare for? The answer is URLLC or ultra reliable low latency communications. That is where you really push the delay and latency to minimal, down to milliseconds. But that will happen with 5G Release 17. It is not out there, but we already have prototype software, together with one car manufacturer in Germany in a reference factory. We are trying out how far the enterprise can push this part of the 5G standard for certain parts of its facilities. The release is not commercially available yet. It is expected next year. But that is a normal pattern. We continuously come out with new releases. Every release has some new features, and some new things have to be incorporated.

SP: Can you give a broader picture?

ME: When we were launching 5G we focused on the non-standalone (NSA) option. The industry did it deliberately. That was done out of consideration of the device side. It was more straightforward for implementing the option than doing the standalone (SA). So, the networks that are operational so far are using the NSA options. The SA option is coming in commercially this year. Then the devices will start to come out. So, give it a few months and standalone offerings will be there as well. Then I think you will have all the major parts of 5G, and then you have a normal evolutionary part of next year's release.

So, if you are a regulator, I would argue that there is nothing that prohibits you. 5G is ready to go. Likewise, if you are an operator, 5G is ready to go. Take the next release or upgrade the system. In that sense, it is straightforward.

SP: If we look from the user or the business perspective, what actual problem can we expect 5G SA to solve?

ME: Quite often, when I talk to people in the industry, they ask me, could they not use the 4G instead? It is true. In many cases, you want to make a phone call. You can use 2G for that. Similarly, for a factory using 5G, one may ask why could this not be done with a lower G? Yes, it can be done with a lower G, and there are implementations where they use 4G and it will be here for a long time. But when you do a new generation, you start from a clean cut.

There are benefits of 5G over the previous generations, as there are benefits of 4G over the previous 2G and 3G. Every generation, we become wiser. One such area is security. A manager or owner of a factory will want to make sure that the facility has the highest level of integrity and protection. One will also think about the robustness, reliability of the network, speed, latency factor, and how the installed equipment would get rolled over time.

We work with an institute in Germany that does research on manufacturing and we have seen such real, critical cases. For example milling of blades in jet engines requires very high precision and advanced technology. We use a high bandwidth sensor. If you can have ultra-low latency and real-time control of this, you can make the milling more accurate; improve the quality of the blades and efficiency of the process. That's 5G. High bandwidth, lots of information, need for very short latency for a high precision product.

SP: Since the actual 5G is still some time away, we understand that 4G and 4G LTE might continue to run the smart operations. Do we see private LTE as the interim solution that the CIOs must continue to consider even as they prepare for the next generation of network infrastructure?

ME: Of course, it will be there as well. We, as human beings, tend to think in simple steps. There is 4G, then 5G, and then everything is 5G. But it is an evolution. There will be a lot of activities in 4G going on for many years on the consumer side and also on the industrial side. It will be a factor of the type of enterprise and what kind of solution it needs, at what time. I am sure many solutions will be on 4G and then at some point in time, it will get upgraded to 5G.

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"THE SHIFT TOWARDS CLOUD AND AI WILL FUEL MASS ADOPTION OF 5G"

PANKAJ KITCHLU
Systems Engineering Director Juniper Networks India & SAARC

Shubhendu Parth (SP): The 5G-narrative has always been about enhanced mobility, flexibility, reliability, and security. What actual business problems can we expect it to solve?

Pankaj Kitchlu (PK): The ultra-reliable, low-latency mobile broadband offered by 5G has the potential to transform the entire industry and create entirely new services at a large scale, which could never have been offered in the past. The introduction of heavy industrial connected machinery that is equipped with real-time decision making would be possible with 5G in sectors such as energy, utilities, mining, or any other mass production driven verticals.

5G can also be utilized for ultra-low latency, critical applications that can be differentiated by service assurances, KPI, and SLA based on business needs that can be served by a secure and managed enterprise network slices. These include sectors such as healthcare, manufacturing, public safety, or enterprises, where physical presence is not possible.

It will also have an impact on the concept of Mixed Reality (MR), which is built on AR and VR for both enterprises and consumers where low latency is crucial to create an interaction between real and virtual worlds to deliver a product. MR augments what we see with additional information from virtual to complete the user experience. Enhanced interaction and manipulation in real-time is now possible with 5G. Sectors that can benefit from this include construction, interior design, retail, gaming, media, and entertainment.

SP: How will the existing commercial consumer-based 5G network be different from what 5G Standalone (SA) promises to offer?

PK: The deployment of 5G SA will be the real end-to-end network that can deliver the full potential of 5G. The current non-standalone (NSA) offering consists of elements of LTE/4G core while awaiting the wider availability and transition towards a full-fledged 5G architecture.

SP: How ready is the 5G technology for mass adoption by enterprises?

PK: The adoption of 5G can be seen as the first generation for enterprises, and the fifth generation for consumer. This is because in the past three decades, the majority of developments in next-generation networks have been focused on consumers, as well as B2C use cases.

As enterprises become more open to the adoption of 5G technology, there will be a surge in innovative and advanced use cases by enterprises embarking on their 5G journey. Furthermore, two other factors that will fuel this mass adoption is the shift towards cloud and Artificial Intelligence (AI), both of which will work hand-in-hand with 5G to make the enterprise transformation journey simpler.

SP: So, who would be the early adopters? Which are the sectors where we can expect to see some early 5G use cases?

PK: Early adopters are changing their architecture needs based on their business model offerings. Furthermore, the readiness of enterprises to adopt 5G to refine their offerings, as well as country-level initiatives by the governments and regulators are factors that will drive 5G investments. What will remain consistent is the basic need to deliver connectivity for organizations in the sectors like logistics, retail, manufacturing, robotics, automotive, mining, and ports. It will also play a big role in the healthcare, fintech, utilities, and transportation sectors, initiatives like smart city, public safety, and events like sports, entertainment, and tourism.

As enterprises become more open to the adoption of 5G technology there will be a surge in innovative and advanced use cases by enterprises.

SP: What will be the impact of 5G on enterprise networks since higher bandwidth and increased availability will need CIOs to focus on where to place storage and processing power on a network?

PK: There will be a low latency key change from hundreds of milliseconds to less than ten milliseconds, resulting in a game-changing reduction in round-trip delay time. This will bring the possibilities of the Edge Cloud even closer for enterprises.

SP: Will the avalanche of data flowing at a high speed from millions of connected sensors and devices necessitate a different level of security mindset?

PK: In today's landscape of omnipresent threats, security needs to remain top of mind with a focus on moving from detection to enforcement without any manual intervention. Real-time cyber attacks are very much a reality today, therefore it crucial that all touchpoints are secure to ensure uninterrupted and seamless operations.

With the massive influx of data from sensors and devices, enforcing security policies across every point of connection could be the starting point for enterprises to think of to create a much smaller attack surface. Juniper Connected Security, for example, unifies all network elements into a threat-aware network that can help detect and combat threats from numerous sources, ranging from native logging and cloud-based threat feeds to the Internet of Things (IoT) devices.

The Juniper solution also has the capability to protect the network from cybercrime, botnets, machine learning, hacktivism, and more. It can quickly create, maintain, and apply accurate and consistent network security policies. One can also manage security devices such as firewalls from a centralized location. The solution also enables organizations to use any physical or virtual machine on the network as an enforcement point, including switches, firewalls, routers, third-party security products, public cloud, and private cloud platforms, and third-party infrastructure.

SP: So, how is the company gearing up to meet the enterprise needs on the 5G front? Please share details of Juniper's offering in this space.

PK: Juniper offers multiple solutions at different levels. We have the Telco Cloud, which is the underlay and overlay network infrastructure with SDN-controlled operations for 5G service-based core. On the 5G transport, we have an end to end Network Slicing for each enterprise traffic type that is driven by business KPIs and SLAs.

We also offer on-premise distributed application hosting Edge Cloud (Edge computing) Environment within enterprise premises managed or hosted by a service provider, as also integrated and connected security, CPE/ firewall, and advanced SD-enterprise – SD-WAN, SD-LAN, SD-Wireless, and SD-Security. Besides, there is the Close-to-Enterprise CDN Services. Juniper has also invested with Stack Patch for delivering Edge Cloud.

SP: On the telcos front and from a roll-out perspective, how different is the 5G network from 4G? What are the challenges faced by the telecom service providers in rolling out 5G?

PK: This is the toughest part of the puzzle to solve. The delivery of capacity on a higher frequency band in urban and dense enterprise locations will be a huge challenge in terms of the footprint required for access radio planning. Furthermore, with highly dense locations needing more radios per square kilometers, the network highway to the nearest Edge Cloud, Central Core or larger Internet use cases will become more complex.

The solution to this challenge can be found in simple planning and having a long-term vision. Service providers can start looking at developing an architecture for the network of the next decade to more easily meet the demands of future growth and experience a more seamless transformational journey.

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"CREATE A 5G ROADMAP AND DEFINE THE FUTURE USE CASES"

SAMAR MITTAL
Vice President & Head – Nokia Software Business, India

Shubhendu Parth (SP): What is the real-world impact of 5G and how can enterprises and businesses benefit from it?

Samar Mittal (SM): When the mobile revolution happened in India, it was basically 2G-2.5G as we call it. It was basic connectivity, mainly voice. The use of data started to increase with 3G, and then we leapfrogged into 4G pretty quickly. We can expect 5G in 12 to 18 months. 5G brings in evolution – not just in terms of speed, but also in terms of peak capacity, concurrency, and a dramatic reduction in latency. These three pillars elaborate into enhanced mobile broadband (eMBB); ultra reliable low latency (URLLC); and massive machine type communication (mMTC).

If we look at it from an industrial revolution standpoint, it started with steam power, followed by electricity and assembly lines, and then electronics and programmable logic. Now we are talking of the fourth generation or Industry 4.0 that is being led by cyber-physical systems. It is also being defined by the convergence of operational technology, information technology, decentralized operations, and self-optimizing, autonomous forces. The need for industry 4.0 has gone up because of productivity optimization – there is a constant need for industries to produce more with less.

This is where 5G has a big role to play. Its impact will be beyond consumer telecom; it will benefit a multitude of industries like manufacturing, utility, logistics, retail, and any industry where extreme automation is required.

SP: Can you share some examples?

SM: Healthcare is one such example. We started the era of Fitbit a couple of years back, but now with the remote monitoring of people, we've already seen hospitals offering certain remote healthcare monitoring services. So, there will be a rapid evolution of IT systems – to cloud-native architecture with artificial intelligence (AI) and machine learning (ML) enabled system. A lot of this has already started with 4G use cases, 4G Plus, or private LTE, as you may call it.

We, at Nokia, have already embarked on this journey. We have a factory in Chennai where we are using certain private LTE use cases to automate. We've been able to carry out certain automation for other industries as well using AI, including smart cranes manufacturing. We've started to use the internet of things (IoT) as well in a better way to ensure that we increase efficiency in the network. While you can derive limited benefits of these use cases through 4G, things start to move pretty quickly the moment 5G is introduced with more flavors to it. So,

> 5G brings in evolution – not just in terms of speed, but also in terms of peak capacity, concurrency, and a dramatic reduction in latency.

you need not wait for 5G to happen. You can start these today and be ready.

SP: So when do can we realistically expect 5G standalone (SA)? And what is the state of readiness of the technology and the enterprises?

SM: From a specification standpoint, 5G SA is still some distance away; the specifications are still getting firmed up. Of course, it's evolving. And it might take some time for mass adoption because enterprises will have to go through quite a bit of change. At the same time, even the networks have to evolve, except in the case of a Greenfield operator, which will be none in India. Globally, there may be one or two Greenfield operators and they can start with 5G SA, but that's a very rare possibility because the return of investments for a Greenfield operator to start 5G might not be there. So 5G SA will still take some time.

But enterprises need to be prepared today with the non standalone (NSA) architecture today in view of the current situation and the way 5G is evolving. They need to do a lot of gearing up in their operational and information technology systems so that they're able to exploit 5G to its full potential as and when it starts to happen. It will be an evolution with the coexistence of 4G, the NSA mode.

SP: And what role can private LTE play here? Can it co-exist? What can IT leaders do to be ready?

SM: Private LTE is an interim solution. The new normal would be defined by a whole new level of automation. That means that existence with 4G will continue but many use-cases will start with private LTE like mining industries, shipping industries, remote surgeries, self-driven cars, or AR cases – where you need low latency or ultra-low latency.

There are several use cases that are primarily coming up: one is the FWA or the fixed wireless access, and then we are seeing automation of the industry. As in the case of our factory in Chennai, it can be started with private LTE. For them to fully realize the potential they will have to have to radically change their IT systems to meet the low latency demands. They need to adopt the cloud-native approach so that the network slicing and other core benefits can be realized the moment 5G comes into the picture. From an enterprise standpoint becoming completely 5G-enabled is a whole lot of change, which will take time. However, they can start with private LTE and then slowly evolve to further use cases of 5G.

As an IT leader, you need to evolve the backend systems so that the network doesn't impact the readiness towards 5G. So, the first thing to do is to create a 5G roadmap and define future use cases. You might not implement them today but a five-year vision will help create your backup systems accordingly. The second thing is to define the IoT strategy. The IoT sensors are non-standardized and hence if you have not done the sizing adequately, you may get stuck with the platform and sensors. Do not look at short-term strategy.

SP: What about the limitations of Physics that 5G faces?

SM: 5G deployment has to coexist with 4G so that we deploy it only where the need and return in terms of monetization are commensurate. So that's the plan that operators will follow. Coming specifically to the millimeter-wave topic and the limitation of physics, let me first highlight that the millimeter wave spectrum is required to address the network capacity demands of specific use cases like hotspot and fixed wireless access. So that's one solution, which can address some of the limitations of hotspot traffics and FWA. But the spectrum in this range has specific characteristics – it has high propagation losses, high fading, offers shorter coverage – but the high frequency helps in a different way. Since the size of the antennas can be quite small it enables us to pack more antennas in the access points and create a larger array.

Our approach to address the propagation loss and its limitation is through advanced beamforming using large antenna arrays and efficient network planning. That's where our decade's of global experience comes in use. We have been evolving network planning techniques are really pushing for spectral efficiency to get most capacity and we have demonstrated in certain cases, the spectral efficiency of up to hundred bits per second per hertz at 28 gigahertz millimeter wave. We have tried to solve the problem to a large extent, and of course it is evolving.

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[COMMENTARY]
MOBILE APPS

Blocking and the legal way forward

As an independent nation, India needs to do everything to protect the country and its sovereign interests in the digital and mobile ecosystems

BY DR PAVAN DUGGAL

India has launched the Atmanirbhar Bharat App Innovation Challenge, after a recent vacuum in the country's app ecosystem, to encourage Indian app developers to come up with innovative and new apps for the local users. This represents a first move by the authorities to encourage local app developers to meet the demand for domestic market-centric apps. In doing this, India has taken a cue from the approach by California, of creating an enabling ecosystem for app development.

India's decision to block 59 Chinese-origin apps has put to test the country's cyber law. It has also highlighted the need to have dedicated laws on data security and privacy.

This development has happened in the backdrop of the recent decision by India to block 59 Chinese-origin apps. The order has been passed because the said apps are stated to have a prejudicial impact upon the sovereignty, security, and integrity of India. Needless to say that blocking the apps has generated a lot of discussion and debate, both within the country and at the international level.

This is the first time in the history of independent India that so many apps originating or having links with one nation have been blocked by the Government of India. The power of blocking has been bestowed upon the government, thanks to Section 69A of the Indian Information Technology Act, 2000.

When one looks at the scope and ambit of the powers under the said Act, one realizes that this power of blocking off any information can be invoked on certain grounds as listed under the Act. It can be invoked in the interest of sovereignty and integrity of India, defence of India, the security of the state, foreign relations with foreign states, or public order or to prevent incitement to the commission of any cognizable offence.

A detailed procedure has been stipulated as part of the rules made under the Indian Information Technology (Procedure and Safeguards for Blocking of Access of Information by Public) Rules, 2009.

The present blocking does present various legal perspectives on the horizon. The public domain is featuring discussion of the impending legal challenges that are likely to arise, given the issuance of the unprecedented blocking order. One of the biggest issues in this regard is whether blocking of information in today's context is at all a relevant and topical remedy.

Blocking used to be effective in the 20th century. However, with the advent of the 21st century, the internet and its ubiquitous connectivity, and given the advent of Virtual Private Networks (VPNs), the blocking today has been rendered an illusionary option for the governments.

India's decision to block 59 Chinese-origin apps has not just put to test the country's cyber law, it has also highlighted that the country needs to have dedicated laws on data security and privacy. It is an accepted fact that India does not have any dedicated law on cybersecurity. This is strange given the fact that a number of countries across the world have come up with their own distinctive national cyber legal frameworks.

Further, despite Supreme Court of India recognizing the right to privacy as a fundamental right under Article 21 of the Indian Constitution in the judgment entitled "Justice Puttaswamy v/s Union of India", India still does not have any dedicated law on privacy. India's proposed data protection law — Personal Data Protection Bill, 2019 — is pending for consideration before the Joint Parliamentary Committee of the Indian Parliament. The said blocking has triggered off a bigger issue that India needs to have a holistic approach to these important techno-legal issues.

Because there is an absence of distinctive dedicated law on cybersecurity or on data privacy, India has no option to rely upon its mother Cyberlaw – the Indian IT Act, 2000. The absence of dedicated data privacy and security law also hamper India's legal approaches and further limits various options that the country currently has.

In this context, India needs to act quickly and proactively. It needs to learn from the experience of countries like Singapore, Australia, and Vietnam that have already legislated new cyber legal frameworks dedicated to cybersecurity and its various aspects. However, as India goes forward in the direction of coming up with its own cybersecurity legal frameworks, it is imperative that we should not engage in mere cut-and-paste approach but should be in a position to adopt global learning of various nations in this regard and

> There is a crying need for India to review and extensively amend the Indian IT Act, 2000 to make it topical and relevant in today's context.

needs to further customize such learning so as to be applicable in the Indian context.

India also needs to be cognizant of the fact that newly emerging technologies are not just emerging on the horizon but are increasingly playing a central role in national developments. Artificial Intelligence (AI) has been seeing massive developments. Further, the advent of AI is beginning to throw up distinctive legal and policy challenges and issues that will need to be appropriately addressed by the country. The advent of Blockchain and the increasing use of Bitcoins further drive the need for India to come up with effective legal frameworks to govern cryptocurrencies and crypto-assets.

With an increasingly large number of Indians using the Internet of Things (IoT) devices, cybersecurity breaches in the IoT ecosystem are beginning to throw up their own distinctive legal challenges. They will have to be appropriately addressed very quickly.

Given the newly changing ground realities of 2020 and given the massive learning that India has seen during national lockdowns, there is a need for Personal Data Protection Bill, 2019 to be revised and briefed up. Further, there is a crying need for India to review and extensively amend the Indian IT Act, 2000 to make it topical and relevant in today's context.

The country has to realize the growing importance and significance of apps, social media, over the top ecosystem as well cloud computing, which is once again underlining the ubiquitous nature of the internet as well as cyberspace. Appropriate attention needs to be given on the increasing emerging of cyberspace as the next new domain of warfare. India needs to be prepared for the next series of cyber-attacks that have already been predicted by various experts in different parts of the world.

With telecommunications emerging as the crucial lifeline and the basis for the operation and continued maintenance of other critical information infrastructures of the country, the onus has to be on the government to declare telecom as the critical information infrastructure of the country. In addition, all efforts have to be put to constantly work on protecting and preserving the cybersecurity of our country's critical information infrastructure. In ensuring that the country's critical information infrastructure is adequately protected, the country can contribute to ensuring the safety of its physical sovereignty as also its sovereign interests in cyberspace.

With the passing days, India is likely to see distinct legal issues and challenges rising, with the blocking of 59 Chinese apps. In the coming times, India has to focus, as a sovereign nation, to do all it takes, to protect the nation and its sovereign interests in the digital and mobile ecosystems.

The author Dr Pavan Duggal is a Supreme Court of India advocate, an expert on cyber law and cybersecurity law, and has been acknowledged as one of the top four cyber lawyers in the world. He is also the Chairman of International Commission on Cybersecurity Law

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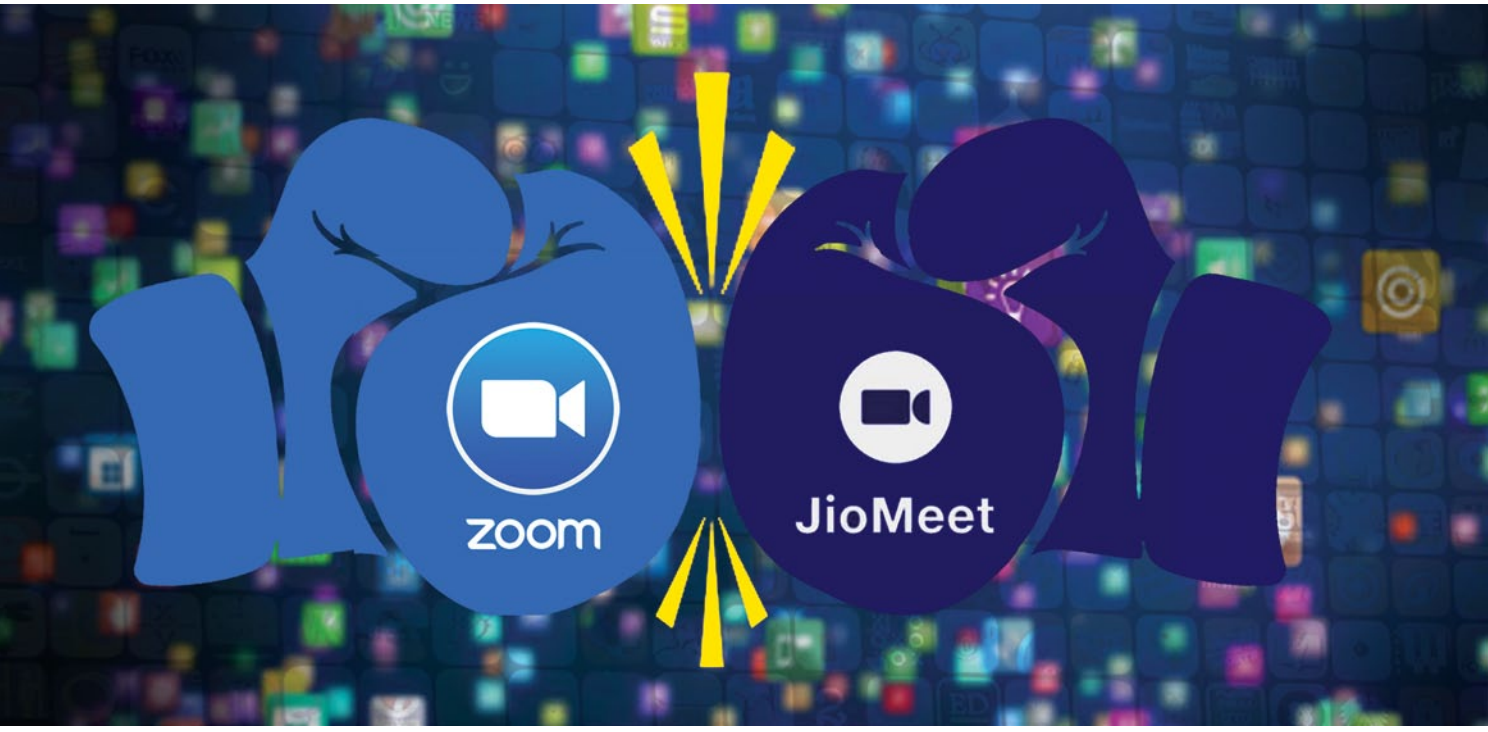
Harping on "Made in India"

Jio Platforms' video-conferencing application has features that are strikingly similar to Zoom. Is it really a great alternative and can JioMeet match its success too?



BY ARCHANA VERMA

Jio Platforms, the holding company of Indian telecom operator Reliance Jio has launched its video-conferencing application that can run across platforms – Android, iOS, macOS and Windows. The application is made in India and can be used both for video calls between two people and for hosting an online meeting of up to 100 participants. Besides, the platform allows one to host up to 24 hours of uninterrupted meeting. For security reasons, the company claims the meetings are encrypted as well as passwords protected.

- **Unlimited daily meetings:** You can host unlimited meetings with a maximum of 100 participants, including the host, for up to 24 hours at no cost. While this may appear like a great offer, several other platforms offer this feature. Allowing up to 100 participants in a web meeting is kind of standard in the video-conferencing world. So, JioMeet is not really offering anything extra here, except that Zoom, the platform that it has modelled itself, caps such free calls at 40 minutes. Google Meet also limits the duration of the conference to 60 minutes for free users.

- **Multi-device login:** The new platform offers multi-device login feature with up to five devices and you can seamlessly switch from one device to another device during the call. Again, this is not a special feature offered only by JioMeet. Most other platforms do offer multi-device log in and the ability to switch from one device to another.

> JioMeet has the added advantage of access to Reliance Jio's subscriber base. It also has the option of integrating the platform with Jio Platforms' other digital services.

- **HD video call and audio quality:** The JioMeet application offers clear and high definition audio and video calling support. However, the HD video call and audio quality will result in more consumption of data so you need to take care of this. In comparison, many platforms already available in the market offer good quality of audio and video streaming without compromising on the data usage volume.

- **Security:** Each meeting is password protected and the host can enable waiting room, so no random participant can join the meeting without permission. We can schedule a meeting in advance and share the meeting details with all invitees. However, unlike Zoom that offers end-to-end encryption, JioMeet is yet to share details of the encryption level and standard.

Other features include Screen sharing for collaborations, active speaker layout, safe driving mode and many more. The application is available on Play Store (27MB), App Store (59.5MB) and you can also download from the platform website.

So what's the USP?

Of late, Make in India has been riding the crest of the wave as public sentiments are in its favour, after the geo-political developments on country's line of actual control in Eastern Ladakh. To add to the fire, some fuel was poured over by Sonum Wangchuk, the local engineer who is also involved in environmental protection and social development.

Wangchuk released a series of videos in which he argued that by buying Chinese products we're doing harm to ourselves and we should buy only those products that are being manufactured in India. His videos captivated the public imagination and the general public opinion started to switch in favour of "Made in India" products. JioMeet is one such product, which is being launched with this tag to bolster its reception by the consumers.

One must remember here that Jio smartphones were being manufactured in China and it is only recently that the company began to make its 4G smartphones in India. Now with "Make in India" in vogue, Jio wants to capitalize on it and showcase its video-conferencing platform and is being vocal about local.

The Indian rivals?

The next question is whether there any other made in India video-conferencing platforms that people can choose from? Surprisingly, this market is not devoid of products. Even before the JioMeet was launched, India had Milan Setu, a cloud-based, secure application available on Google Play. There is also Say Namaste, which provides unique attendance link that remains live only for 24 hours.

Apart from these made in India video-conferencing platforms, there are several American platforms including Microsoft Team and Google Meet. These include GotoMeeting, Avaya, EZTalk and GlobalMeet.

In times of work-from-home, when video conferencing has become an integral part of office work, even if we don't have Zoom and other Chinese-origin video-conferencing platforms, the market is full of platforms to use. JioMeet will have a tough competition from all these platforms which have already been in the market for quite some time and offer similar features.

The promoters, Reliance and the holding company Jio Platforms, of course, have the muscle of money and power on its side. There is a chance that the smaller Indian platforms may not be able to stand up to the new VC tool as they don't have the resources to match the company's level of promotional campaigns. Besides, JioMeet has the added advantage of access to Reliance Jio's subscriber base. It also has the option of integrating the platform with Jio Platforms' other digital services.

If the government wants to have a market with several players and not one giant swallowing the smaller companies, then the government has to make the field more conducive for the other Indian video-conferencing platforms.

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Getting trustworthy culture right

Reliable networking is more than just a technological challenge. It's a cultural issue that permeates across functional departments, all the way to the C-level

BY PRADEEP KATHAIL

It wasn't that long ago that most enterprise resources resided in heavily-protected on-premises data centers surrounded by vigilant layers of security. Trust was placed in securing the computing environment itself – the physically isolated data center that only trained and vetted personnel could physically access and the network that strictly controlled connections from enterprise endpoints.

Now all the physical and virtual security layers built into data centers that we relied upon for years have changed. Data "centers" are wherever the data and applications are located – in public clouds, SaaS providers, branch sites, and edge compute and storage. Every employee uses mobile devices, some of which are personally owned, for accessing and manipulating corporate resources. Virtualized workloads move among cloud or IaaS providers to improve responsiveness to a workforce in constant motion. Branch sites quickly need new direct internet connections to work with cloud applications. Global black swan events cause enormous shifts as whole populations rapidly move to work remotely. The attack surface has grown exponentially, literally overnight.

Another evolutionary and significant change in the attack surface results from transformations in the basic architecture of router and switch hardware. Just a decade or so ago, most routers and switches that formed the foundation of corporate and world-wide networks were built with proprietary silicon, hardware, and specialized operating systems. Back then, hackers were content to focus on the population of billions of x86-based and Windows-operating PCs and Linux servers, taking advantage of the same vulnerabilities and exploitive toolsets to invade and infect them. They largely ignored routers and switches because they required specialized tools to attack vendor-specific vulnerabilities—too much work for threat actors with such a target-rich environment of x86 machines to troll.

Hackers turn to network for access

But the choice of targets changed as hackers increasingly turned their attention to attacking enterprise data

Source: Cisco

sources spread over distributed data centers, cloud platforms, and a mobile workforce. The opportunity for attacks became more prevalent as routers and switches gradually standardized on commodity hardware, Linux, and modules of open source code.

Some enterprises and cloud providers are even trying white box and bare metal boxes to shave a few dollars off data center networking capex. However, it's the shared x86 and ARM code, Linux, and open-source code that draws the attention of hackers, providing a potential foothold into corporate data-rich networks.

By focusing on gaining access to network devices through common attack routes, malevolent hackers may be able to steal security keys and IP addresses among other sensitive data, opening more pathways into the network and the treasure-troves of corporate data. This attack vector can be particularly insidious when open source code that is integrated into the Network Operating System has Common Vulnerabilities and Exposures (CVEs) that go un-patched, offering hackers convenient documented doorways.

Own networking devices, own the traffic

As network components became a more attractive target for hackers and nation-state spies looking for access to corporate resources, the sophistication of attacks increases to not only gain control over routers, but to hide the evidence of infiltration. The development of

> A chain of trust should be built-in, starting with the design, sourcing of parts, and construction phase of both hardware and root-level software.

persistent malware that can survive hard resets because the malicious code alters the BIOS or even the lower level boot loaders to gain control of the root is one such particular advancement.

Without built-in protection at the hardware root layer that prevents altered low-level code from loading and infecting the entire OS, detecting and eliminating these persistent malware infections is next to impossible. An infected networking device – router, switch, access point, and firewall – becomes an open gateway to all the network traffic.

With the multitude of dangers constantly testing the gateways of networks, there should be no such concept of "implicit trust". At the core of the defensive network is the principle of proven trustworthy hardware and software working in conjunction to protect the network devices from attack. By building on a foundation of trustworthy networking components and secure software, the connected sources of data and applications distributed through cloud services, branch sites, and a mobile workforce are also protected.

What are the fundamentals of building trusted network systems and what should CIOs and CSOs be asking of their vendors?

What CIOs and CSOs need to ask?

It's interesting to examine the paradox of enterprise CIOs and CSOs insisting that the hardware and operating systems of data center components are verifiably trustworthy while relying on a network fabric based on commodity components.

To secure critical data and application resources, trust must permeate the hardware and software that run networks from the data center to campus to branch and cloud. Needless to say, that covers a very large territory of intertwined components, each of which must reinforce the trustworthiness of the complete network. Here are some of the major points to research when selecting network vendors and choosing components.

- Is the network hardware authentic and genuine?
- What is the origin of all the software installed, including BIOS and open source modules?
- Have components or installed software been modified while the unit was in transit from manufacturing to the customer?
- Are network devices running authentic code from the vendor?
- Are there any known CVEs with the software, including any open-source modules?
- Are software and security patches available and applied?
- Is enterprise sensitive information, such as encryption keys, stored on network devices protected?

To ensure trust in a network, security-focused processes, and technologies must be built into the hardware and software across the full lifecycle of solutions. Such a high level of engineering and supply chain control is very difficult to accomplish on low-margin, bare-metal hardware. If the choice comes down to savings from slightly less costly hardware versus an increase in risk, it's worthwhile remembering the average cost of a single stolen record from security breaches is USD 155 (in the US), while the cost of the loss of customer trust and theft of intellectual property is incalculable.

A chain of trust should be built-in, starting with the design, sourcing of parts, and construction phase of both hardware and root-level software. It continues throughout the Secure Development Lifecycle (SDL), all the way to end of life for secure disposal of routers and switches, which can have sensitive data still stored in memory.

Security embedded in hardware

Hardware engineers must have an overriding mindset of security starting from sourcing of parts from reliable and certified manufacturers; designing secure boot strategies using Secure Unique Device Identifiers (SUDI)

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embedded in Trust Anchor modules (TAm); and Root of Trust tamper-resistant chips for secure generation and storage of cryptographic key pairs.

The SUDI is an X.509v3 certificate with an associated key-pair protected in hardware. This identity can be either RSA- or ECDSA-based. The key pair and the SUDI certificate are inserted into the TAm during manufacturing so that the private key cannot be exported. The SUDI provides an immutable identity for the router or switch that is used to verify that the device is a genuine product. The result is hardware that can be verified as authentic and untainted, maximizing the security of the traffic flowing through the network.

Secure software development lifecycle

Software developers must strictly follow the secure development lifecycle (SDL) guidelines for coding the network operating systems with a combination of tools, processes, and awareness training that provides a holistic approach to product resiliency and establishes a culture of security awareness.

From a trust perspective, the SDL development process includes product security requirements, management of third-party software, including open-source code and secure design processes. It also includes secure coding practices and common libraries, static analysis, and vulnerability testing.

Security and vulnerability audits provide assurance that as problems are uncovered during the software development and testing cycles, they cannot be ignored. Ideally, the audit team reports not to the engineering management but to the office of CSO or CEO to ensure that problems are completely fixed or the release red-lighted until they are remediated. This is an example of a culture of trust that permeates across functional departments all the way to the C-level – all in service of protecting the customer.

Ensure use of verified software

Once trust is established for the development and release of networking software, the next step is to ensure that the software images delivered to customers'

Source: Cisco

> As the number of products, software packages, and connected devices in networks continue to rise, it's inevitable that security vulnerabilities will increase.

controllers are original and untainted. To make a downloadable image trustworthy, it can be protected with a hash created with SHA-512, encrypted with a private key, and combined with the software image as a digital signature package.

That image is downloaded directly to customers' network controllers. The controllers use a matching public key to decrypt the digitally-signed hash and image package to verify nothing has been altered from the original image. Only software images that pass this critical test can be loaded on devices, preventing any malicious code from booting on a controller, router, or switch. This step ensures that only the vendor's approved and unaltered code is running on network devices.

Track, report, and fix CVEs

As previously discussed, open-source and third-party code and APIs are commonly integrated into all modern network operating systems. Likewise, the core OS for network devices is commonly based on open-source Linux kernels. All of these externally-developed code modules need to be certified by their creators and tested by neutral third-party organizations as well as the ultimate end-use vendor.

As the number of products, software packages, and connected devices in networks continue to rise, it's inevitable that security vulnerabilities will increase. Ironically perhaps, one reason for the increase in Common Vulnerabilities and Exposures (CVEs) is that the industry is getting better at finding and reporting them.

To ensure trustworthy networking, vendors must commit to coordinated disclosure, starting with a system for tracking every piece of open source and third-party code incorporated into network products. In addition, every CVE discovered either internally or externally needs to be tracked and fixed by a responsible entity in the trusted value chain of partners and suppliers. Customers, partners, and researchers need to be consistently notified of every recently discovered and fixed CVE and the potential for risk. Transparency improves customer security.

A Third-Party Software Digitization (TPSD) program is another example of a corporate-wide initiative for managing third-party software – including royalty-bearing commercial software as well as free and open-source software. The system automates the tracking and tracing of "Where Used, Where Is, Where Distributed" for compliance, contributions, security, quality, and customer accountability. A TPSD ensures that when a CVE is uncovered in open source or third-party code, the exact usage of the code is immediately known so that fixes can be applied in every instance.

As with the Security and Vulnerability Audit team, a Product Security Incident Response Team (PSIRT) that is independent of engineering is critical to keeping an unbiased watchful eye on all internally and externally developed code. PSIRT members continuously monitor open source and third-party code used in NOSs for reported CVEs. In addition, customers and researchers need a documented method of reporting to PSIRTs any CVEs that they discover. In turn, vendors need a transparent process for reporting on fixes and patches and level of severity back to customers, partners, and security researchers.

An important way to collaborate with industry peers on CVEs is through the Forum of Incident Response and Security Teams (FIRST) organization, which authors the PSIRT Framework. The Framework identifies the core responsibilities of PSIRT teams, provides guidance on how to build capabilities to investigate and disclose security vulnerabilities and their remediation to customers in a transparent manner.

As you consider the trustworthiness of your networking ecosystem, it's worthwhile considering your vendor's involvement with organizations like FIRST and the Industry Consortium for Advancement of Security on the Internet – which are strong indicators of a fundamental commitment to transparency.

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Defining DDoS defence design

The 2.3 Tbps DDoS attack on AWS highlights that enterprises should use zero-trust approach to secure applications in a multi-cloud environment and decide what not to expose

BY PAUL NICHOLSON

We have reached another milestone with the largest distributed denial of service (DDoS) attack on the record being reported by Amazon Web Services (AWS) at 2.3 Tbps in the first quarter of 2020. This surpasses the last record attack by a whopping 70%. The previous record-holder was the Memcached-based GitHub DDoS attack that measured 1.35 Tbps on 28 February 2018.

Effectively, these headline-grabbing "performance gains" in DDoS attacks have been escalating steadily over the last four years, with a major high-profile attack every two years. This trend includes the watershed Mirai botnet attacks of 2016.

Arguably, Mirai represented the highest-profile set of DDoS attacks with the "innovative" multi-vector botnet

> The Mirai botnet attack code was open-sourced, and to attempt to unsuccessfully hide its authors, many variants were created. These still plague us today.

attack targeting security blogger, Brian Krebs, at 620 Mbps, and continued with the report the next month from the French hosting company OVH of 1.2 Tbps. This DDoS attack, at over a terabit per second, was the first-ever seen.

The Mirai botnet attack code was open-sourced, and to attempt to unsuccessfully hide its authors, many variants were created. These still plague us today. Each of these record-setting DDoS attack has been different, but each can help us learn to develop better defenses.

Is this really the largest DDoS attack?

Scanning through the history and records of DDoS attacks one can note that despite its enormity this was not the largest attack. We have had first-hand customer reports of attacks larger than this just last year. However, this certainly is the largest publicly disclosed attack on record to date, and thus, it represents an important milestone.

Many organizations do not publicly disclose the extent or volume of attacks they experience. For example, one of our hosting customer showed statistics of DDoS detections and mitigations totaling over 25,000 in a 90-day period. This is not typically disclosed, and the attacks are steadily absorbed into a well-planned DDoS defense infrastructure.

With the increased focus on DDoS defence since the Mirai botnet attack, many organizations have deployed solutions to protect their users and networks, with most of the attacks mitigated and not reported. Preparation is the key to anticipating the normal and seasonal attack types that your solution can handle, especially complex multi-vector attacks, and ensuring you have the latest information about the DDoS weapons that could threaten user experience and your brand.

Ongoing threat research like A10's DDoS Weapons Report, the AWS Shield Threat Landscape Report and others should be regular reading for DDoS defenders.

Takeaways from the CLDAP and mPPS

The reported AWS attack was based on a Connection-less Lightweight Directory Access Protocol (CLDAP) DDoS reflection attack, which combined with amplification attacks, are techniques expected for a high-volume attack. We continue to see reflection and amplification attacks as the weapon of choice, along with CLDAP and other common amplification attacks such as exposed UDP Portmap, DNS, NTP, SSDP, and SNMP UDP-based services.

These attacks have two primary benefits: first, amplification of the attacker's payload could generate 5x, 10x or 100x the traffic from their requests, and second, they can spoof to hide the attacker's tracks while targeting the payloads at a specific target of their choice.

CLDAP is a known amplification tool, and while AWS does not offer many details in its report, we do know CLDAP is not one of the top DDoS weapons available today. The A10 threat research team analyzed information regarding the threat of CLDAP versus other DDoS weapons and it paints an interesting picture.

In the latest information from A10's DDoS Weapons Report for Q2 2020, CLDAP does not make the top-five DDoS weapons. It is far less prevalent as an available weapon to exploit. We can see the number of open CLDAP servers compared to the top-five is a fraction. For every CLDAP weapon there are 116 Portmap weapons. So, while it is a smaller attack surface, it is still highly exploitable, as the AWS DDoS attack showed.

When we look at the top-five countries for all DDoS weapons, we see over two million weapons in the United States, but in comparison, we only see 1,294 CLDAP weapons. This is just 0.13% of those weapons. The lower numbers are not a huge surprise. A couple of large cloud-hosting organizations, including Amazon, show a larger number of weapons as compared to the typical high-profile networks (by ASN designation), which could point to the fact that these servers are inadvertently being advertised, and possibly not secured properly,

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by enterprise IT teams who have ported application workloads to the cloud.

Enterprises should tightly secure applications in multi-cloud environments using a zero-trust model, for example, to decide what should and should not be exposed. DDoS protection is another layer in a zero-trust model that can report on network anomalies, stop unwanted traffic and mitigate attacks. In cloud environments, the shared-responsibility model should be employed as security is not just the provider's responsibility. This, again, points to the need for a zero-trust security approach and mindset.

While the throughput of the attack is often the focus as it is a big headline-grabbing number, the additional numbers from AWS Shield do also warn of other trends DDoS defenders need to plan for. We've often talked of millions of packets per second (mPPS) numbers as a key metric a DDoS solution should take into account. The Verizon Threat Report of 2014 showed alarming increases, and obviously those numbers are dwarfed now. That said the steady increase is interesting. We see the CLDAP attack was a dramatic spike over the "largest bit rate (Tbps)" YoY/QoQ numbers by 188% and 283% respectively, but it's also notable to look at the "largest packet rate (mPPS)."

The mPPS increased at a steady YoY/QoQ of 13% and 4% respectively. The real numbers come in for the periods of Q1 2019, Q4 2019, and Q1 2020, as 260.1 million, 282.2 million, and 293.1 million. That is a lot of packets, and it is not abating. Now this was not necessarily because of the CLDAP attack, but the latest of these happened during the same quarter, reinforcing the need for a comprehensive DDoS protection strategy. Clearly, there are multiple peaks that must be conquered not just the headline-grabbing one.

How to protect yourself?

CLDAP is a UDP-based directory lookup protocol complementing the TCP-based LDAP protocol. It is designed to reduce the connection overheads at retrieving organizational resource information from a directory service database when using LDAP. However, as mentioned in the CLDAP RFC 3352, the protocol was inherently designed with security vulnerabilities such as anonymous access, no integrity protection, and missing confidentiality protection.

If the CLDAP server is not properly configured and is exposed to the internet, it will respond to any requests even if the CLDAP client is spoofed. The CLDAP responses could be as high as 56 to 70 times the original CLDAP request. This is known as a high amplification factor. Because of its high amplification factor, CLDAP servers are often exploited by the DDoS attackers for UDP reflected amplification attacks. At the time of this article, we are tracking 15,651 CLDAP servers open to the internet that could be used to trigger gigabits, if not terabits, of amplification attacks.

Since the reflected CLDAP packets all come with UDP port 389 as the UDP source port, blocking or rate-limiting port 389 traffic from the internet is an effective DDoS protection method to mitigate the CLDAP reflection and amplification attack, especially if it is not expected to receive CLDAP responses from the internet. Alternatively, TCP or encrypted LDAP configurations can be used.

While CLDAP is the attack du jour, the largest attacks have all used different attack vectors, so the next record DDoS attack is unlikely to be CLDAP, but it is likely to be a DDoS amplification and reflection attack, based on the top DDoS weapons we see quarter after quarter. Thus, it's important to ensure that you have baselines for your traffic, practice zero-trust DDoS defense best practices, and keep up to date on the latest DDoS attack trends.

Proactively protect the network so you do not become the next DDoS headline.

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Get ready to face the unknown

The new-generation, easy-to-use end-to-end encrypted solutions can help organizations secure their sensitive data and that of their customers

BY PRAMOD SHARDA

"The biggest part of digital transformation is changing the way we think," a quote every industry is currently adapting while facilitating remote-working to their employees. In regular terminology, transformation is any significant change in form, nature, or appearance. At the moment if we look around us, we can see transformation evidently; individuals, organizations, as well as industries, have all transformed or transforming, modifying the traditional methodologies in order to fit into the current landscape.

The onset of COVID-19 has accelerated the path to the cloud. Today, cloud computing has become the core for most organizations, and it will continue to remain the same in times to come. The post-COVID phase would certainly witness stupendous growth in this area as it is affordable, easy to use, and also highly customizable. The dawn of cloud technology brought us closer and made communication one of the most essential aspects of human life easier and faster.

There would occur to be a need to digitize every aspect of a business process that will be beneficial in the longer run. In response to the pandemic, companies have also adopted the requirement of efficient team collaboration tools as a way to ensure remote teams can communicate and collaborate. Collaborative solutions are the need of the hour highlighting the paradigm shifts in business operations.

COVID, collaboration, challenges

There exists a certain uncertainty that comes along with digitization and it strictly refers to data security. But concerns over security are genuine and enduring. With the rising concerns over data protection and privacy, many enterprises feel uneasy about passing control of their communications infrastructure to a third party. With security breaches and malfunctioning, it is imperative that we are vigilant and, on our toes, to face unknown challenges.

However, communication on different platforms, such as social media and emails, requires a certain level of privacy. Moving our communications onto the cloud exposes us to the risks of hacking, identity theft, DDoS attacks, malware, and eavesdropping. Time and again leading organizations have made it to the headlines owing to data breach and it becomes immensely important for organizations to choose collaborative solutions carefully enough to not end up as the victim.

Thus evolved the need for end-to-end encryption, a communication system wherein when a user sends an email or a message to someone, no one is monitoring the network or can see the content of the user's message. Encryption is the basic building block of data security,

> The risks of being unable to secure an organization's data are immense, but properly encrypting corporate information can save USD 385,000 per breach.

it doesn't just stop people accessing user's data or eavesdropping on conversations it offers protection and ensures a computer system's information can't be stolen and read by someone else.

Why E-2-E encryption?

The end-to-end encrypted cloud allows one to get a higher level of security for their data, one of the most important ways to ensure data integrity on any computer or phone. It blocks third parties from accessing the data and saves us from the trouble that can be caused by a malicious hacker.

Most individuals struggle to understand the need for end-to-end encryption, with the advancement in technology we need to acknowledge the fact that nearly half the population is actively using digital spaces to communicate and connect with the global audience. With more and more people gaining access to online communication on various platforms there has been a significant rise of data breaches and cybercrimes across these platforms. End-to-end encryption allows us to continue the conversation without the fear that our private information is being read or secretly modified, by anyone else except the sender or receiver(s).

Whenever communication occurs on a cloud, they have no ability to see the content. That's because the encryption and decryption of messages sent occur entirely on the device. Prior to a message leaving the device, it is protected with a cryptographic lock, and only the receiver has the keys to unlock the same. The keys change with every message that's sent. All of this happens behind the scenes confirming the conversations to be safe and secured.

The pandemic has however changed the scenario of the existing work culture and there has been a major shift towards remote working. Remote working has enabled individuals the comfort to work from home without getting exposed to COVID-19, however, this further reflects the increase of individuals accessing their home networks for the same. This resurfaces a common dilemma of the users instating chances of interruption/ hacking or other malicious attacks. However, having an end-to-end encrypted cloud interface back up allows one to ease out the tension of malicious attacks or data breaches.

The risks of being unable to secure an organization's data are immense, but properly encrypting corporate information can save USD 385,000 per breach, according to a recent study. The new generation of secure, easy-to-use, and competitively priced end-to-end encrypted solutions now present in the market are effective tools that can help organizations secure their sensitive data and that of their customers. All this occurs while providing easy access to stakeholders through advanced security features.

End-to-end encryption implements Transport Layer Security (TLS) which is intended to prevent data the messages are encrypted by the sender but the third party should not have the means to decrypt them. Such prevention is possible because plain text messages are encrypted in the form of ciphertext and then again decrypted when the recipient is expected to receive it. We can say that encryption is the transformation of data from a readable format into an encoded format that can only be read or processed after it's been decrypted.

End-to-end encryption works on certain encryption algorithms. The message sent is encrypted with the help of an algorithm; the same can be decoded by using a particular key. This key can be stored on the receiver system and the same can further be transmitted with the data that has been encrypted.

In today's parlance with the fast-evolving technologies, there is a new challenge every day, but with new challenges there arises a need for newer ideas and solutions. There is an increased dependency on the IT sector to innovate and equip ourselves for what lies ahead. Cloud communications have become one of the most significant aspects today, in areas of technological development in order to devise enterprise-class security protections designed to counter those risks.

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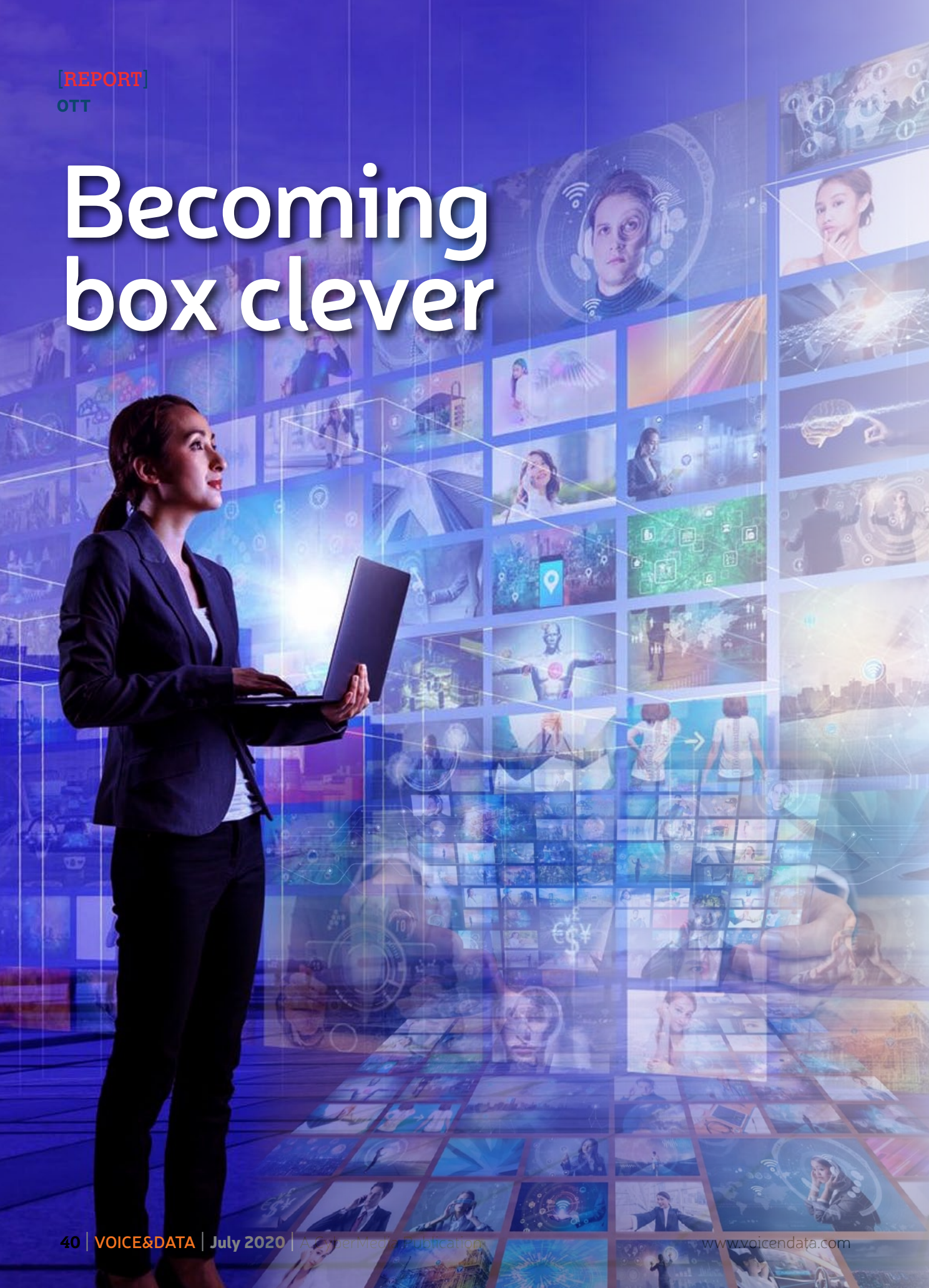
Becoming box clever



The majority of Indian users prefer to consume entertainment when they want, not when the broadcaster decides to deliver it. This has created a level-playing field for OTT platforms

BY SOMA TAH

There was a time when it was hard to imagine a house without a television set, and now for many, it is even harder to imagine life without a smartphone and mobile internet connection. The average cost of 4G data and smartphones in India has gone down drastically in the last few years giving people more ways to consume entertainment at their own pace and the comfort of their choice of personal screens.

The entry of Reliance Jio into the Indian telecom space has not only disrupted the industry pricing for 4G data or 4G devices, it has made a far-reaching impact on the mobile video consumption too. Thanks to the availability of digital entertainment options offered by the Video on Demand (VoD) or Over the Top (OTT) services, an increasing majority of the Indian internet users today consume content when they want, not when a broadcaster and content owner decides to deliver it.

The all-pervasive smartphones with affordable data have also brought the vibrant native speakers base of 22 scheduled Indian languages from Tier 2, 3, 4 cities online and created a massive opportunity for the domestic OTT players to serve them in their native languages. Because, unlike the prominent OTT players such as Netflix, Amazon Prime, or Hotstar that largely cater to the English and Hindi-speaking urban population, regional OTT players have the advantage of targeting a mass market comprising semi-urban and rural populations.

The engagement levels of the Indian language internet users were also found to be on the higher side (530 minutes per week) than urban internet users (487 minutes per week), confirmed a study data by Google and KPMG in 2017.

"There is a huge potential lying for OTT players in Tier 2, 3, and 4 markets which can't be ignored. We, at ALTBalaji, are currently focusing on ensuring that we dominate the Hindi speaking mass market because when you look at the geography and demography of the country, 70% of the content consumed is in Hindi," ALTBalaji SVP-Marketing for Analytics and Direct Revenue Divya Dixit said.

Adds Happii Digital and Broadcasting Network Director Kailasnath Adhikari, "The next wave of growth in OTT landscape will come from our very own Tier 2,3,4 cities and the Indian language speaking population. The increasing digital revolution in these places will help bring a massive surge in viewership and subscriptions across the OTT platforms and will also help to create a demand for Indian language content as well to cater to this new set of viewers. It will be the same as what regional channels did to television roughly a decade ago."

As per KPMG estimates, Indian digital media and entertainment (M&E) revenues grew from Rs 121 billion in FY18 to Rs 173 billion in FY19 at a growth rate of 38.5% CAGR- making it the fourth largest revenue contributor in

> Unlike Netflix, Amazon Prime, and Hotstar that cater to the English and Hindi-speaking urban population, regional OTT players can target the mass market.

> As binge-watching on OTT platforms become more common, the content creators are experimenting with different genres and formats of content.

the Indian M&E space after TV, print and films. The M&E sector in India was estimated at Rs 1,632 billion in FY19. Digital is also the fastest-growing segment among all and it might even surpass the film revenues in the coming years *(see: India M&E Market Size & Revenue)*.

Viewers' habit is evolving

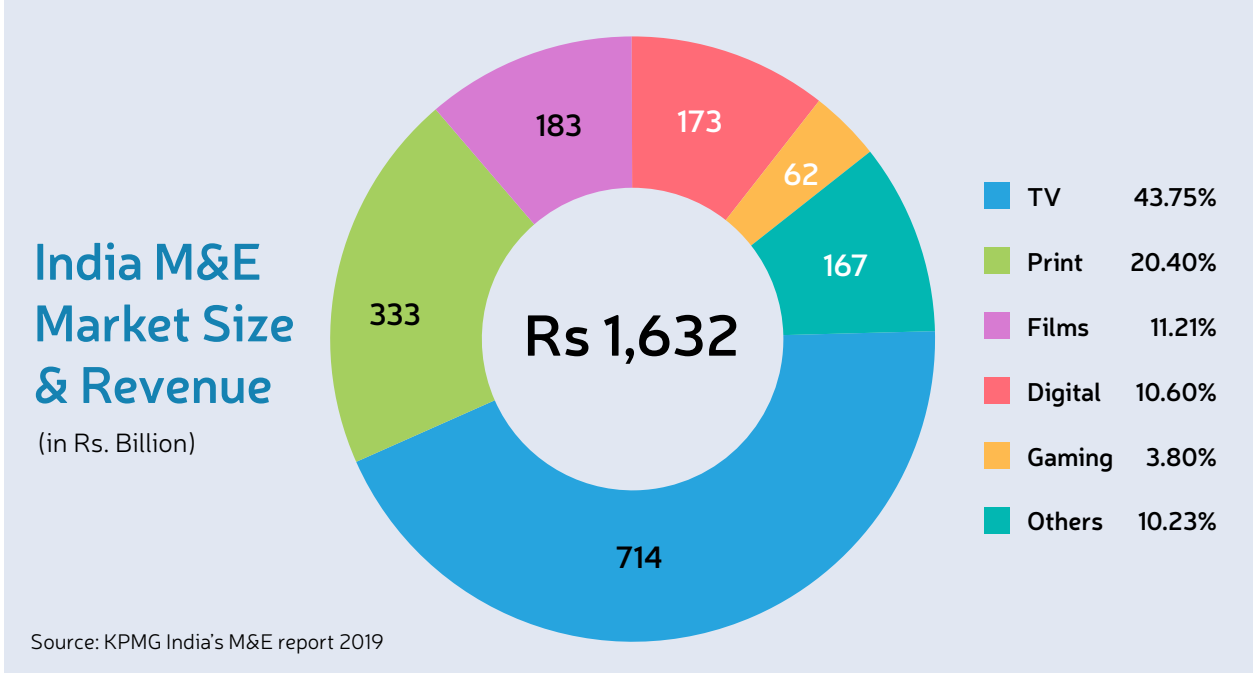
The viewing habits of Indian consumers have evolved a lot in the last few years. While on the one hand, short-form video content consumption on smartphones and social platforms has been on the rise, binge-watching shows on various OTT platforms have also become more common on the other hand, rather than watching them on daily or weekly installments. This has let the content creators experiment with different genres and formats of content.

"The way different channels exist on television, similarly different products provide very different relationships with the customers. They sit in different spaces in the customers' lifecycle. If we look at it from a consumer's lens, it's just that some days people like to watch comedy, and some days they like to watch a drama," Eros Now CEO Ali Hussein stated.

He further added that an increasing number of viewers are now interested in watching original shows and hence a lot of OTT players are now focusing on creating content. "This is an interesting phenomenon because it brings storytelling in a new form and redefines the way OTTs focus on customer acquisition and retention with unique content strategy."

According to Shemaroo Entertainment COO – Digital Zubin Dubash, different viewers have different choices and it is essential to offer customized and curated content as per their choice. "ShemarooMe has specialized content categories which include movies, music, devotional and kids content, comedy category to cheer people up during these testing times. We give consumers the freedom to pick and choose from the categories of content and pay for them separately," he said.

A recent Zinnov study on the Internet content consumption in India observed that most of the Tier-2, 3, 4 city-dwellers access the internet for the first time through mobile phones and therefore present unique preferences in terms of content variety, language, and format. Zinnov has categorized the content consumption



Source: KPMG India's M&E report 2019

> With people isolating themselves due to the pandemic from mid-March onwards, there has been a dramatic increase in the time spent on online games.

trend under 3Vs – variety, vernacular, and video-first *(see: India M&E User Preference)*.

The COVID-19 impact

Social distancing and work-from-home during COVID-19 outbreak have also changed the entertainment consumption patterns of people across the world. Outdoor entertainment modes took a blow, but certain segments of media and entertainment saw a generous amount of spike in the consumption, particularly in TV, OTT, and gaming, in terms of time spent and new user acquisitions.

An interesting app usage data insight by Bobble AI reveals a whopping 82.63% increase in time spent on various OTT platforms during the first half of Lockdown 1.0 in India. Netflix has seen a 110% increase in time spent, followed by Amazon Prime Videos with a 98.92% increase. Netflix saw a 54.80% increase in daily active users (DAU) count also, while Amazon Prime saw a 23.52% increase.

Keeping the viewers hooked

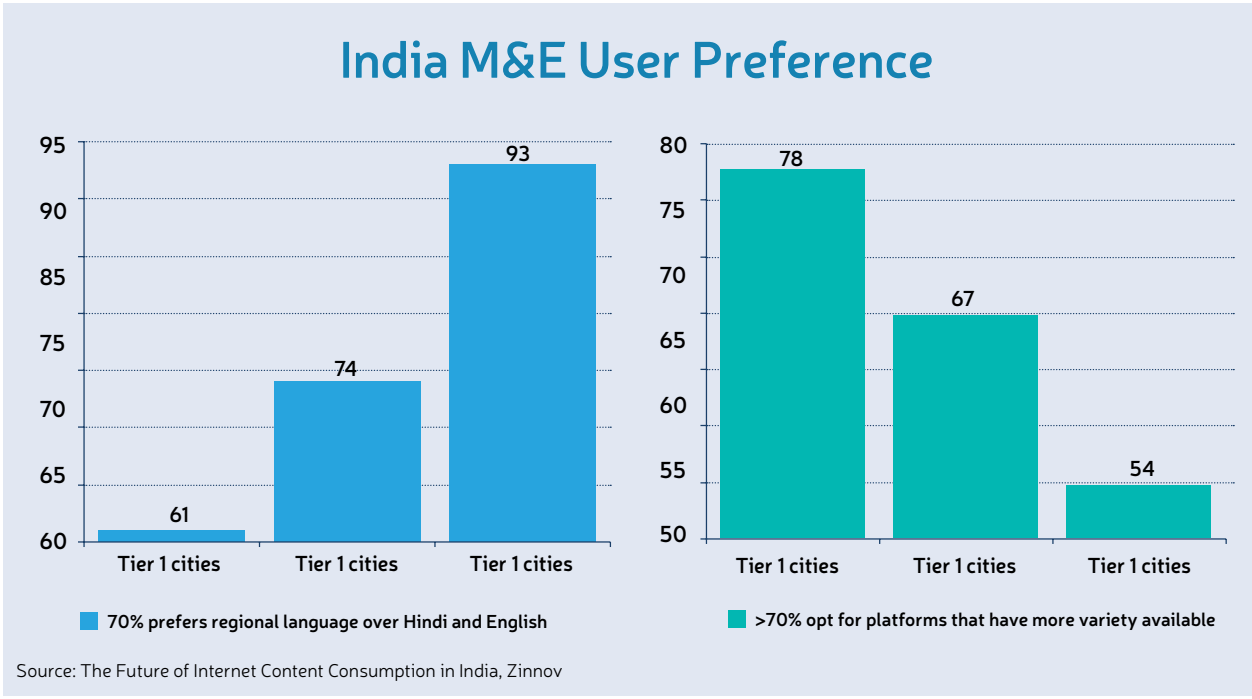
The OTT industry might be witnessing unprecedented growth as the perfect home entertainment option during COVID-19 crisis. The real challenge will be to keep the users hooked on to the platform, even after the home confinement ends. In the long run, OTT platforms need to think beyond views and build sustainable strategies that drive growth and monetization.

OTT platforms in India today are mostly dependent either on advertising or on subscription for monetization. Since India is a price-sensitive market, most consumers do not want to pay premium prices for digital content. A great deal of involuntary churn also happens due to a lack of auto-renewal in the subscription. On top of that, the fact that customers are content loyal, not platform loyal making it extremely necessary for the OTT players to invest in vibrant content repertoire and originals to differentiate makes it even more difficult for the OTT players to sustain.

OTT platforms have started exploring effective techniques to keep customer acquisition low and expand monetization opportunities. To boost the subscription revenues OTT platforms have now come

India OTT business & monetization models

Monetization Model	Details		Key Players
Subscription-based video-on-demand (SVOD)	Users pay subscription charges to get access to the entire content repository	amazon prime video, NETFLIX, ZEE5, ALT BALAJI, EROS NOW, YUPPTV, SUN NXT, HOOQ, voot kids, hoichoi	Amazon Prime Video, Netflix, Zee5, ALT Balaji, Eros Now, Yupp TV, Sun Nxt, HOOQ, Voot Kids, Hoichoi
Advertising-based video-on-demand (AVOD)	Users watch content for free and platforms earns revenue through advertisements	TVF, YUPPTV, Arré, MXPLAYER	TVF, Yupp TV, Arre, MX Player
Freemium	Hybrid OTT business model combining features of AVOD and SVOD models	YouTube, hotstar, ALT BALAJI, EROS NOW, SUN NXT, YUPPTV, HOOQ, voot, SONY liv, hoichoi	Youtube, Hotstar, ALT Balaji, Eros Now, Yupp TV, Sun Nxt, HOOQ, Voot, Sony Liv, Hoichoi
Transactional video-on-demand (TVOD)	Users pay one-time payment per view instead of subscribing to the OTT packages	VEQTA, YouTube, ZEE5	Veqta, Youtube, Zee 5
Telecom revenue	Users need to pay telco charges and get complimentary access to the OTT platforms	JioTV, airtel Xstream, PLAY vodafone, Idea Movies&TV, TATA sky binge	JioTV, Airtel Xstream, Vodafone Play, Idea Movies & TV, Tata Sky Binge



Source: The Future of Internet Content Consumption in India, Zinnov

up with innovative pricing structures like sachet pricing, mobile-only pricing, offline payments, content bundling, regional packs, etc. They are also exploring strategic partnerships to get access to a wide customer base and better monetize their content through collaboration/ syndication route, partnerships across telcos, cable/ DTH operators, other digital platforms, cab aggregators, and even hardware platforms *(see: India OTT business & monetization models)*.

Partnerships spurring OTT growth

RJio's entry disrupted the Indian telecom space with free voice and extremely low data prices. RJio has not only changed the way people consumed data on mobile phones, but also led to a sharp decline in telco revenues. Telcos had no option apart from looking beyond the traditional voice and data offerings and encouraging data consumption on their networks through content offerings, which has largely been executed through strategic partnerships with OTT platforms. Such strategic partnerships with telcos were also important for OTT platforms as they get faster and wider access to a captive subscriber base with minimal spending on customer acquisition.

All the three major telcos including RJio, Airtel and Vodafone Idea have now become content aggregators for various OTT platforms. They are leveraging those content partnerships to upsell higher prepaid or postpaid voice and data plans to subscribers.

The next big bet: online games, sports

Premium live sports continue to draw a large set of viewers for TVs in India. Sports media rights market was worth USD 1.1 billion in 2019, according to a report from Media Partners Asia. OTT accounted for 21% of sports media revenue generation in 2019 across the 11 APAC markets and the number likely to almost double over the next five years to reach 40% by 2024, the report said.

However, the disruption of sports broadcasting due to COVID-19 has opened up new opportunities for OTT players. With people isolating themselves at their homes due to the pandemic scare, from mid-March onwards, a dramatic increase has been recorded in the time spent on online games. Hence, online games have emerged as an attractive option for OTT players with the power to engage the young and adult demographic alike.

Gamification is also considered to be a good way to reduce churn, enhance stickiness, and user loyalty on any OTT platform. A few OTT players such as Hotstar and Zee5 are using live sports and gamification to drive content engagements on their platforms already, and we are likely to see more OTT players betting big on online games. This will not only help them look beyond their core offerings but help them broaden their content repertoires and turn themselves into a one-stop entertainment destination for the users in the future.

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"DOMESTIC PLAYERS ARE HEAVILY FOCUSED ON REGIONAL CONTENT"

ALI HUSSEIN
CEO, Eros Now

Soma Tah (ST): How do the consumer viewing habits impact the content creation and delivery strategies for the OTT platforms?

Ali Hussein (AH): The way different channels exist on television, different products provide very different relationships with the customers and hence they sit in different spaces in the customers' lifecycle. If we look at it from a consumer's lens, it's just that on some days people like to watch comedy, and other days they like to watch a drama. So, when they want to watch a cover song of a particular popular track, they would potentially go to a platform like YouTube. When they want to watch a TV serial which they've not been able to catch up on the television, then they would go to platforms like Hotstar or JioTV. Similarly, if they want to see some popular and evergreen films of yesteryears, they would come to a platform like Eros Now.

An increasing set of viewers are particularly interested in watching original content, hence a bunch of OTT platforms are investing heavily on creating originals now. This is an interesting phenomenon because it brings storytelling in a new form and redefines the way OTTs focus on customer acquisition and retention with a unique content strategy.

ST: Between the short snack-able content and binge-worthy content, which one wins?

AH: There are two very separate kinds of consumer behaviours that cue into why they're watching a particular platform or why they watch a particular type of content. The short-form recreational video consumption had indeed gone up drastically over the last few years, predominantly on social platforms. Till recently, India also happened to be one of the biggest markets in the world for TikTok. But it is not at the cost of lean back viewership, where people prefer to watch a film or binge-watch a series. Both those use cases are prevailing in the consumer's life and both will continue to grow simultaneously.

> An increasing set of viewers are interested in original content, hence a bunch of OTT platforms is investing in creating originals now.

ST: With players like Amazon and Netflix focusing on regional content is it becoming the new battleground for OTT in India?

AH: If we look at Netflix and Amazon- they essentially started as an English language content service. Between them, Amazon has made a bit more headway in terms of building the Hindi or regional repertoire. Domestic players, on the other hand, are heavily focused on regional content. India with its large population base will let the OTT platforms continue with their play and forte – they just need to work up their strengths to build to cater to their target viewers.

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"LOCAL AND RELATABLE CONTENT GIVES INDIAN OTT AN EDGE"

DIVYA DIXIT
SVP-Marketing, Analytics and Direct Revenue, ALTBalaji

Soma Tah (ST): Has India's growing affinity towards OTT platform changed the content strategies for the domestic players in the segment?

Divya Dixit (DD): Digital has primarily been an ever-evolving medium that is constantly innovating. The competition amongst OTT players is ever increasing. Any major player would need five key elements to stay ahead in this game of running a virtual entertainment business. It includes uninterrupted connectivity, going local as mobile devices become the primary source of content consumption, the requirement to explore new experiential options, value pricing for the end-user, and personalized content offerings for the end consumer.

Additionally, Indian originals have picked up pace in the past few months as audiences are in the lookout for local and relatable content. Indian OTT players have an edge over international players as they understand the market better which helps them create content for different sets of audiences. At ALTBalaji, we have the largest content library of Indian originals which are attracting the audience. With a plethora of diverse content spanning across multiple genres, our programming has something for everyone. The genres that best perform on our platform are thrillers, youth-oriented shows, young romance and urban drama. Some of them are garnering high viewership numbers even months post their launch.

ST: The OTT in India has largely been a metro phenomenon. Are you actively exploring the largely untapped market of the vernacular speakers residing in Tier 2, 3, 4 cities?

DD: When it comes to language content, 64% of India's digital video consumers prefer consuming content in Hindi, says a KPMG report. We have a vast library of 60+ originals across genres that cater to all kinds of audiences. Our shows that were launched three years back when we entered the industry are still immensely popular amongst audiences and relevant even in today's date.

Indian originals have picked up pace in the past few months as audiences are in the lookout for local and relatable content.

There is a huge potential lying for OTT players in Tier 2, 3, and 4 markets which can't be ignored. We are currently focusing on ensuring that we dominate the Hindi speaking mass markets as when you look at the geography and demography of the country, 70% of the content consumed is Hindi. Taking these Hindi offerings to wider and regional audiences, many of these shows have also been dubbed in other Indian and International languages like Tamil, Telugu, Malayalam, Bhasa, Arabic, etc. amongst others. Realizing the growing importance to localize our content, we will gradually move towards other regional markets and shall continue to focus on expanding our language content library in the coming years.

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"CONTENT WITH CULTURAL ETHOS GARNERS BETTER NUMBERS"

KAILASNATH ADHIKARI
Director, Happii Digital and Broadcasting Network

Soma Tah (ST): India's OTT has largely been a metro phenomenon. Do you have plans of tapping the large vernacular audience from the tier 2, 3, and 4 cities?

Kailasnath Adhikari (KA): Urban audiences are on OTT, but the next wave of growth in the sector will come from our very own tier 2, 3, and 4 cities and Indian language speaking population. The increasing digital revolution in these places will help bring a massive surge in viewership and subscriptions across the OTT platforms and will also help to create a demand for Indian language content as well to cater to this new set of viewers. It will be the same as what regional channels did to television roughly a decade ago. TV started with Hindi and then we saw the massive growth in regional television be it entertainment or news. Our Bhojpuri and Marathi broadcasting did phenomenally well. We foresee the same for the OTT business and are looking to produce some engaging regional content for the web.

ST: How important is it for the OTT players to create content offerings and formats keeping the viewers' interest, attention span, and watching habit in mind?

KA: Businesses will thrive not only by retaining current subscribers but also on reaching out to new ones and making them subscribe to your platform. Thus, it is extremely crucial for any platform to study the viewing habits of the consumers, and their content preferences, etc. The exercise will help the OTT players in creating new originals formats that will help them catch their viewer's attention. Tending to Indian cultural ethos is also important. Everyone loves seeing our reflection on screen – the reason why the films bringing out the lives from small towns and highlighting the cultural nuances often become a huge hit with the viewers. Also, if you see the current trend, you will see that the web content with deep-rooted Indian cultural ethos usually garners better numbers, because viewers can connect to it.

> Urban audiences are on OTT, but the next wave of growth in the sector will come from the Indian language speaking population.

ST: Will original content be the key differentiator for the OTT players in India from the monetization perspective?

KA: True. Syndicated content is available across all platforms but that lures a consumer towards a particular platform. It will be the originals which will make them stick to the platform for a while. Most of the platforms, especially the SVOD ones have their best original offering behind the paywall. That speaks volume on why the emphasis is on originals to drive your subscription numbers.

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"THOSE NOT THINKING OF REGIONAL WILL BE LEFT OUT OF THE GAME"

ZUBIN DUBASH
COO Digital, Shemaroo Entertainment

Soma Tah (ST): How do you view the evolution of OTT business in India?

Zubin Dubash (ZD): I would break up India's OTT evolution in three distinct phases. The first was habit formation – getting users to move to a new device for content consumption, from TV to digital. The perfect bridge for this was the 'Catch Up TV', positioned as 'Prime Time is now My Time'. The second phase was garnering traffic and loyalty on the platform with a constant flow of known content like cricket, sports, movies, etc. That's the time OTTs introduced and experimented with originals to lure customers, to make them more loyal and sticky.

With these two phases, there is today an average of 100 million monthly active users (MAU) on the OTT platforms, mostly on ad-based video on demand (AVOD) and very few on subscription video on demand (SVOD). However, AVOD stays as a traffic guzzler with almost no ROI. The third phase is where you convert the loyalists into paid subscribers, which is why we are seeing a strategic focus on SVOD by all the players.

ST: India's OTT has largely been a metro phenomenon. Do you think there is a large untapped vernacular language market in tier 2, 3, 4 cities that can be tapped?

ZD: Since 2016, after the democratization of 4G data, thanks to Jio, there has been a massive surge in digital video consumption in tier 2-5 markets. Any OTT business not thinking of regional will be eventually left out of the game. ShemarooMe offers an extensive array of regional content catering to Hindi, Marathi, Gujarati, and Punjabi audiences spread across movies, plays, and talk shows.

> After the democratization of 4G data there has been a massive surge in digital video consumption in tier 2-5 markets.

We have seen 142% viewership growth on our regional content consumption and we are expanding to offer more languages in the future.

ST: How important is it for the OTT players to create content offerings and formats keeping the viewers' interest, attention span, and watching habits in mind?

ZD: Different viewers have different choices and it is very essential to offer customized and curated content as per their choice. We have specialized content categories that include movies, music, devotional, kids, and comedy to cheer people up during these testing times. We give consumers the freedom to pick and choose from the categories of content and pay for them separately. For Bollywood movie lovers, we have a unique content offering – Bollywood Premiere that showcases World Digital Premieres of critically acclaimed Bollywood movies every Friday. We have always seen good engagement and viewership amongst the audiences for this category.

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Powering on-demand-video

While hyperscale data centers are already changing the way OTT players operate, the adoption of Blockchain will be a real game-changer for the sector

BY NITIN JADHAV

Coronavirus is one word that took the world by storm. Literally, panic is in abundance; public transport is shut, and work from home is a norm these days. However, there is something else that is gaining popularity amongst those stuck at home in these times of crisis – OTT media platforms like Netflix, Amazon, Disney TV, Hotstar, etc. The OTT trend has picked up so much during the pandemic times that Nielsen has predicted a 60% increase in that online streaming making it necessary for players like Netflix and Amazon Prime, amongst others, to adjust their business strategies.

Thanks to deep internet penetration, cheap data, and exciting content, video consumption has been on a growth trajectory in India for some time now. The latest BCG-CII report indicates that the average digital video consumption in India has increased more than double to 24 minutes per day from 11 minutes over the past two years. As the report rightly points out, the rise in these numbers are also because of the increase of the OTT players in the country.

Over-the-top world view

There is no doubt about the fact that OTT technologies have disrupted the Indian entertainment landscape. Subscription-based, on-demand OTT platforms like Netflix, Hotstar, and Amazon Prime are slowly and steadily becoming the preferred medium of entertainment for modern Indians.

The shift in viewer sensibilities has propelled the growth of the country's OTT industry. As per a Boston Consulting Group report, the Indian OTT market, which is currently valued at USD 500 million is expected to reach USD 5 billion by 2023. The television sets are also now becoming smarter. They are now catering to the needs of these OTT technologies by making their content available in a high-quality viewing experience. No wonder that the India television market is projected to surpass USD13 billion by 2023, led by these new breeds of Smart TVs on the block.

What powers the OTT?

CDN or the content delivery network is the infrastructure through which OTT content is delivered to the end customer. Simply put, CDN is hosting the original content – video, picture, etc. – on a central server and then sharing it remotely through caching and streaming

> The need for speed, scalability and network latency are driving the OTT players towards Hyperscale Data Centers, and they need all the three without a glitch, 24x7x365 days.

servers located across the globe. Hence, a relevant network capacity planning feature built into the CDN is required to monitor network traffic and plan the capacity increase ahead of time.

Video storage on the cloud

Video files are unusually large. To compress them on the fly and stream them on-demand to hundreds of millions of people with high resolution and minimal latency requires blazingly fast storage speed and bandwidth. It is a technological nightmare. With the growing quantity and sophistication of OTT video content, there is more traffic, more routing, and more management across the CDNs.

The OTT players typically rent space in the cloud to store their data. As their content keeps expanding and setting up the infrastructure means huge capex, there is a need for a high level of expertise in this ever-changing and updating technology landscape. Hence, going to a third-party service provider makes complete sense. This makes life extremely simple for everyone as the only thing that now needs to be done is for the user to ask for a specific file to be played, and the video player, in turn, will ask its content delivery network or CDN to fetch the desired content from the cloud.

Need for speed

The need for speed, scalability and network latency are driving OTT players towards Hyperscale Data Center service providers. They need all three in major proportions and 24x7x365 days, without a glitch even during or rather more during times of crisis like the current COVID-19 situation. Since the current and future demand of these players cannot be fulfilled by traditional data center players, they need are hyperscale data centers that can scale up the provisioning of computing, storage, networking, connectivity, and power resources, on-demand.

These data centers are designed and constructed on large land banks with expansion in mind. Also, they are created with the idea of absolute agility. Something highly desired by the OTT players. The OTT players are looking for service providers who can quickly increase the bandwidth and the storage capacity during high streaming and downgrade during slow times.

Redundant connectivity, local internet exchange and national exchange connectivity are also some of the things that an OTT player looks for in a data center and will find it more easily along with everything mentioned above in a hyper-scale facility.

Future of the OTT: Blockchain all the way

OTT technology is heading for some exciting times. While complex machine learning (ML) and artificial intelligence (AI) algorithms are already getting adopted for predicting the viewer preferences, it is the increase in adoption of Blockchain that will be the real game-changer for the industry. Blockchain can help content creators and distributors in storing, cataloguing, copyrighting, and distributing digital content. It's irreversible; the decentralized public ledger will also enable these players to introduce more effective access policies and restrictions. This will help protect its content from copyright infringements and online piracy.

Recently Spotify, the Swedish streaming giant had to shell out USD 30 million in a settlement over a royalty claim by an artist. With Blockchain, you can deploy a smart contract as well as it can be used to store a cryptographic hash of the original digital music file. The hash associates the address and the identities of the creator.

Another trend that will be a game-changer for this industry is 5G. With 5G, the next generation of networks will be able to cope better with running several high-demand applications like VR and AR. This will change the way content is developed and looked at on OTT platforms. It will also, however, make the role of hyper-scale data center more critical. The networks will ultimately be in them, and they will be the actual load bearers of it all.

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Transformation that works

AI is fast emerging the go-to tool for contact centers as they begin to invest in new services to improve customer experiences

BY DEEPTI SAGAR

Today's consumers are raising the bar on what they expect along the customer journey and in response, companies are adopting strategies to deliver an improved experience. Corporate Contact Centers (CC) are a key touchpoint where businesses can build strong connections, earn trust, and create loyalty.

Delivering delightful and memorable customer experience is a priority, so contact centers are investing in new technologies to improve access, increase personalization, and simplify interactions. This is a generation of consumers dominated by 'on-demand' behavior. Anywhere, anytime access is a reality – and contact centers are expected to deliver a consistent omnichannel experience.

Artificial Intelligence (AI) continues to elevate as a strategic priority for contact centers. As per the Global Contact Center Survey 2019 by Deloitte, 75% of contact center leaders were making investments in AI capabilities and 56% of them believed that AI has broad application in transforming the call centers.

This further got accentuated in recent times where anytime, anywhere call centers came to a reality. Service continuity and sales pressure forced companies to move from on-premise call centers to remote call centers. Immediate benefits realized from remote call centers generally outweighed the challenges faced, like real estate savings, work-life balance, and uplift in workforce diversity. There is a growing acknowledgment that issues faced were not flaws in operating model design but attributable to the timing of events. Hence, there is greater support for a shift to the 'new normal' in the customer community.

As a result, many leading telecom operators, banks, retail giants are considering adopting this as a norm. As customers are also gearing to the new normal in many facets of life, this is the right time for organizations to accelerate the transformation of call centers.

Organizations can adopt three kinds of AI-led service philosophies:

- **High-touch:** While AI and cognitive levers are used for deflection to self-care, diagnosis of closure requires human intervention.
- **Lite-touch:** In this, low complexities are managed via AI and cognitive levers, while the human intervention-based diagnosis and resolution are used for higher-complexity issues.
- **Zero-touch:** This allows all E2E interaction to be managed via AI and cognitive levers for most call drivers. Human intervention is needed only for exceptions and premium handling.

Let us look at some of the AI-led primary use cases that can be applied to these philosophies to transform the call centers. These include the engagement of DIY customer or the self-service model, driving the effectiveness of the

> Contact center leaders are deploying AI for scenario planning. AI is helping club operational, financial and experience data into actionable decision making.

agents, executing advanced operational and strategic analytics and insights, and enabling borderless workers.

DIY customer engagements: Most of the existing chatbots are used for deflection – channeling the customer to the right queue. AI is now changing this. Corporates are investing significantly in conversational AI to understand the intent and offer first point resolution to customers. This will enable them to improve operational efficiencies and elevate the experience. Deloitte's Global Contact Center Survey 2019 indicates that the use of chatbots and messaging is expected to double for handling complex interactions in the next two years.

Agent effectiveness (next best action): This has been one of the major focus areas during the last few years and is more inclined towards upselling. It is now being re-purposed to deliver personalized service interactions by shifting the focus from "diagnosis and correction" to "pre-empt and serve". AI is helping agents to evolve from script reading mode to intuitive decision-making mode.

This involves investments in capabilities to access past interaction history across channels for agents to understand the context and avoid repeat questions on verification and understanding problem statements. It also requires the integration of AR and VR capabilities to support remote troubleshooting, including technical fixes. This leads to avoidance of ping-pong transfers and agents can provide precise support based on the visibility of the premises and equipment

The other pre-requisites include intuitive knowledge management where supporting SOPs and information is made available on the go. Customer sentiment tracking to adjust tone and responses based on customer's emotions is also important to bring in the effectiveness.

Advanced operational and strategic analytics and insights: Contact center leaders are deploying AI as a tool for scenario analysis, planning, and management. AI is helping club operational, financial, and experience data into actionable decision making. Some recent use cases include the establishment of advanced algorithm based contact center digital twin to model scenarios on type of skills, the number of shifts, changes in agent SOPs. This helps call center leaders with real-time information and impact analysis on the cost to serve, idle bench, and workload optimization.

Workforce without borders: With AI, there is a mega shift in call center fundamentals from being dominated by location strategy to skill strategy. According to the survey, during the next two years, the number of companies with at-home presence call centers will increase from 34% to 56%.

A workforce without borders allows companies to expand their recruiting effort to access the necessary skillsets while offering flexibility that workers require. This skill strategy needs to be further complemented by the right forms of virtual employee engagement and collaboration. This requires that supervisor BOTs are allowed anytime, anywhere access to supervisors even while working remotely.

It is also important for collaboration and sensing tools to conduct daily team huddles in a seamless manner, while enabling agent mood-sensing for pre-emptive interventions by a supervisor to avoid performance dips. Virtual rewards to celebrate and acknowledge individual and team successes and milestones and virtual learning for keeping agents up-to-date with necessary skills, process, and product updates are the other areas to focus on.

Data privacy and virtualization: Enabling privacy and data security measures through the right form of desktop virtualization is another important AI-led use cases that can transform the call centers

Contact centers are investing in new services as they focus on ways to improve customer relationships through trust, ease of access and personalization. An ever-increasing focus on elevating the human experience and the continuing adoption of new technologies are expected to drive the transformation of contact centers in the coming years.

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Time for change in mindset

Technology allows us to build a highly elastic IT infrastructure at the core of the agile organization. Is your organization geared up for the new normal?

BY ANAND PATIL

We are experiencing what is possibly the biggest global economic disruption since World War II. The pandemic is likely to have a great impact, both on human health, as well as the health of the global economy. With most of the world observing social distancing norms and staying home, businesses have been facing their own black swan moments, which they have had to react to with unprecedented alacrity.

While these events unfolded at different points in time worldwide, each business has had to go through three phases. At first, the immediate reaction was to ensure the safety of their people and then activate mechanisms to enable work to resume, albeit with a lower capacity. In the second phase, as things started to settle down, and social distancing rules were enforced, business leaders worked to re-establish their productivity in the new world of work, to the best extent possible.

The success in this phase depended on the industry. Knowledge workers in the ITeS industry, for example, were able to get back to full productivity in a relatively short period of time, as compared to shop floor workers at automobile manufacturing companies. Finally, in the third phase, after navigating lockdown restrictions, each business leader is now trying to predict how the industry will evolve, and how the "new normal" will look. At this time, each of them is thinking of how they can leverage this new experience to build a business that is more resilient than ever before.

There are many examples of businesses also using this opportunity to creatively "pivot" to new business models. Locally, food delivery apps turned to deliver groceries and essentials; fitness start-ups moved to online classes, as have a slew of education providers. To a large extent, experts and analysts believe that this trend is here to stay. In fact, this transformation is becoming a matter of survival for most companies; those that cannot make the shift are staring at an uncertain future. Each

change in the business means that the entire company has to adapt to be successful quickly. This includes the employees, workplaces, systems, processes, supply chain, ecosystem, et al.

If frequent changes become the norm going forward, each function within the organization has to be ready and develop an "agile" mindset. There has to be enough flexibility to be able to respond and adapt quickly to changing requirements of the business.

The same is the case with IT. As the CIO, how do you plan for such situations? There are two conflicting priorities here – resilience, which requires robust systems and processes to be in place, vs. agility, which demands changes in plans at the drop of a hat. The answer is to have IT systems and infrastructure that are resilient, yet malleable enough to be reconfigured rapidly to suit even unforeseeable requirements. While this may seem quite

> There are two conflicting priorities here – resilience, which requires robust systems and processes to be in place, vs. agility, which demands changes in plans at the drop of a hat.

challenging – and it is – there are a few principles that can be adopted.

- **Software-defined to software-driven:** Now, more than ever, it is important to adopt software-driven infrastructure components. From networking to servers and storage, from security to power systems – if they can be controlled by software, they can be managed (and reconfigured) remotely. If the software control point is being delivered via the cloud, it adds flexibility, scalability, and an evergreen operating environment. The resilience portion of the requirement means that one needs self-healing systems that can function steadily, even when connectivity to the software control point is temporarily lost. No physical intervention should be necessary unless it is to change a failed hardware component.

- **Extreme user mobility:** It is important to assume that users are going to be on the move. Therefore, any systems and apps that are deployed need to be accessible from anywhere in the world, on any device, with internet connectivity being the only prerequisite. This holds true even for operations and management tools.

- **Digital collaboration:** With users and employees being anywhere in the world, collaboration goes online. Therefore they need to be provided with capabilities that mimic physical workspaces – one-to-one and one-to-many digital meetings and events, file sharing including version control, instant messaging, and bulletin boards. The single most overriding factor that determines adoption, and thereby effectiveness, of this platform, is the integrated user experience. Bad user experience can hinder employees from getting their work done, so choose carefully.

- **The cloud:** This may seem like an obvious inclusion, but the idea is not as much about leveraging the public cloud as it is about adopting a cloud-like model for all technology decisions. So, the infrastructure that you build for the organization should follow the cloud principles of extreme elasticity, unprecedented scale, relentless automation, constant optimization, and pay-as-you-consume. The closer you are to this model, the more agile your infrastructure can be.

- **Programmability everywhere:** As you start piecing together the components to build malleable IT infrastructure, it is critical to think about programmability as a key capability across the board. The ability to use APIs for simple reporting or complex task execution is a vital consideration in the quest for relentless automation and visibility. It also allows for advanced scripting between systems, which can further enhance automatic remediation and reaction to triggers, thus improving overall cross-domain resiliency. For example, an app latency issue detected and root-caused by an application performance monitoring tool can trigger the infrastructure manager to increase the heap memory on the server, thus solving the problem – all without manual intervention.

- **Security in depth:** The cliché says security should be "built-in", not "bolted-on". And it rings true in every situation. Evaluate each component in isolation for faultless, zero-trust security, and then step back and ensure that the entire security architecture can work together to react to attacks.

Agile enterprise for the new normal

Eventually, agility is a state of mind. The willingness to learn, change, adjust, tweak, re-learn, and start again is a critical attribute to stay competitive in a changing environment. Speed and timely decisions are the keys to seizing opportunities and navigating challenges.

IT can be a big part of what makes a company agile, or what can make it clumsy and slow. It is important to realize and implement what is "good enough for now", and can be moulded quickly to the "new normal". The software and hardware of today allow us to build highly elastic IT infrastructure at the core of the agile organization.

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Walking the digital dream

India needs to plan for fiber-to-the-home with more foresight and promptness than ever before, and be ready to cope up with any dynamic situation

BY SHAILENDRA TRIVEDI

Our communication infrastructure is a complex ecosystem consisting of broader internet, cellular networks, local area networks, and optical backhaul networks. It offers service to almost all aspects of our daily life and is likely to become even more essential to us as we move toward a future involving the Internet of Things (IoT), artificial intelligence (AI), and 5G. The communication infrastructure will be challenged with regard to availability, capacity, and data throughput.

Fiber-based technologies are becoming key enablers of digital India. The relevance of fiber to the home (FTTH) is propelling India's digital growth story. Fiber could

> All mobile traffic has to be hauled back through fiber, which is happening very slowly. This is even more important because mobile traffic is becoming increasingly data-heavy.

be the most critical infrastructure that we need today, and therefore the government intends to increase the country's fiber footprint to 7.5 million fiber kilometers by 2022.

Fiber will play a key role in enabling the government's ambitious Bharat Net Program to provide high-speed broadband connectivity for all. In developed countries, the fiber enabled backhaul comes up to 75-80% while it lags at 30%. The 2019 FTTH India Summit addressed the very need for accelerating the GDP growth and kick-starting demand in a deliberate attempt to translate policy objectives to reality through a total perspective turn-around.

The central government has given it a high priority to complete the fiberization of the country. It is now up to the states to realize the importance of a continued and time-bound rollout that will be critical to enhancing their economic competitiveness. Reports indicate that a 10% increase in internet traffic in India can lead to a 3.3 % increase in GDP, which is a huge multiplier.

Fiber, the solution for increasing mobile traffic

All mobile traffic has to be hauled back through fiber which is happening very slowly. This is even more important because mobile traffic is becoming increasingly data-heavy and the mobile spectrum will not be sufficient to address this. Prioritizing and accelerating rights-of-way to ensure quick fiber rollout as per the National Digital Communications Policy (NDCP) 2018 agenda is imperative.

All stakeholders including the center, the states, the telcos and affiliated industries should make a concerted effort towards enhancing the fiber network roll-out across the country to complement our Digital India aspirations.

In India, although the initial outlay is often seen as a barrier to broadband rollout and adaption, the higher network stability, and reliability result in high customer satisfaction and therefore payback of the investment and an improved competitive position for the network provider in relation to Digital subscriber line (DSL) providers.

Way forward to address growing demands

What India needs is a complete program for an extremely forward-looking expansion of fiber optic (FO) networks that cover all network levels. The solutions should range from high-density Optical Distribution Frames through splice closures and connection boxes to connectors that can be connected to optical fibers in less than a minute on a construction site. The solutions should seamlessly be built upon each other and be permanently scalable. The modular concept should allow network operators full planning freedom for a considerable length of time.

FTTH networks should be planned with more foresight than ever before and at the same time be equipped to cope with any dynamic developments. Cabling solution providers estimate that the extensive investments in a full-coverage FTTH range will only pay off over the long term. This is why planners and network operators should opt for long-term, high-end products. The valuable FO cables should not be changed and certainly not have to be removed because they were not planned with sufficient capacity in mind. This will ensure that the network is capable of meeting the needs of users for years to come.

With the ability to provide Gigabit connectivity, FTTH opens up a range of possibilities. Among these are triple-play services - the packaging of voice, high-speed internet, and television as a combined offering from a single telecom provider. Convenience and safety are also top priorities for developers of the mega project, which is why vital services such as fire alarms, CCTV, intercoms, and access control will all be connected to a centrally managed system via the secure FTTH network.

The author Shailendra Trivedi is Sr. Director of Sales for Public Networks at R&M India

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[REPORT]
TLF DIALOGUE

Driving enterprise and social growth

Telecom and mobile the internet played a critical role in enabling India to work from home during the current pandemic. It's time for telcos to drive digital and Atmanirbhar Bharat

BY PRADEEP CHAKRABORTY

Continuing with its series of online industry interaction, Voice&Data organized the second edition of its TLF Dialogue on the role of telecom for enterprise and social growth. Telecommunication and mobile internet have played a pivotal role in enabling India to continue working during the current pandemic.

The webinar that was presented by Sterlite Technologies Limited (STL) saw the speakers focus on the role of the telcos in driving economic transformation and providing essential digital infrastructure support for Atmanirbhar Bharat. The speakers also deliberated on where the country's economy and industry were headed, the new normal and future trends.

Delivering the introductory note, CyberMedia Group Chairman Pradeep Gupta highlighted how quickly the telecom sector was able to rise to the occasion and deal with the surge in demand for data and network and responded to the crisis.

"In the first 48 hours, we experienced tremendous growth in demand, similar to what we had in two years. We stepped up to the task. All of that was done by people who were working from their homes. There was a problem with an enterprise in Delhi. We solved their issue. We also have a NOC that has been empty for the last three months. People have been doing WFH. It is a revelation that a lot of the activities can be done from home," Vodafone Idea Ltd (VIL) Chief Technology Officer (CTO) Vishant Vora said.

Gupta agreed that the way the telecom industry reacted to the pandemic situation was brilliant. "We did not even realize that something was happening," he stated.

VIL Director for Enterprise Business Abhijit Kishore added: "We have moved from being a telco to becoming a technology player, offering cloud and managed services. We also see a clear shift towards digital transformation. This shift is very evident. It is the new normal. People are now working from their homes."

Kishore also stated that telcos are exploring how they can make the same shift happen for the enterprises. "Customers have been able to handle the massive surge in data. This transition happened overnight. Automation is also changing. Today, everything is available as a

"The society and technology are becoming software oriented. SDN is a key area. So is software. We have to ensure that we play to our strengths"

Vishant Vora
CTO, Vodafone Idea Limited

"Half the world today has digital infrastructure. We now need to address how one can scale efficiently on the software and the infrastructure sides."

Dr. Badri Gomatam
Group CTO, STL

service. We are now fully designed to serve the scale with utmost responsibility," he stated.

Changes embedded

Pointing out that digital transformation is yet to get accelerated Gupta asked what changes will get embedded permanently?

Vora said these can be digital. "Cloud is another big trend, and so is data. Without these, you can't run your businesses. We are cloudified and scaled up in large capacities. That flexibility has helped us. The adoption of the cloud will accelerate, and so will digital. If you want to go digital, telecom becomes very essential. There has been unprecedented scalability as well," he said.

Speaking at the webinar, STL Group CTO Dr. Badri Gomatam pointed out that various things have impacted the lifestyle. "Half the world today has digital infrastructure. We now need to address how one can scale efficiently on the software and the infrastructure sides. Communication technologies will focus on SDN, and make it cloud-native," he said, adding that the FTTH penetration has been growing all over the world.

A survey conducted during the webinar showed that over 50% of the audience believed that FTTH penetration in India was less than or just 3% across India.

Digital transformation

Gupta noted that digital transformation is now the way of conducting business. In the new normal, what will be the new business models?

Kishore said the new normal is hard to define, right now. "We now have a huge opportunity. We see smart automation coming out, eg., in healthcare. Some other sectors are automotive and manufacturing. VIL also plays in IoT and smart automation. This will be the key, along with data shifts, video conferencing, etc. We have partnered with the automotive industry and need to see how IoT solutions can be leveraged," he stated.

For the last two years, VIL has been investing in next-gen technologies. Vora added that the cloud is a huge area. "We are also investing in wireless technologies, like massive MIMO. We also have large investments in IoT and consumer spaces. Analytics is another area, and it will be the next big thing. Getting the insights from these transactions will benefit the enterprises," he said.

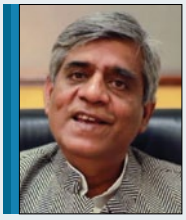
Dr. Gomatam said from STL's point, evolution will take place. From an architecture perspective, there is wireless and wireline convergence happening. This brings an important place for all the activities mentioned. We have use cases of low latency, AR/VR, gaming, streaming, etc. There is the ability to run your network and FTTH, on the cloud, as well. We have invested in several technologies.

Atmanirbhar Bharat

The TLF Dialogue also explored how the telecom sector can help in making Atmanirbhar Bharat happen.

"We have moved from being a telco to becoming a technology player, offering cloud and managed services. We see a clear shift towards digital transformation."

Abhijit Kishore, Director – Enterprise Business, Vodafone Idea Limited



"The way the telecom industry reacted to the pandemic situation was brilliant. We did not even realize that something was happening."

Pradeep Gupta
Chairman, CyberMedia Group

Vora added that all agree the "licence raj" needs to be dismantled to improve the ease of doing business. The amount of spectrum we buy needs to be looked at as well.

Kishore said that as far as the telcos are concerned, we are emphasizing on customer needs. Telcos providing self-reliance needs and the digital India part of the objective need to be helped. We also need to focus on the MSME segment. Telcos play a major role in making them self-reliant. We try and help them connect, automate, etc.

Vora noted that we are trying to keep India self-reliant and keep the users more productive. We bring technologies faster to the market and bring benefits. Society and technology are becoming software oriented. SDN is a key area. So is software! We have to ensure that we play to our strengths. Technology is a very fast-moving sector. We need to be more future-looking. In the future, the networks will become almost 80% software-driven. We also need to develop our own IPRs and patents.

Dr. Gomatam agreed that building upon the R&D is very important. We have a lot of young talent coming up. There are hunger and thirst to build stuff. The ability of India to leapfrog is immense. We need to see how the younger generation adopts it. They should work in emerging technology areas. There is a shift taking place. Embedded software stacks are being done in the country. Also, businesses will be able to commit to more solutions out of India.

To this, Gupta asked whether India can go vocal about local? Will security and software be the focus areas? Vora said there was potential in these spaces. We also need to develop patents and build an ecosystem around that. Kishore agreed the potential is there. We need to be able to monetize and scale that.

On another question regarding the scarcity of spectrum, Vora clarified that there is no scarcity of spectrum. In India, we have made it artificially scarce. There are countries like China and Japan. We now need to have an adequate spectrum and build on it for prosperity.

Kishore felt that there will be growing use cases. Those, supported by the robust fiber network, will help. Over time, people will consume bandwidth that is provided. Telecom today is an essential service. This is the right time to take note. It is an absolute essential for enterprises for enhancing productivity. He added that the eSIM will be part of the IoT in the future.

Finally, how can we help transform the OTT channels and engage with customers? Highlighting the latency and bandwidth experience, Vora said, "We need to do quick processing via the edge network. The OTT players make money from how fast the users can access their content. Telcos will have mobile edge computing in the near future.".

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Nation first for telecom

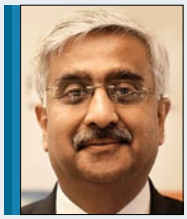
Digital networks remained resilient and proved to be a lifeline during COVID. It's time for the telecom sector to tap new opportunities and dreams

BY PRADEEP CHAKRABORTY

"Telecom and digital networks have contributed to the health and wealth of the nation. Digital networks in India have remained resilient and proved to be a lifeline in these tough times," Department of Telecom Secretary and Digital Communications Commission Chairperson Anshu Prakash said recently.

He was speaking at the online panel discussion organized by the Cellular Operators Association of India (COAI) and India Mobile Congress (IMC). The Telecom Secretary also highlighted that never before has this sector been so permanent, as of now. "The world, and India, could not have dealt with the pandemic without the support of digital networks and the telecom sector. During the lockdown that started from 22 March, the mobile consumption jumped from 270 petabytes to 303 petabytes. Now, it has somewhat stabilized. The digital networks and the telecom infrastructure have remained so resilient and reliant," he said.

Praising the sector Prakash said that the telecom industry workers were true COVID-19 warriors. "We did not face the breakdown a single day. The minister asked me to ensure that the telecom networks are running. It has been a tremendous job very well done. We could not have survived without the digital networks, which are



"We could not have survived without the digital networks, which are like the arteries in our body. Networks are the circulatory systems of India, and the world."

Anshu Prakash
Secretary, DoT & Chairperson, DCC

like the arteries in our body. Networks are the circulatory systems of India, and the world. You have managed such an important system," he stated.

The Telecom Secretary further pointed out that health and wealth are symbiotic with the networks. "Digital healthcare contributes to USD 1.6 billion to the Indian economy currently. At least USD 7 billion by 2024 can be reached. There is anytime and anywhere health response system. A person's records can be accessed. We started the m-health concept. It is very successful. The quality of healthcare has improved by leveraging the digital system. The patients' responses can also be checked. There has been the digitization of data. Multi-stakeholder and collaboration are critical for the industry to take it to greater heights."

"The industry, regulator, government, and the consumer have to collaborate. The NDCP 2018 has a roadmap that we can follow. The National Broadband Mission is very critical for our country. We now have a never-before opportunity before us to catapult ourselves to new heights," he said.

Earlier, delivering the opening address COAI Director-General Rajan S Mathews said that what transpired across our networks over the last 90 days was well known. "It is 25 years since mobility started. Today, landlines are available on demand. What is landscape experienced so far," he asked.

Platform role of industry

TRAI Chairman Dr. RS Sharma said that the pandemic has been very crucial for the sector. "Telecom industry has played a really wonderful role. It has been at the forefront right through the pandemic. Telecom service providers have been real heroes during the pandemic by providing uninterrupted service," he said.

The TRAI chief also highlighted that the industry maintained the networks without any interruption. "It is a wonderful service to the nation. It is a tremendous amount of suffering we all are also going through. The pandemic has harassed the world. However, adversity has brought opportunities. The industry needs to change its business model to capitalize on opportunities provided by new technology."

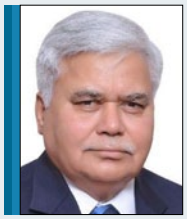
The platform role that the industry will play in the future has come out. A lot needs to be done and accelerated. The NDPC 2018 needs to be implemented and also accelerated. "We need to realize the Digital India dream of the Prime Minister. The pandemic has shown everybody that this is the right way to go, to create a robust, ubiquitous, and reliable infrastructure. We have been the rising sector of India. Every other industry's views towards the telecom industry have changed," Dr. Sharma said.

Telecom on the forefront

Bharti Airtel Ltd COO AjaiPuri said that the ongoing COVID-19 has brought telecom to the forefront. "We have kept the lights on, 24x7, while India stayed safe in their homes. We made sure that lives do not get disrupted. A large part of urban India became rural. We had to move resources and deployment remotely."

He said the industry is poised to grow and will become a central focus of all the new initiatives to take the nation forward. Quite a few things may not go back to the way it was. "We will relook our social engagements. We need to create a digital platform for telecom. Possibly, we are more efficient today, thanks to telecom. We have the support and encouragement from the government. The next five to 10 years will be a period of unprecedented growth. We will do whatever it takes, to take the nation forward in future," Puri said.

His thoughts were echoed by Reliance Jio Infocomm Ltd MD Sanjay Mashruwala. He noted that the pandemic has presented the industry with a great opportunity. "Our PM had spoken about Digital India. We are witnessing everything today. We are using



"Things will have to unbundle. Telecom is going to play an extremely important role. Inventions will lead to new use cases. ICT has an extremely bright future."

Dr. RS Sharma
Chairman, TRAI

the AarogyaSetu app for contact tracing. Twenty years ago, our chairman had a vision of making phone calls cheaper. Today, it is nearly happening," he said adding that telecom has emerged as the nation's circulation system.

Presenting his perspective Vodafone Idea Limited MD and CEO Ravinder Takkar said that telecom has been a major contributor to development in India. "Telecom is the second largest investment sector in India, and we have the lowest rate of voice and data in the world," he said.

"We have to now convert our infrastructure to a platform, enabling the layer for new technologies. If we do our part right, we can get to the goal of a USD 1 trillion-economy by 2025. We have to convert the connectivity layer into a digital e-commerce layer. Technologies such as IoT, M2M, AI/ML, blockchain, etc., are going to change a lot of things. As we contribute to this space, the key point will be collaboration. More collaboration is required with TRAI, DoT, and the other government bodies," Takkar stated.

The next 25 years

STL Group CEO Dr. Anand Agarwal stressed that while the last 25 years was about telecom, the next 25 years will be about digital. "We are separating that. The only asset was the spectrum. There is a clear demarcation between a platform and an infrastructure," he said.

"In the digital paradigm, the distinction will become even more apparent. The usage patterns have changed locations. It is no longer one-way. There is a large increase in traffic. Apps are getting synchronized. We are collaborating on the cloud in real-time. The shift to digital will be required. It will be closer to the consumer. It will be connectivity and compute, along with storage. There will also be a converged, disaggregated network. This provides a great opportunity for India. This requires new kinds of investments. Currently, the investment in digital infrastructure in India is 3-4% of the GDP," Dr. Agarwal said. He also pointed out that globally, countries that are recognizing the value of digital infrastructure have taken the utilitarian route. "This will require a concerted effort between the government and the industry. The US has opened up 1GHz of the spectrum on the unlicensed band. It will spur innovation and demand. We have to focus on those kinds of investments," he said.

Long-term strategic thinking

Stressing that India has been looking at networks from an integrated perspective, which has been an extremely good model, Dr. Sharma said that the country now needs to move on from this model. "Now, we have to connect the people anytime, anywhere. We also need to have long-term strategic thinking."

He also called upon the industry to let the apps grow around the infrastructure. "Today, we are a platform. Tomorrow, we will be dependent on the strong platform. Things will have to unbundled and explode. Telecom is going to play an extremely important role. Inventions will lead to new use cases. ICT has an extremely bright future," the TRAI Chairman said.

The Telecom Secretary added that the wireline infrastructure has to really accelerate and grow. "TRAI has given some recommendations in 2015. Even the E and V bands have huge potential. Airwaves in the E band, which falls between 71-76 GHz and 81-86 GHz, and V band, between 57-64 GHz, can transmit data with the speed of around 1,000 megabits per second. The bands are mostly used as backhaul, which means connecting the core of a telecom network to nodes and then onto towers, to transmit data. There is huge potential to be tapped from these bands. There is huge potential also expected from 5G. We should move towards all this in the future," Prakash concluded.

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Clipping the charger wires

With more smartphone manufacturers adopting the Qi standard, smartphones with wireless charging capability is expected to touch 7% by Q4 2020

BY MANISH RAWAT

In a hyper-competitive smartphone market, differentiation is the key – this could be in terms of design, looks, or performance. With more customers than before being interested in smartphone performance, especially battery juice, smartphone brands have embraced wireless charging capabilities. This does away with the need to fumble with cables to recharge mobile phone battery.

With the OPPO Ace 2, OPPO has introduced the wireless charging capability of 40W. On the other hand, brands such as OnePlus and Xiaomi with OnePlus 8 Pro and Xiaomi Mi 10 5G respectively have come up with 30W. For the rest of the brands, 5W is a base, and a few handsets support 7.5W, 10W, and even up to 15W.

OK... But, what exactly is wireless charging? How does it work? Does your smartphone even support it? And last but not the least, what are the trends that we see in wireless charging?

Here are the answers.

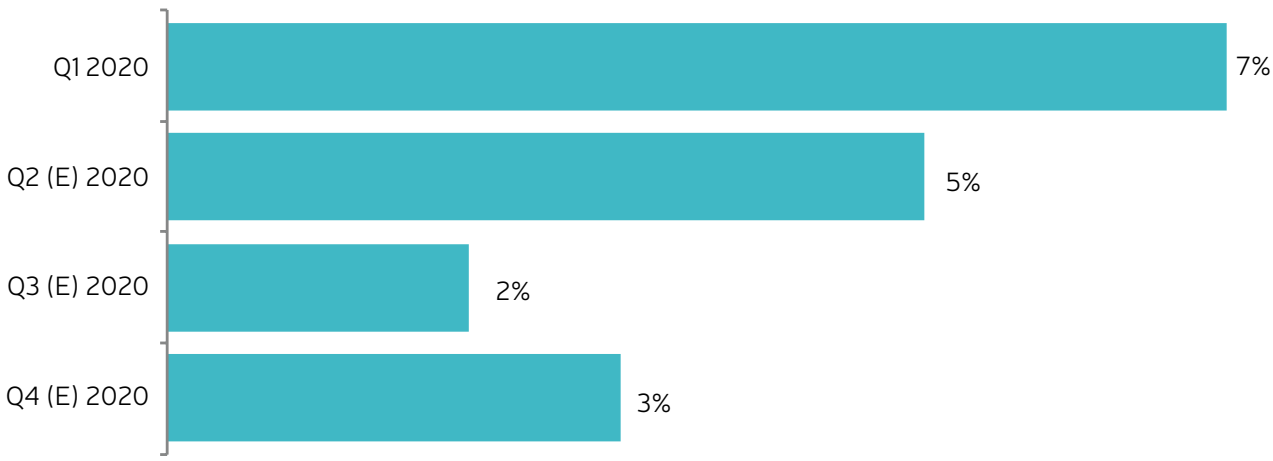
The transmitter, the receiver, and the power supply are typically the three key elements in wireless charging. The adapter is usually regulated with a DC voltage between 5V and 20V which connects to the main supply and powers the transmitter.

Inductive and resonant are the two main technologies behind wireless charging. The mainstream wireless technology standard is Qi (pronounced "chee"). Qi is a standard that has been developed by the Wireless Power Consortium (WPC). The technology involved is known as magnetic induction. It uses an electrical current to generate a magnetic field, creating a voltage that powers the phone without your plugging a wire into it, which greatly limits the distance and a comparatively new feature for powering iPhones and popular Android phones.

The growing market

An ever-increasing number of smartphone manufacturers

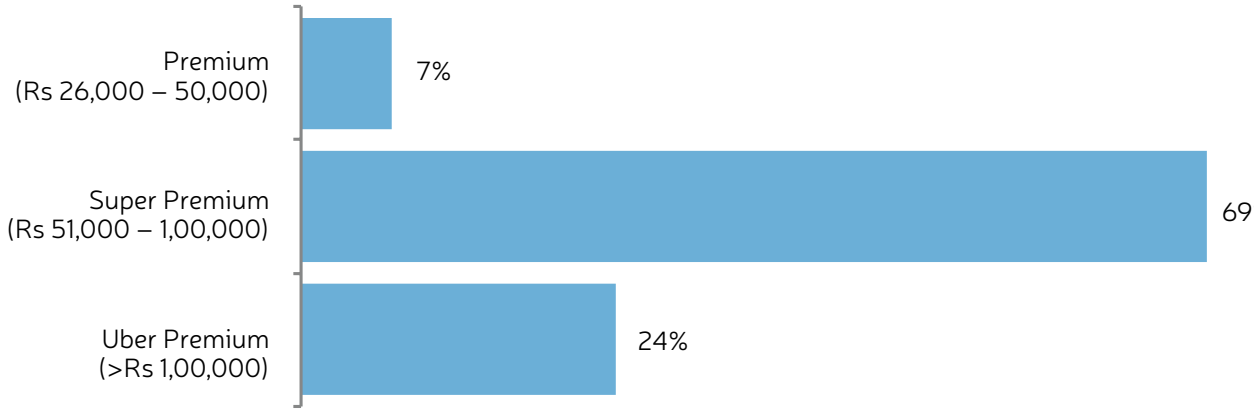
Wireless charging smartphone growth



Source: CMR India Mobile Handset Market Review Report

With the continuous technological shift in wireless charging, many phones can now support reverse wireless charging where one can charge other devices using the phone.

Wireless charging smartphones (by price segment)



Source: CMR India Mobile Handset Market Review Report

have embraced the Qi wireless charging standard. Also, major smartphone manufacturers like Samsung, Apple, Sony, LG, Huawei, Nokia, and Motorola have adopted the Qi wireless charging technology.

According to the CMR India Mobile Handset Review Report, smartphones with wireless charging capability is expected to touch 7% by Q4 2020 [see: Wireless charging smartphone growth].

Similar to the fast charging adoption trends seen in smartphones, the wireless charging initially featured in flagship smartphones. At the end of 2019 and early 2020, the adoption of wireless charging in smartphones increased significantly in the super-premium price bands. With the launch of recent Samsung and Apple smartphones, the trend towards smartphones with wireless charging capabilities has intensified further.

In the premium smartphones (Rs 26,000 – 50,000) segment, Apple iPhone XR, Samsung Galaxy S9 Plus and Google Pixel 3 are some wireless charging capability Smartphones which are fastest growing under this segment [see: Wireless charging smartphones. In the super-premium (Rs 51,000 – 1,00,000) segment, wireless charging smartphones are predominantly dominant and account for 69% of the smartphones. Some popular smartphone models in this price segment, include the likes of Apple iPhone 11 and Samsung Galaxy S10 Plus (by price segment)].

Apple and Samsung are the only two smartphone brands in the Uber-Premium (>Rs 1,00,000) segment with 7% cumulative contribution and mainly driven by Apple iPhone 11 Pro Max and Samsung Galaxy Fold.

However, current wireless charging mechanism meant for mobile phones are recognized to be slow and energy inefficient as compared to wired charging. But this wireless charging makes life easier and more secure for individuals, enabling them to overcome the challenge associated with the rise of multiple wired devices that are all-pervasive in everyday settings.

Some wireless chargers are faster than others and capable of charging a large battery smartphone in less than two hours because of the modern higher-powered chargers. With the continuous technological shift in wireless charging, many phones can now support reverse wireless charging where one can charge other devices using the phone.

The author Manish Rawat is an Analyst with the Industry Intelligence Group at CMR

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Qualcomm Ventures to invest Rs 730 crore in Jio Platforms

Reliance Industries has announced that Qualcomm Ventures, the investment arm of Qualcomm Incorporated, will be investing Rs 730 crore in Jio Platforms at an equity value of Rs 4.91 lakh crore and an enterprise value of Rs 5.16 lakh crore. This translates into a 0.15% equity stake for Qualcomm Ventures in Jio Platforms.

The investment will enable Qualcomm to support Jio Platforms on its journey to rollout advanced 5G infrastructure and services for Indian customers. "Qualcomm offers deep technology know-how and insights that will help us deliver on our 5G vision and the digital transformation of India for both people and enterprises," Reliance Industries Chairman and Managing Director Mukesh Ambani said.

The series of investment has enabled Jio Platforms to raise a record Rs 1.18 lakh crore from 12 investors in exchange for 25.24% equity stake, including Rs 43,573 crore by Facebook and is followed by Silver Lake Partners, Vista Equity Partners, General Atlantic, KKR, Mubadala, ADIA, TPG, L Catterton, PIF, and Intel Capital.

"With unmatched speeds and emerging use cases, 5G is expected to transform every industry in the coming years. Jio Platforms has led the digital revolution in India through its extensive digital and technological capabilities. As an enabler and investor with a longstanding presence in India, we look forward to playing a role in Jio's vision to further revolutionize India's digital economy," Qualcomm Incorporated CEO Steve Mollenkopf stated.

Jio Platforms has made significant investments across its digital ecosystem, powered by leading technologies spanning broadband connectivity, smart devices, cloud, and edge computing, big data analytics, artificial intelligence, Internet of Things, augmented and mixed reality and blockchain.

Zoom Hires Jason Lee as CISO

In its effort to strengthen the much-needed product security, Zoom Video Communications has brought in Jason Lee as its Chief Information Security Officer. He will lead the company's security team and report to Chief Operating Officer Aparna Bawa. Lee, who until recently was the Senior Vice President of security operations at Salesforce, has over 20 years of expertise in information security and operating mission-critical services. He has also served as the Principal Director of Security Engineering at Microsoft.

The company recently completed its 90-day security and privacy plan that it had rolled out on 1 April 2020 to address security and privacy that had led to several countries, including India, issuing an advisory against it. Lee will focus on continuing its path of putting the security and privacy of its users first by ensuring that the frictionless and easy-to-use platform remains secure, a company release stated.

Tat Wee to lead Snowflake South Asia sales

Cloud data platform company Snowflake has appointed Tat Wee as its South Asia Head of sales engineering. He will be responsible for driving the adoption and expansion of the company's solutions around the region which includes ASEAN, India, Hong Kong, Macau, Taiwan, and South Korea. Wee brings to the company over 20 years of experience in the IT industry, building successful teams focused on customer excellence.

Prior to joining Snowflake, he served as the Field Success Officer for Lucidworks, and as the Head of Sales Engineering for Splunk, he led the team through a successful IPO in 2012. He has a strong track record of transforming start-ups and has introduced new products and solutions that have been adopted across the Asia Pacific region including Japan, the company release said.

Nokia offers s/w-based upgrade for 4G, LTE radios

Telecom infrastructure company, Nokia has announced the availability of a software-based upgrade that will enable its 4G/LTE radios to be migrated seamlessly to 5G/NR. The upgrade of existing radio elements via the software will help operators streamline the process of refarming 4G/LTE spectrum into 5G/NR.

"The upgrade software will also support existing customers and the installed base by offering a seamless and cost-effective upgrade path to 5G/NR," a company press release stated. It added that the new feature will have a high value to it's customers as they provide immediate support for approximately one million radios, reaching 3.1 million by the end of the year and over five million in 2021.

The ability to upgrade 4G/LTE radios via a software update will significantly smooth out the deployment of 5G/NR FDD, avoiding costly and disruptive site visits. Most of the 5G/NR deployments at present are performed with TDD cmWave and TDD mmWave deployment but the next big wave of 5G/NR rollouts will be delivered by refarming existing FDD bands to 5G/NR. TDD spectrum benefits from enlarged coverage and capacity when combined with already deployed FDD network infrastructure and spectrum bands via TDD/FDD Carrier Aggregation.

"We already provide market-leading LTE radios to hundreds of customers around the world. This is an important solution because it will help our customers, quickly and efficiently upgrade their existing LTE radios so that they are 5G ready saving them time and money," Nokia Mobile Networks President Tommi Uitto said.

Nokia has a vast customer base of 359 4G/LTE customers with deployed FDD RF units most of which are possible to upgrade. The company also has Dynamic Spectrum Sharing (DSS) already in live networks covering 2G/GSM-3G/WCDMA-4G/LTE and recently introduced DSS for 4G/LTE-5G/NR. "This capability completes a DSS solution, covering all access technologies and making the radio frequency refarming to 5G/NR a simple and efficient process," the release stated.

McAfee launches cloud-based SIEM solution

Device-to-cloud cybersecurity company McAfee has unveiled its Enterprise Security Manager (ESM) Cloud, a new cloud-based security and information event management (SIEM) solution which can help organizations detect, investigate and become operational in two hours. The company claims that its ESM Cloud removes traditional barriers to SecOps efficiency and can help accelerate digital transformation. "As a cloud-based solution, the McAfee solution extends the value of a traditional SIEM by providing faster onboarding of security telemetry, automatic updates, and continuous system health monitoring," the company press release stated.

According to McAfee's cloud adoption and risk report – work-from-home edition – that looked at cloud security trends during the COVID-19 pandemic, external attacks on cloud accounts grew 630% and the overall enterprise use of cloud services increased by 50%. These attacks come from constantly evolving threats hiding behind normal enterprise activity. "SIEM solutions need to be able to identify and defend against attacks within an ever-increasing volume of events, the sophistication of threats, and cloud infrastructures," the release said.

"The ESM Cloud helps McAfee take its next step towards XDR functionality with highly scalable event collection, normalization, enrichment and analytics, along with customizable dashboards and reporting. This will help customers rapidly reduce the signal to noise ratio and prioritize detected threats in hours as opposed to days," McAfee enterprise products Vice President Anand Ramanathan said.

Samsung introduces fully virtualized 5G RAN

The Korean giant Samsung Electronics has announced that its new carrier-grade, fully-virtualized 5G Radio Access Network (vRAN) solution will be commercially available this quarter. The solution provides a new option for mobile operators seeking improved efficiencies, cost savings, and management benefits from deploying a software-based 5G radio infrastructure.

Samsung's 5G vRAN consists of a virtualized Central Unit (vCU), a virtualized Distributed Unit (vDU), and a wide range of radio units to enable a smooth migration to 5G. By replacing the dedicated baseband hardware used in a traditional RAN architecture with software elements on a general-purpose computing platform, mobile operators can scale 5G capacity and performance more easily, add new features quickly, and have the flexibility to support multiple architectures, the company press release stated.

It can also reduce maintenance costs by moving to a commercial off-the-shelf (COTS) x86-based platform, while matching the reliability of a traditional RAN. COTS x86-based servers are standard and readily available computing elements from a large supplier ecosystem. Operators use them today for a range of IT needs. "Samsung's 5G vRAN validates a software-based

alternative to vendor-specific hardware, while offering high performance, flexibility, and stability," Samsung Electronics Executive Vice President and Head of its R&D and Networks Business Jaeho Jeon said. "Once the solution becomes commercially available this quarter, we look forward to providing carriers with additional architectural options for building innovative and open 5G networks," he added.

Ericsson launches AIR solutions for 5G mid-band deployment

Ericsson has announced the launch of two new antenna-integrated radio (AIR) solutions that can help communications service providers deploy mid-band 5G networks faster and on a wider scale without adding to their site footprint.

The latest additions to the Ericsson's radio system portfolio – Hybrid AIR and Interleaved AIR – enhance the company's 5G platform the company said, adding that the solutions address the issue of physical space restrictions that some base station sites face.

"Ericsson has recognized that physical space restrictions at some base station sites are a challenge for communications service providers wishing to extend their footprint to include 5G. The new AIR solutions directly address this issue to enable communications service providers to manage the growing complexity of macro sites and towers while reducing site footprint and optimization costs," the company press release stated.

No extra physical space is needed at existing sites. When deployed with Massive MIMO, communications

service providers can deploy mid-band 5G with the new solutions faster and on a larger scale. With the Hybrid AIR and Interleaved AIR solutions, we can help our customers to quickly deliver the benefits of the 5G Massive MIMO to more end users. This launch also shows the effectiveness of fully integrated Kathrein Mobile Communication products in our Ericsson Radio System," Ericsson Product Area Networks Head Per Narvinger said.

Tech Mahindra launches blockchain-based digital rights platform

Tech Mahindra has rolled out blockchain-based contracts and rights management systems (bCRMS) for the global media and entertainment industry. The platform is designed to enable production houses and content creators to track revenue, royalty payments, manage rights, and address the issue of content piracy.

Built on open-source Hyperledger Fabric protocol, the bCRMS utilizes techniques like content hashing and forensic watermarking to track and trace content. "The technology is industry agnostic and thereby it could also be used across other industries like trade, finance, and healthcare that have the requirement for intellectual property and secured digital content," the company said, adding that presently it is deploying the platform for linear broadcast and over-the-top service providers.

According to the company press release, the platform built on IBM Blockchain restricts unauthorized access and redistribution of digital content. It also mitigates the risk of content piracy and helps manage royalty payments. "The platform is designed to be scalable and empowers artists, fulfillment partners and distributors with a clear, automated system for accessing and managing payments," the release stated.

"The bCRMS is developed to usher in the next generation of digital rights management systems for the media and entertainment industry that orchestrate the entire media content life cycle workflows across pre-production, post-production and distribution phases to enhance revenues, preempt contracts or rights infringement and focus on redefining end customer's content consumption experience" Tech Mahindra's blockchain and cybersecurity Practice Leader Rajesh Dhuddu said.

Avaya expands DaaS offering to new markets

Avaya has announced the availability of its device-as-a-service (DaaS) offering in nine new markets. The offering enables businesses to acquire the communication devices on a monthly subscription basis. "The expansion of this offering comes during a time of increased demand for flexible payment programs to help customers manage costs and future-proof their investments," the company said.

The company reported 200% quarter-to-quarter growth in subscription-based services in its latest earnings report. "The success of the Avaya Subscription program is the result of customers accelerating their digital transformation activities – including establishing a new all-weather workforce that can work securely from anywhere and adding technologies that enable them to better serve customers," Avaya Subscription Marketing Director Steve Brock said. "They want the latest software and support at a price point that lets them more forward immediately, so that they can innovate when they have needs, with additional financial options," he added.

The company's DaaS offering complements its subscription program – equipping customers with the devices required to maximize the potential of this software, and enabling customers to purchase them in the same flexible, predictable manner. Since Avaya's portfolio is platform-agnostic the devices can be deployed across platforms, including that of other companies. According to the company, businesses in Mexico, Thailand, Australia, Taiwan, Argentina, Japan, Hong Kong, Colombia, and Singapore can now subscribe to Avaya devices for the workplace and home offices.

Transforming the future of technology

5G is likely to have a big impact beyond just telecom and those owning the largest number of related patents will dictate how business is done. This race for dominance has just begun

BY MANOJ POONIA

The buzz about 5G technologies has been going around for quite some years now, and we are currently witnessing a race between big players – Huawei, Samsung, Qualcomm – to amass 5G-related patents at a very high rate. This race for dominance is not without compelling reasons. Let us understand why.

The impact of 5G

The impact of 5G will not be restricted to the telecom sector, but to many other sectors that utilize, or will utilize, the telecom sector as a backbone. The list of such sectors is long. For example, the automobile industry started embedding telecom technologies in

> Patent licensing is a complex business, and licensing of 5G patents will be no different. Licensing of patents within the telecom sector means that it is happening between competitors. This makes the negotiation fierce.

cars to make them smarter, the infotainment systems in cars nowadays can connect to the servers of the manufacturers wirelessly. This is all enabled by the current 3G and 4G technologies. In the future, it will be the 5G that will enable this, albeit at a much faster data speed.

Things do not stop with the automobile sector. Internet of things (IoT) – a term used to describe a system of interconnected devices – will also leverage the 5G backbone for communicating with other devices to make them smarter. This, in turn, means that many of the futuristic smart devices – home appliances, like smart microwave, smart AC, smart cameras will likely leverage the 5G for its data communication needs. A logistics company monitoring its fleet will also leverage the 5G technology. It will not be an overstatement to say that 5G will be to the telecom sector, what Google is to the internet today.

Patent licensing in 5G

Talking about patent licensing, there are two kinds of patents – first the Standard Essential Patents (SEPs) and second the patents that relate to the standard, but disclose technology that is not essential to the standard, and is rather optional. The former is more valuable as every device that uses 5G will necessarily implement the technology of every SEP patent, and therefore, will have to take a license from the owners of these patents. Not all the SEPs will be owned by a single company, so patent pools will be formed, wherein the owners will pool their patents for licensing to interested parties, for the collective benefit of the owners.

Patent licensing as such is a complex business, and licensing of 5G patents will be no different. The reasons, if one may ask: licensing of patents within the telecom sector essentially means that the licensing is happening between competitors. This makes the negotiations fierce. The way licensing in the telecom sector generally works is that royalty rates are determined based on the selling price of the product.

This is not the case with other industries. For example, the licensing in the automobile industry is normally based on the selling price of the component from the OEM, as opposed to the selling price of the entire car. With other sectors using the 5G backbone, such differences will likely complicate the patent licensing in 5G more than ever. Currently, the 5G standards are in a formative stage, and there is no patent pool by the owners. In fact, setting up of a patent pool is also a daunting task since the royalty shares of a collective patent pool are calculated in accordance with the number of patents owned, and the nature of the patent.

With so many specifications being built in the 5G standard, most probably it will not be licensed on its own. Also, there are overlapping patent families between the 4G and 5G standards, i.e. in a patent family one member relates to the 4G standards and another member relates to 5G standards even though the invention in a patent family is basically the same.

In the retrospect, it's easy to see how 4G has impacted our lives by bringing lightning-fast speed internet from the WiFi to our phones. Gone are the days when electricity bills were paid using the "Utility bill payment" sections of the banks, it all happens now from the convenience of apps in our phones. The impact of 5G will definitely be bigger and on a larger scale making everything around us smarter and more efficient.

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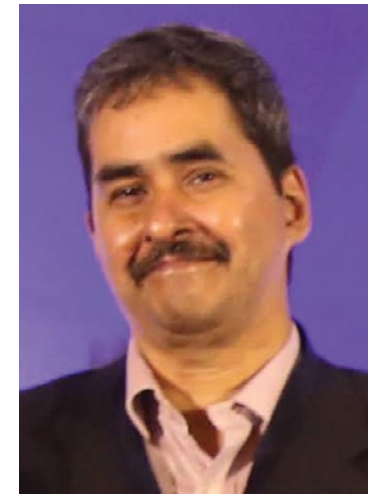
Time to regroup

The pandemic has given us an opportunity to re-imagine how telcos and the others will handle the growing cloud- and app-based economy



Pradeep Chakraborty

We have just completed the first half of the year 2020. It has all been about the Coronavirus, and how all the telecom networks have stood the test of time in this pandemic. Perhaps, the future is not going to be all that gloomy. Time and again, telecom has performed the role of a saviour.

It is time to regroup. Telecom has helped us to respond, rebound, and perhaps, re-imagine. By responding, telecom has really kept things stable and alive during the pandemic and will continue to do so.

By rebounding, telecom is also helping grow new businesses. For example, earlier, there were no PPEs or even hand sanitizers. Through telecom, and over television, and the world news, people across India have seen how those items were made. And then, they made all that in double-quick time.

There are analyst figures that point to the growing penetration of mobile phones and broadband over the next five years or so. How you may ask? Simple. The pandemic has taught the world the value of connectivity and networks, and of having great devices that can enable you to connect. There are plans in place to boost the existing telecom infrastructure assets, such as mobile towers, data centres, submarine cables, and fibre, as well.

People have also learned how to do better business continuity plans (BCP), managing workforces, operations and supply chains, over these past three-four months. The shift to remote and work-from-home is also leading to demand connectivity and network infrastructure.

Here, a word of caution. Some elements of telecom cannot get duplicated easily. There are also risks of COVID-19 exposure. Manufacturing and delivery of network equipment will probably get delayed. These could slow the buildouts of 5G and fiber networks. There could be some bargaining as well, between suppliers and buyers.

Telecom has helped us to respond, rebound, and re-imagine. By responding, telecom has really kept things stable and alive during the pandemic, and will continue to do so.

And, this is where we need to re-imagine. How will telcos and the others handle the growing popularity of cloud-based services? What would be the enterprise mobile apps that could be used? How are the investments going to look like in artificial intelligence? How will smart cities function in the future? How will edge computing, or multi-access edge computing ride 5G? There are many angles. These are just a few.

Maybe, we can develop each one of these topics into separate webinars.

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