DISRUPTIVE TELECOMS

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WORLD REPORT DECEMBER 2020

DIGITAL ACCELERATION

Telecom industry is at the forefront of enabling this acceleration

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From the Editor

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Top 10 Disruptive Tech Trends for 2021

When it comes to year 2020, there is no doubt that the ongoing Covid-19 pandemic has affected the worldwide economy as well as the advancement of technology and new product development in different businesses.

Regardless of this ongoing pressing situation, there have been various new innovations, driving technology trends across various segments, including artificial intelligence, 5G, internet of things (IoT), extended reality (XR), and automotive safety.

We are presenting a list of 10 most important disruptive tech trends that will have great impact on the year 2021.

Trend 1: Fast Emergence of 5G

Year 2021 will see rapid deployment of commercial grade 5G services and more operators will embrace new standard of communications to serve their customers in a better way. 5G will turn out to be a real disruptive game changer or year 2021.

5G will provide the much needed boost al the digital collaboration, telecommunication and videoconferencing needs of the new normal today and deliver accelerated speeds for customers. This will hold special importance for 5G use cases around education, medical care and technology-led manufacturing.

Fast emergence of 5G will also bring significant growth in widespread adoption of IoT. Enterprise and SMBs utilizing IoT have noticed an improved insight into customer needs, practices, and inclinations. The value of 5G, in this way, will soar in 2021.

Trend 2: Growing Demand for Data Analytics

More and more organizations will adopt AI and ML driven data analytics in order to get business critical network insights and gain better operational efficiencies as well as win over their closest competition.

Throughout the next years, firms will decide to work with partners that focus on data analytics and implement practices that derive more value from their network investments.

Trend 3: Integration of AR Glasses

Augment reality (AR) glasses will move towards a smartphone connected design in 2021 with the smartphone filling in as the computing platform for the glasses.

And as 5G network environment turns out to be more developed in 2021, unique convergence of 5G smartphones and AR glasses will empower smartphones to run AR applications all the more easily and deliver advanced personal audio-visual entertainment functionalities by utilizing the additional computing power of smartphones.

This will also hold huge importance for an ongoing home-based educational environment. And hence, smartphone brands and mobile network operators will move to embrace AR glasses market on a large-scale in the year 2021.

Trend 4: Automation Roadmaps

The impact of COVID-19 pandemic is changing automation plans for organisations quickly toward back-office processes and business strength. Intelligent automation will represent the infusion of robotic and digital process automation with pragmatic AI driven solutions. These innovative developments can assist organizations with getting more proficient and tough while extending their operations.

Trend 5: Development of Driver Monitoring Systems

Development of driver monitoring system will also move towards new dimension in the year 2021. Automotive safety technology is moving from applications outside the vehicle to more of an in-vehicle scenario, and sensing innovation is presently incorporating driver status monitoring with external environmental readings.

And hence, automotive AI integration is turning into an empowering agent of automotive safety, extending beyond entertainment and user assistance functionalities.

Trend 6: Adoption of Distributed Cloud

A distributed cloud environment is where cloud services are distributed to different physical locations, but the operation, governance and evolution remain the responsibility of the public cloud provider – this will gain importance as enterprise and SMBs look for low-latency, scalable and yet cost-effective cloud solutions.

This model allows organizations to have cloud services delivered with low-latency scenarios and reduced data costs and also helps to accommodate laws that dictate data must remain in a specific geographical area. This will also drive adoption of public cloud in a renewed manner.

Trend 7: Work from Anywhere

Work from anywhere operations model will be quite critical for businesses to emerge successfully from COVID-19. At its core, this operating model allows for business to be accessed, delivered and enabled anywhere — where customers, employers and business partners operate in physically remote environments.

Trend 8: Adoption of SASE

As we move towards a highly converged and networked society in the year 2021 - SASE or Secure Access Service Edge will hold greater significance and this is where the future of network security will evolve.

SASE is the convergence of wide area networking, or WAN, and enables network security services into a single, cloud-delivered service model.

This approach allows organizations to apply secure access no matter where their users, applications or devices are located. SASE delivers great advantages such as an unprecedented WAN scalability, edge to edge security and an increased network performance.

Trend 9: Investments in Quantum Computing

In this pandemic era – as a technology, quantum computing is helping in the administration of COVID-19 on dealing with the spread, searching for potential vaccines, and the advancement of therapeutics. And in the year 2021, organizations will move towards this technology segment to quench their thirst for innovation.

Trend 10: Focus on Hyperlocal Operations

In the upcoming decade, large enterprises will go hyperlocal and improve their capacity to work with hyperlocal operations, along with small and medium sized businesses developing and growing to new topographies.

And in order to enhance operational efficiencies in such a scenario, organisations should plan structures that can efficiently distribute customer engagement and business tasks to significant geographic locales while holding centralized technology management benefits.

CONTENT

Journey to Digital Acceleration

With remote work, remote learning and digital transformation almost everywhere, fast paced digital acceleration is now a reality and it is taking hold in enterprise across various industry verticals. The definition of digital transformation and acceleration may vary from business to business, it is clear that we are in a state of evolution, with data at the helm of all this

More recently, the pandemic has also been driving the pace of digital acceleration. Digital acceleration is more important now because you can use data as an output of the digitization exercise to better understand risk. The pandemic has created more risk than we've ever seen in our generation, and many people were completely unprepared.

Digital Transformation

Digital transformation involves digitizing information and processes. In the first wave, the initial digitization process involved buying and selling process (e.g., e-commerce). Then people started recognizing there is a huge opportunity to assess every single process within a company.

This is just the tip of the iceberg on the benefits to be realized when it comes to using digitalization of information in a supply chain to better understand each step in the process, identify ways to make it more efficient and be able to translate those learnings into insights-driven decision-making.

And digital acceleration is not just applying or gathering data from a process, but also accelerating growth and impact of your business using data and digital learnings. This includes digital maturity as an indication of the readiness of your organization to leverage digital technologies and insights. Digital transformation readies the

organization to take advantage of data; digital acceleration optimizes the capabilities for growth.

Road to Digital Transformation

Digital transformation is emerging as a key driver of sweeping change in the world around us. It has the potential to significantly improve consumer lives and create broader societal good, while providing businesses with new opportunities for value creation and capture.

The telecommunications industry is at the forefront of this transformation, both as an industry witnessing large-scale change in its market environment and as a key driver of worldwide digitization.

Investment by the telecommunications industry in technology and interoperability has underpinned an immense shift in information and capital flows through the global economy, while providing the building blocks for the emergence of entirely new business models across industries.

In parallel, access to a globally connected network has empowered millions of people around the world, by giving them access to real-time information, marketplaces and social programmes that will have long-term implications for quality of life.

It is clear that digitization will be a source of transformational change, but there are a number of challenges that need to be overcome. In many cases, the gains from digitization have been inequitable, with the benefits not reaching those who need them most. At the same time, the exponential increase in global information flows has created new risks for data privacy and security.

Businesses across sectors are grappling with challenges related to changing customer expectations, cultural transformation, outdated regulation and skill shortages, among others.

Enabling Fourth Industrial Revolution

The ever-wider availability of technologies such as mobile, artificial intelligence, cloud, analytics and platforms is dramatically altering the way we live, work and interact – in what has been termed the Fourth Industrial Revolution. The telecommunications (telecom) industry is playing a critical role in enabling this digital revolution unfolding around us.

The telecom ecosystem has provided the fundamental building blocks – access, interconnectivity and applications – that are enabling this digital revolution to take place. A large share of potential value stemming from digitization across global industries over the next decade is dependent on the telecom industry delivering essential infrastructure, applications and productivity improvements in many areas.

The industry faces a rapidly changing economic and competitive landscape driven by internal and external digital disruptions. So far, the role that telecom operators have played in accelerating digital business and service models has not translated into new value for the operators themselves.

Pressure on traditional revenues means that it is increasingly important for operators to look at new digital business models to make sure that they share in the value from digital transformation.

Future Horizons

The next decade of digitization will look markedly different from the past and companies across the industry will need to be well-prepared to take advantage of the sweeping transformation taking place in consumer lives, enterprises and the broader economy.

We have identified four broad digital themes, each including definable digital initiatives that enterprise and SMBs can implement, which we believe will have the biggest impact on telecom companies.

Future-Ready Networks.

Virtualization and an abstraction of the physical hardware layer promise to fundamentally change the basis of future service differentiation by creating self-optimizing and secure zero touch networks.

Beyond the Pipe.

The increased digital transformation of consumers' lives and businesses presents the telecom industry with important opportunities to extend revenue streams beyond connectivity, through integrated internet of things (IoT) solutions, consumer and enterprise digital services, and reimagined models of digital communication leveraging advances in natural human interfaces and augmented reality/virtual reality – AR/VR capabilities.

Redefining Customer Engagement.

To win the race for customer loyalty and mindshare, telecom industry players will need to increasingly deploy features and tools that deliver delightful digital experiences. This is especially important as customers now expect the high-quality digital experiences they receive in one industry to be matched by companies in other sectors.

Bridging the Gap on Innovation.

The need for rapid innovation, greater convergence and new services means that telcos must fill capability gaps using new innovation models and revamped talent strategies for a digital workforce.

Challenges to Change

Some significant barriers stand in the way of this value capture: firms are encumbered by legacy assets; there is limited collaboration between

the public and private sectors; the "innovator's dilemma" encourages inertia; and the culture at incumbent firms is impacting their ability to attract and retain the best digital talent.

There are other challenges hindering societal value creation. For instance, slow or uneven adoption of digital communications or the internet in under-penetrated regions can exacerbate the digital divide by concentrating most of the benefits in the population segments that are better prepared to benefit from the technology – the wealthy, the educated and the skilled.

Unlocking wider value for the lowest economic segments will need focused action to address the analogue challenges – affordability, fair competition, locally relevant content and accountable institution. Network transformation will be necessary to enable new business models beyond the pipe and address changing customer expectations.

Enabling new cross-industry business models in areas such as IoT will require flexible and agile networks that allow ubiquitous coverage of people and things, software defined network functions and analytics, personal data protection and cyber-resilience, ultra-reliable low-latency communication, and enhanced mobile broadband. New business models leveraging emerging technologies will require strong collaboration with vertical industries and internet platforms.

Competitive advantage in digital services and IoT will be driven by the capability to collect and analyse large pools of data specific to vertical-market use cases and to target value opportunities through customization of services and offerings. Operating in the digital age requires corporate cultural change along with new organizational structures.

Creating a culture of innovation will be dependent on breaking through established organizational hierarchies and orthodoxies. This will be driven mainly by a change in governance, incentives, metrics and talent strategy. Digitization of the industry will require a transformation of existing policy and regulatory models.

Transformational change in networks and business models will have to be accompanied by greater flexibility in regulation, especially on spectrum management, consistency across jurisdictions and fiscal policy.

Looking Ahead

Looking ahead, what might the distribution of industry profits in 2025 look like? Interestingly, many industry executives believe that the share of wireless/wireline operators in industry profits could fall even further, implying that these companies are still not doing enough to capture long-term value from digitization.

There are signs that the next phase of competition in telecommunications may look different from the past, accelerating the need for operators to abandon incremental initiatives in favour of transformational innovation. A number of key trends are likely to increase pressure on margins by forcing operators to undertake large investments at a time when competition in the industry is intensifying.

These trends include:

1,000x capacity driving innovations

The growth in data consumption and the surge in the number of connected devices are likely to require future networks to have 1,000 times more capacity than is available today. At the same time, a growing number of real-time applications will demand that end-to-end network latency be reduced to milliseconds, to enable a seamless and lag-free experience in browsing, watching videos or even remotely controlling robots or vehicles.

To cope with bandwidth demand, mobile networks will transform into a massively dense heterogeneous network ("HetNets") with a high degree of flexibility afforded by technologies such as software-defined networking (SDN), network function virtualization (NFV) and Cloud RAN. With spectrum efficiency and bandwidth coming to its logical limits, the new normal will be densifying cells by up to a factor of 100.

Some of these requirements will be met through the expected transition to the next-generation (5G) network, but the rapid increase in demand is likely to drive much faster development and adoption of these technologies on legacy networks as well.

Colliding Platforms

The emergence of the digital economy has meant that networks and semiconductors now form the infrastructure layer of application-specific technology stacks, with other layers consisting of enabling platforms (integration software, operating systems), applications and digital services for end-users. Until now, these layers have developed independently, with large numbers of participants in each layer competing to build and provide services for specific-use cases.

However, we are already seeing increased convergence and consolidation towards the middle platform layer. Application developers and digital service providers are developing their own integration systems and middleware as these aspects become critical to their business models and also provide large revenue and profit opportunities (Amazon Web Services is a prime example). At the same time, network operators are developing new capabilities in these areas to move beyond the relatively slow-growing infrastructure layer.

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Diminishing Differentiation

The emergence of data-driven business models now means that competitive differentiation is driven by companies that can best utilize consumer data to drive business models. Telecom players, already lacking OTT businesses in this respect, face a real threat of being left to compete on two inherently contradictory fronts – price and throughput – that could put margins under further pressure.

Telcos could be left to compete as IP-connectivity pure plays. In the extreme scenario, increasing commoditization of the core offering could see margins drop to the levels of utility companies.

Customer 3.0

Customers are beginning to judge the quality of the products or services they receive not only against competitors within that sector but also against the best customer service they have experienced in any industry.

Customers now expect levels of personalization, on demand access and quality that match the leaders in any industry. This will become increasingly important for operators as expectations evolve faster than the industry's ability to meet them.

Networks as national assets

Governments are recognizing the potential for telecom networks to drive competitive differentiation at a national level, but they also view the industry as a key source of government revenue through licensing fees and sectoral taxes. Several countries – including Japan, New Zealand, Singapore, India, Australia and the Republic of Korea – are deploying widespread fibre-to-the premises (FTTP) networks at a national scale to bridge an emerging digital divide and deliver key social benefit programmes. However, these efforts that put networks at the centre of government or political agendas could mean higher profitability pressures on operators through greater regulatory scrutiny, pricing pressures or even wide-ranging nationalization of telecom assets.

A series of digital, industry and customer trends is accelerating digital transformation in telecommunications. The industry is gearing up for a massive increase in demand from other industries. Customer expectations are crossing industry boundaries and raising the bar across industries, forcing telecom operators to redefine customer experience. Networks themselves will evolve from being differentiated on proprietary hardware to an era of software-defined systems. And pressures on traditional revenues have meant that operators are looking at new digital business models and service areas, with areas such as IoT likely to emerge as new battlegrounds.

Networks of the Future

One of the key achievements of the telecom industry has been to establish the vast physical networks of local, national and global connectivity that have transformed the world. However, the ability of physical infrastructure to drive differentiation has diminished drastically.

In the future, networks are likely to evolve in two main ways. First, advances in digital and cloud capabilities will transform operators' cost bases, moving away from expensive, proprietary hardware to generic, commoditized equipment that allows a greater share of resources to be invested in increasing reliability, flexibility and innovation through software. Second, an explosion in diverse use cases across industries will require networks that are flexible, autonomous and customized, while ensuring that underlying data flows are reliable and secure.

Software-differentiated networks

Over the coming decade, network functions traditionally implemented on costly hardware will be replaced with lightweight software solutions supporting standard "IT-like" or API-based interfaces, deployable on very inexpensive, general-purpose hardware platforms. This shift is being led by technologies built on and enabled by the cloud, such as software-defined networking (SDN) and network function virtualization (NFV).

While the industry is yet to arrive at a common vision for future networks, most view SDN and NFV as central to their plans. These technologies promise several important benefits: SDN by separating the control and data layers; and NFV by replacing complex network functions with easy-to-manipulate virtualized software. Widespread adoption of these technologies will be driven primarily by network cost reduction. It is estimated that SDN and NFV could generate savings of 25% to 75% of overall operator operating expenditure thanks to significantly reduced provisioning, monitoring and hardware costs.

These technologies also promise to create value for customers through flexible services, faster times to market and improved user experiences. The ability to view and manipulate network functions on demand, and at a granular level, will catalyse service innovation and allow stronger collaborations between customers and providers.

From the outside, the deployment of SDN and NFV may look like any other industry technology push, but many analysts are comparing the scale and scope of the transformation to be equivalent to the introduction of IPbased networks (which enabled the global internet). While current adoption levels are negligible,

SDN and NFV are forecast to be a fundamental part of telecom networks across the world by 2025, with significant potential benefits for both the industry and its customers.

While there is yet to emerge a common defined standard for deployment across carriers and technologies, large network carriers – AT&T, Verizon, Deutsche Telekom, NTT, Telefónica, Singtel among others – are likely to lead the efforts to develop and standardize critical components of SDN and NFV.

Bridging the Gap on Innovation

Innovation within the telecommunications industry has made an immense contribution to global productivity. The evolution of fixed- and mobile-network technology has brought lightning-fast connectivity to users across the world, changing the way we collaborate and interact. The industry has set benchmarks in collaboration, with bodies such as the GSMA, tm forum and MEF driving the development of global standards to enable widespread adoption.

In the digital age, however, the industry's traditional innovation models (with investment cycles stretching five to seven years), the development of industry standards, licensing contracts and wide infrastructure development have not protected it from external disruption.

Digital disruption today is characterized by declining technology costs, rapid innovation models and a fail-fast culture. Digital has dramatically reduced entry costs at almost every point of the value chain, making it increasingly difficult to predict the emergence of new competition.

Today there is an urgent need to provide agile, integrated and seamless connectivity and digital services, juxtaposed with telcos' traditionally long investment and innovation cycles, should force operators to sharpen their focus on new innovation models.

Digital Services

As digital disruptors and OTT players attack traditional communication revenues, telecos are pursuing opportunities to move up the digital stack to the services layer. With a large customer base, ownership of key infrastructure and strong technology capabilities, telecom operators will try to take on the role of digital services providers, often emerging as disruptors to other industries. The next decade will see operators make an aggressive push to transform their revenue mix through focused initiatives across a number of key services applications.

Integrated on IoT

IoT is likely to be the next major value opportunity across industries. Industrial IoT, for instance, is forecast to add $14 trillion of economic value to the global economy by 2030. As providers of key connectivity – between sensors, devices, data centres and people – the telecom ecosystem will be integral to the proliferation of the "internet of everything". As business models evolve over the coming decade, linking more than 50 billion new legacy sensors to a common network will require industries to work closely with the telecom ecosystem.

While the telecom industry stands to benefit from meeting the massive increase in demand for data packets – its core "product" offering – several companies within the ecosystem are recognizing the potentially large value opportunity that lies beyond just providing the infrastructure necessary to meet additional demand. Operators are investing to move up the technology stack towards building the platforms, applications, integration and analytics capabilities that unleash the real power of IoT.

Reinventing Future-Proof Communication

Innovations ranging from natural user interfaces and holography to augmented reality (AR) and virtual reality (VR) show the potential to change how we interact with one another and the world around us. These technologies point to the future of smartphones – and maybe beyond.

By 2030, the PC will be 50 years old and the smartphone almost 15 years old. What will be the new normal for communication devices?

Virtual Reality and Augmented Reality have the potential to become the next big computing platform and possibly emerge to be "as game-changing as the advent of the PC".

This is particularly relevant in light of the transformational change that personal computers and smartphones brought to everyday lives of consumers and employees (and the value these firms created in the process). While telecom operators missed out on a potential windfall with the explosion in mobile, a focus on emerging technologies can ensure that significant value is captured for shareholders.

AR and VR could herald a shift away from the screen and significantly reduce the gap between our digital and physical worlds, in the process reshaping existing ways of buying products, getting medical care or communicating with those around us.

The application of AR and VR is likely to extend beyond just social media and gaming: recent analysis shows that the majority of investments in these technologies have taken place in commercial and industrial applications. The variety of those commercial and industrial applications – including labour training, retail, real estate, security, manufacturing, logistics, healthcare and data analytics – are evidence of the VR/AR potential to transform how we work, socialize, learn, entertain and consume.

Powering Cloud Gaming with 5G Networks

By Patrick Joggerst, Chief Marketing Officer and EVP, Business Development, Ribbon

Everyone from operators and vendors to analysts and market forecasters agree that cloud gaming is set to be really important for 5G, and vice-versa. But what do gamers themselves think, and what do they expect from this technology? How aware are they aware of the capabilities of 5G, and is it something they're eager to leverage?

We commissioned research with 5,000 dedicated hardcore gamers (defined as players who typically put in more than three hours gaming every single day before the pandemic) across five countries. Across the group, the average amount of time spent gaming was 3 hours and 40 minutes per day, with just over 20 per cent of the group spending more than five hours a day on gaming.

That time increased dramatically during periods of local lockdowns and social distancing measures, with the number of gamers playing more than five hours a day almost doubling to 43 per cent. Additionally, the average gaming time went past four hours with more than three-quarters of the gamers spending at least that amount of time playing games every day.

There is no doubt that these are the very people that operators need to reach with 5G gaming services. The good news we uncovered for the operator community is that these gamers are very 5G aware. Even better news is that they are deeply committed to their gaming habit, and willing to invest in order to improve their experience. The less good news is that the vast majority of today's 5G networks are not setup to deliver the services that gamers are looking for.

Nearly all the 5G networks deployed around the world have been of the 'non-stand-alone' variety, where the 5G radio path uses existing supporting infrastructure and is not capable of delivering the network slicing capability that has long been touted as one of the key differentiators of a 5G network.

The gaming experience, and the cloud gaming experience even more so, depends on a low latency connection. One of the great advantages of 5G networks is that they are architected to deliver network slicing with guaranteed levels of service within each slice. However this capability is only available in stand-alone

5G networks, built on packet optical transport infrastructure designed to handle slicing and deliver end-to-end low-latency connections. Without that infrastructure, the hardcore mobile and cloud gaming market will remain out of reach.

The question then becomes: is this market worth reaching? Our survey says yes. Hardcore gamers spend, on average, around $84 per month on their broadband and mobile connectivity combined. And what should really grab the operators' attention is that four out of five of them would seriously consider swapping their existing broadband and mobile contracts for a 5G mobile service if it offered a better connection and lower latency.

Furthermore, 95 per cent of that group were prepared to pay significantly more every month for the improved experience. In fact, some 60 per cent said they would spend at least half as much again – that's more than $120 per month for 5G to replace their existing home broadband and mobile contracts.

These dedicated gamers know what they want from 5G and are well informed about the service they receive. They know their exact ping rates, and they also know that if latency on a connection exceeds 30 milliseconds, the gaming experience suffers. Diving deeper, only 7% of the gamers we surveyed believed their current connection consistently delivered the optimal low latency rate of ten milliseconds required to enjoyably play cloud gaming. Additionally, a sizeable 83 per cent believed that a 5G connection would make cloud gaming a much more compelling experience.

They are not wrong. Stand-alone 5G networks are capable of exponentially outperforming the gamer's current mobile and fixed connectivity experience, providing faster download speeds and latency as low as one millisecond. These gamers are well aware of this potential performance boost and some 58 per cent of them said they would switch to a 5G service provider offering a high-quality bundled gaming subscription as soon as they could.

Patrick Joggerst, Chief Marketing Officer and EVP, Business Development, Ribbon

Bundling a gaming subscription with a 5G contract adds further potential revenue fuel for the operators. After all, if you examine their spend on games, subscriptions, connectivity, and accessories combined, our hardcore gamers were investing a total of $260 each month.

The global gaming market is massive, with some 2.7 billion ardent gamers in the world, and we estimate the revenue opportunity from 5G gaming connectivity alone is worth an extra $150bn a year for the service provider community. That's before you add the opportunity for service providers to bundle a cloud games subscription, or develop partnerships with gaming companies, into the service packages. Then the rewards get even bigger.

All of which means that – after speaking to the actual users – our view is that everyone was right: gaming is a vitally important 5G market. But to reach it requires a step change in the investment strategy. Non-stand-alone 5G does not unlock that market. To reach that latent, and currently unfulfilled demand for mobile and cloud gaming, service providers need to invest in network slicing, in a packet optical transport infrastructure to support it, and in full stand-alone 5G networks.

Patrick Joggerst is the Chief Marketing Officer and Executive Vice President of Business Development for Ribbon Communications, a secure real time communications company. Previously, Patrick was EVP of Global Sales & Marketing for GENBAND.

He has an accomplished career in communications spanning three decades, having managed sales and marketing organizations for both telecommunications service providers and technology suppliers. Prior to GENBAND, Patrick served as Vice President of Global Sales for BroadSoft, a leading provider of software and services that enable service providers to offer Unified Communications over their IP networks.

Patrick also served as the Executive Vice President & General Manager for the Carrier Services & Solutions business unit at Aricent Group, a systems integration and software solutions provider owned by KKR. Earlier positions held by Patrick included: Senior VP of World-Wide Sales at NextPoint Networks (formerly NexTone), EVP of Global Sales and Marketing at Telcordia Technologies, President of PrimeCo PCS, President of Carrier Service at Global Crossing, as well as several executive positions at AT&T.

MediaTek at the Forefront with Technology Designed for 5G Era

When it comes to future of smartphones –chipsets are right at the heart of enabling future-proof innovation and delivering great capabilities in the hands of users.

With its continued focus towards meaningful innovation - MediaTek is at the forefront with technology designed for the 5G era, delivering high performance gaming experience, unrivalled image quality, uninterrupted connectivity and smooth responsive action in smartphones. Anku Jain, Managing Director, MediaTek India speaks with Zia Askari from TelecomDrive.com about the company's priorities for 2021 and what we can expect from MediaTek in 5G era.

As we move towards embracing 5G, this is going to be about array of IoT devices, drones and of course smartphones – what are your key priorities going to be in the year 2021?

In the coming year, the 5G market is expected to increase significantly. We are expecting around 500 million (chip) units to be shipped in 2021. At present, we are also working on technology upgradation like 5G modem technology, WiFi-6, Edge AI capability, and 8K capability as a part of our commitment to deliver high quality, highly reliable, and trustworthy products and solutions to our customers. With such strong fundamentals, we have full confidence that we will continue delivering value to our customers in 2021 and beyond.

Talking about smartphone SoCs in 2021, we believe that most chips will feature 5G capabilities and AI enhancements for premium user experiences. Consumption of data is increasing at an incredible rate and there is a growing demand and requirement for faster and better connectivity devices and solutions. According to TRAI data, there were 743.19 million internet subscribers at the end of March 2020 with wireless being (97 per cent share of the overall pie).

We have come a long way from 2G services in 1995 to pervasive 4G in the present and are now looking forward 5G transformations in 2021.

Smartphone gaming is fast emerging as a key enabler for driving new age customer experiences. How is MediaTek enabling great user experience on gaming front?

Globally, gaming is gaining mileage and several smartphone makers are working towards launching devices that support high-end gaming. We are working on bringing seamless gaming experiences through dedicated chipsets that provide optimal results to the Indian gaming enthusiasts.

MediaTek has a strong focus on segments including 5G, smartphone gaming and smart homes. We are closely working with our partners and developers towards introducing newer and more feature-rich chipsets in the market. We have been quite aggressive with our launches in 2020, having already unveiled our gaming chipsets MediaTek Helio G70, G80, G85, G25 and G35, aiming at mainstream gaming smartphone segment. All the SoCs are powered by MediaTek HyperEngine Game technology. The MediaTek HelioG series is designed to deliver a fast and fluid mobile gaming experience.

The mobile gaming market is booming in India and smartphone makers are keen on delivering the best game-play experience to consumers and gaming fans. MediaTek is at the forefront with technology designed for the 5G era, delivering high performance, unrivalled image quality, uninterrupted connectivity and smooth responsive action even in the most demanding games.

How do you differentiate your offering on gaming when compared to what is already available in the market today?

MediaTek has been working on bringing seamless gameplay experiences with dedicated chipsets that support high-end gaming provides optimal results to gaming enthusiasts of the country.

Apart from the Helio G Series, MediaTek has recently expanded its gaming-focus to Dimensity series chipsets with the addition of 1000+ and 800U chips. These chipsets are designed exclusively to propel incredible smartphone gaming experiences along with 5G capabilities.

The Dimensity Series combines the latest CPU and GPU cores with ultra-fast memory and massive AI performance to deliver fast and fluid action. And for even more gaming power, the Dimensity series is paired with MediaTek's HyperEngine game technology that tunes the entire smartphone to an advanced gaming console with best user experience possible.

What are some of the innovative offerings from MediaTek that we can look forward to in the coming months?

MediaTek has been focused on the gaming segment and has collaborated with several mobile giant players. MediaTek is committed to enabling the smart devices ecosystem in India and is focusing on boosting 5G capabilities to make great technology available in the country for everyone.

The company has been shipping a lot of chips, which will be packed in the upcoming smartphones that will be shipped in the Indian market. The 5G enabled gaming handsets are what people will be witnessing in the coming year from MediaTek as we believe that India will be a major market for 5G phones and technology in 2021. We certainly will work very closely with our customers to fulfil their demands and expectations for the coming years.

We are still in the middle of this pandemic today. How has this affected MediaTek as an organization and how do you look at the future?

The industry has gone through many challenges due to Covid-19. The major issue faced by the global manufacturing sectors was the disruption in the supply chains due to worldwide lockdowns.

In fact, with social distancing, online education remote work system took a leap that leads to acceleration in demand for smart devices like smartphones, tablets, and laptops etc.

MediaTek is continuously pushing boundaries and bringing high-end feature-rich smartphones even in the mid-ranged handset segment, ensuring that everyone has access to advanced technology experiences. MediaTek powered smartphones are preferred by consumers across the spectrum and in the near future we look forward to powering premium handset experience for our consumers by collaborating with device makers who are keen to walk an extra mile in technology development.

Please share your market vision and projection for year 2021? What are some of the key trends that you see shaping up in the coming year?

We are expecting 500 million (chip) units to be shipped in 2021. At present, we are working on technology upgrades like 5G modem technology; Edge AI capability, WiFi-6 and 8K capability. We believe that most chips will feature 5G capabilities and AI enhancements for premium user experiences in the coming year. As the consumption of data is increasing at an incredible rate, there is a major requirement for faster and better connectivity solutions.

We are working on bringing 5G connectivity to consumers sooner by targeting the sub6GHz frequency band that is ideal for the Indian landscape by 2021. We are also collaborating with leading cellular operators, equipment makers and suppliers to verify the market readiness of 5G technologies and make it accessible.

The Urban Digital Divide – Eliminating the "Digital Deserts"

If you ask me, what are the most profitable businesses – the answer is Internet based software companies and they are the ones driving most innovations and meaningful disruptions today

By David Sumi, VP – Marketing, Siklu

According to a recent report from the Brookings Institution, more than 18 million U.S. households in 2018 had no broadband service "at all." Further, "the majority of digitally disconnected households live in metropolitan areas, and the gaps are especially large when comparing neighborhoods within the same place. Effectively, some residents live in digital poverty even as their neighbors thrive." And "from dense urban cities to emerging exurban counties, 13.9 million metropolitan households live without an in-home or wireless broadband subscription…".

This is a paradox as it is almost assumed these days that all metropolitan areas in the US have extensive deployments of fiber optic networks. These are typically part of regional backbone networks that provide inter-city and cross country connections and then, within the city, they "branch out" to connect individual neighborhoods. Despite this extensive fiber footprint, there remain large pockets of underserved businesses and residences when it comes to the current definition of "true" broadband services provided to the end user by cable, FTTH, DSL or fixed wireless. This condition has resulted from various historical and economic reasons and does not "discriminate," as it can apply to lower income neighborhoods or business districts with multi-story office buildings and other operations.

This "digital poverty" – or sometimes called "digital deserts" – is a recognized hindrance to economic growth and various initiatives with incentives are underway at the federal and state levels. The current global pandemic has aggravated this situation, as it has become increasingly clear over the last few months that demonstrating that "good enough" broadband for a non-COVID world does not come close to meeting the increased "need for speed" when people are staying at home, working from home, attending school from home, binge watching from home and visiting family and friends from home ("Zoom anyone?"). In particular, with schools closed and children distance learning, not having broadband is now not just critical but essential. Mayors across the country are dealing with this crisis and are searching for answers.

To remedy this situation, service providers and their OEM suppliers are designing in upgraded technologies such as FTTH and DOCSIS 3.0 and wireless providers are emphasizing the merits of mobile 5G technology. However, when it comes to 5G, the "fixed" variety has a clear advantage over mobile for the purposes of eliminating the digital deserts. Leading carriers in the US have conducted trials of fixed wireless access (FWA) broadband in several cities, using the mobile 5G "NR" (new radio) frequencies. However, the 5G NR bands actually have limited spectrum or bandwidth for FWA Gigabit speed services, whereas fixed 5G millimeter wave bands such as the V (60 GHz) and E (70/80 GHz) have vast swaths of available spectrum (e.g., from 5GHz to 14GHz contiguous, or a total of 24GHz), are virtually interference-free and are inexpensive to use as they are either license-free (V-band) or "lightly licensed" (E-band).

The following examples show how community leaders, council members and mayors alike are using V- and E-band mmWave to eliminate digital deserts and improve the quality of life for their constituents.

In Florida the Tampa Housing Authority (THA) resolved its urban digital divide dilemma with an innovative solution. When residents of the "Tempo" community, near downtown Tampa, found themselves quarantined, hundreds of them were without Internet connectivity due to financial restraints and limited service options. The THA owns and operates the Tempo and reached out to local company PBX-Change to boost Tempo's broadband connectivity throughout the property.

PBX-Change offers advanced, high-speed telecommunications services to homes and businesses throughout the Tampa area. The company proposed a wireless solution to the THA, specifically a mmWave one based on Siklu's EtherHaul™ 5500 product line. PBX-Change explained that it would then be possible to connect the Tempo back to their nearest fiber optic line POP, which was more than a mile away, with a 5Gbps Full duplex link. Furthermore, given the emergency conditions, the connection

from the Tempo to an Internet POP needed have at least 5 Gigabits of capacity and quick installation.

The project started on June 22nd and less than a month later. This demonstrates again the efficacy of a mmWave solution as, for instance, connecting a fiber optic line to the facilities would have taken months and costed much more. The Tempo now offers Internet Access to its residents through a network of more than 200 WiFi APscovering 265,000 square feet. Supporting hundreds of users, retail operations and guests, the traffic generated by this WiFi network and the Tempo can be measured in Gigabits.

Our second example concerns the DigitalC initiative in Cleveland. DigitalC came out of the One Cleveland project in 2015 and carries on the latter's mission to connect the citizens of Cleveland to true broadband services. Cleveland currently ranks in the top 5 of "least connected" cities in the US. More than 45,000 residents have no Internet connection at all and more than 30,000 residents in addition to that lack true broadband.

This situation developed in scattered pockets of the city, wherewired infrastructure was poor or non-existent. And those conditions remained that way simply because people could not afford the $75/month that large service providers would charge for high speed Internet access. As a result, there was no financial incentive for these service providers to extend the fiber optic lines and other equipment into these areas in order to make available high speed offerings to these locations. The cost of trenching new fiber, the time it would take, resulted in an unattractive ROI and hence nothing was done.

And then COVID-19 hit and what was a problem became absolutely devastating – no broadband meant no work, no school. Thousands of students had no way to attend the virtual classes, all that were available.

David Sumi, VP – Marketing, Siklu

The school district in Cleveland and the mayor were trying to solve this issue with incumbent providers. But these were all wireline (cable/fiber) solutions which did not exist in these areas and would take months or more and millions of dollars to implement. Not to mention at a monthly price many cannot afford.

DigitalC knew about the capabilities of the fixed wireless access option, but had concerns about the viability of the legacy sub 6GHz equipment in the area. This band cannot support the Gigabits of capacity people need is susceptible to interference from a variety of Wi-Fi and other electronic sources. This interference deteriorates the signal quality or can even break the connection. However, wireless was the only option as the neighborhoods needing access had no infrastructure at all -- no fiber, no backbone and especially no connectivity for the last 100 feet. Everything would have to be deployed from scratch.

DigitalC reached out to Siklu directly for help in not just supplying the wireless systems, but with network design and deployment, residential installation and service turn up. DigitalC relied upon Siklu to give them a complete, operational Gigabit network. DigitalC supplied the list of customers and where they lived – Siklu was responsible for the rest.

Reaching out to local contractors Siklu leveraged community resources to bring this vision to reality. As of November 2020 in little more than a few weeks more than 100 homes or MDUs are now enjoying high speed connectivity, many for the first time ever. Over the next few months DigitalC and Siklu will be working hard to bring true broadband to the 40,000 unconnected citizens of Cleveland. This project demonstratesclearly the power of Fixed 5G – rapid time to market, extremely cost effective, and available to everyone.

Industrial IoT Right in the Middle of India's 5G Revolution

With telecoms and enterprise moving forward to embrace the next generation in communications technology – 5G is going to play a critical role towards driving productivity to the next level and Industrial Internet of Things or IoT is right in the middle of this 5G revolution in India. Zia Askari from TelecomDrive.com speaks with Lt Gen Dr. SP Kochhar, Director General, COAI about the astonishing success of India's telecom story, how the industry is looking forward to embracing 5G and what are the most relevant use cases of 5G going to be in India.

India's telecom story is quite astonishing and has been a leading light for many other countries. Where do we go from here now?

The growth of telecom in India has been astonishing over the past few years. With a subscriber base of more than 1.2 billion, India now stands as the second-largest telecom market in the world, not only in terms of mobile and internet customers but also on the number of app downloads. The industry is a major contributor to the country's GDP. It is set to grow as the second-largest smartphone market globally by 2025 and is also expected to have 88 million 5G connections by 2025 (GSMA).

Lower tariffs and the availability of affordable smartphones were among the key factors that contributed to the wider adoption of wireless technologies in the country. Liberalized government policies like the National Digital Communications Policy (NDCP) 2018 is expected to boost growth and enhance foreign investments in the sector. Earlier this year, the government also raised the FDI cap for telecom from 74 percent to 100 percent.

While the outlook is positive in many aspects, the industry, in reality, is going through tough challenges. The Indian telecom companies, known for the lowest tariff in the world, are grappling with several challenges such as Low ARPU, competition from unlicensed OTT players, high spectrum pricing. The upcoming months are very crucial for the telecom industry as the government has announced spectrum auctions.

We emphasize on the fact, that telecom networks are integral to pursue the ambitious digital projects that the Government of India, under the leadership of Prime Minister Narendra Modi, has envisioned. Thus, the future of Indian economy greatly depends on how telecom evolves in the coming months.

How does COAI look at today's telecom market in India? Are there more challenges or opportunities here?

The telecom market in India promises huge potential, but it can be realized only if the industry gets over the financial and regulatory constraints. While there are challenges, opportunities also exist. During the pandemic, we saw how telecom and IT took over almost all the activities performed by humans at workplaces digitally. Almost all sectors were able to evolve quickly to manage this crisis only because they had a robust telecom infrastructure to rely on. Teleworking, online education, e-commerce, smart factories, and others - the list goes on. Now, this

trend will continue as citizens have adopted them as part of their lives, leading to the importance of telecom networks even more crucial for the normal day-to-day functioning of the society.

With 5G at the doorstep, a number of use cases are being developed. 5G networks are known for their higher capacity and lower latency, so it can support data-intensive applications. In India, 5G is set to dramatically transform the industrial, farming, healthcare and government sector. Modern technology trends like Internet of Things (IoT), Edge computing, smart factories, smart homes, telemedicine and various applications supported by Artificial Intelligence (AI) are the emerging 5G opportunities that can radically transform the economy of India in the coming years. With the Prime Minister's vision of making self-sustainable communities through digital empowerment, telecom infrastructure is expected to get all the backing from the government.

How do you look at 5G (and its localized use cases) as a key enabler for India's digital enablement? How are operators gearing up to enable this in the near future?

The fifth generation of network technologies (5G) is believed to be faster, smarter and more efficient than 4G. With 5G offering 10Gbps data rate (10 to 100x improvement over 4G and 4.5G networks), 1-millisecond latency, up to 100x the number of connected devices per unit area (compared with 4G LTE), 99.999% availability, 100% coverage, and 90% reduction in network energy usage compared with current technologies, new use cases can also be developed. India, on its path to becoming a fully digitized economy and can leverage the power of 5G to create new opportunities and bring inclusive development across the multifarious section of the society.

Industrial IoT is one of the focus areas of 5G in India. IoT in India is estimated to grow rapidly to achieve around 2.7 billion IoT units in India by the end of 2020 and around 100 billion units by 2035. Fleet management, asset tracking, smart metering and connected vehicles are some of the current use cases of IoT in India. IoT will move to the center stage with 5G.

With 5G launch expected in 2021, new use cases are likely to evolve. Sectors like farming, healthcare, education, utilities, and more will be the top beneficiaries. In farming, the high-speed 5G network with near zero latency can support the use of sensors in crop monitoring and related applications. For healthcare, remote surgery, 24x7 patient monitoring and teleconsulting are some of the immediate possibilities. With vast network coverage, 5G can support the online education initiatives in rural India, a key mission undertaken by the Digital India project. Similarly, digital banking that has gained significant momentum during a pandemic is expected to get wider coverage with the ubiquitous connectivity offered by 5G.

> ***5G is set to transform industrial, farming, healthcare and government sector***

The impact of 5G on public infrastructure will be huge. Smart cities characterized by connected roads, energy networks and smart homes are integral components of modern, developed society. In India, the transformation has already begun. To take that forward, we need a robust 5G ecosystem supported by all the stakeholders including the Government. The industry also needs regulatory and financial backing from the government.

What are some of the big challenges that you see in India's telecom turf today? How is COAI helping the industry here?

The biggest challenge facing the telecom industry is the financial health of the sector. . A number of factors can be attributed to this:

1. **AGR and its implications:** The verdict mandated operators to pay off around Rs 1.43 lakh crore in AGR within a period of 10 years. The verdict is said to have a long-term impact on the industry, as it will put severe capex/opex constraints on our member TSPs.
2. **Debt and tariff:** India has the lowest telecom tariff; conversely Indian telecom industry owes a huge debt to the government. The industry debt stands at around 8.5 lakh crores. Such obligations also mean that they will not have adequate cash flow for the next two years at least. COAI has been raising the demand for setting a floor price with immediate effect to protect the industry from a collapse.
3. **Spectrum availability and pricing**: There is need by the cabinet to reconsider the high base price of the spectrum. Lower reserve price will support TSPs to focus on achieving objective of 'Digital India', while allowing TSPs to make investments in expansion of service. The industry has been constantly taking up the issue of reduction in spectrum which can be used for 5G services with the Govt. There is also a need for iidentification of a clear road map for availability

of spectrum. There is a need to adopt long term perspective w.r.t spectrum pricing i.e., have long term benefits in mind rather than short term benefits in terms of generating revenues from auction. The Government needs to set affordable pricing for spectrum auction to allow widespread applicability and also ensure availability of contiguous, interference free spectrum. 4G auction is also a priority; with a lot of spectrum with operators expiring next year there is urgent need for them to buy spectrum otherwise it can lead to impact on quality of service.

In view of the current concerns, COAI has urged the government to intervene and support the industry by adopting a number of measures including the refund of unutilized input tax credit or granting the TSPs soft loan at MCLR rate with GST input credit as collateral. COAI also urged the government to rationalize the regulatory levies, by reducing the effective rate of the Spectrum Usage Charge (SUC) by 3% and reducing the licensing fee to 1%. Another key demand from the industry is to enact a uniform Right of Way (RoW) policy across all the states in India. Also going forward, there is need to look at redefining the AGR definition, so that its implications doesn't not impact the industry adversely.

Our PM has launched the "Aatmanirbhar Bharat" initiative. Where are we today on this and moving forward, how can India's telecoms embrace this and truly become self-reliant?

India is blessed with plenty of natural resources and manpower. With the right technology support and government backing, telecom industry can take the lead in Aatmanirbhar Bharat initiative launched by Prime Minister Narendra Modi. With 5G being the next big wave for telecom, India has set an ambitious plan to establish 5G manufacturing facilities, backed by both the government and private players.

The Make in India policy, an integral part of the Aatmanirbhar Bharat, will not only help Indian firms become self-reliant but will also safeguard the nation's interest on intelligence matters. With telecom network acting as the lifeline of all government and private organizations, the task becomes even more imperative. Traditionally, we not invested heavily in R&D and hence have been left behind in the IPR game, so going forward we have to incentivize R&D if we want to make Atmanirbhar Bharat a reality and we must also consider Open Source as a serious business opportunity and become smarter at trade negotiations. This all has to be supplemented by a supporting ecosystem for businesses, where doing business is easy and convenient from approvals to trade practices.

Government has initiated a slew of measures to encourage domestic manufacturing, including raising custom duty of 5G imports. Such measures will largely benefit domestic players and make cheaper equipment available for the industry. Government also announced Production Linked Incentives Scheme for telecom equipment manufacturing worth Rs 15000 crores, which could be available for five years. Earlier TRAI had also recommended setting up an R&D fund for telecom, but no major steps have been taken on this so far.

In light of the ongoing pandemic and work from anywhere concepts...What are some of the big trends that you think will be important for accelerating success for India's telecoms in the year 2021?

When a nation confronts a calamity, be it flood, earthquake or an epidemic like the COVID 19, telecom networks take over the primary function- communication- and help the authorities deal with it effectively. Unlike the other calamities that are short-spanned, COVID has been here for months, and its impact will be visible across the globe for at least a decade. Thus, the industry should be prepared to address the ongoing and emerging needs from across all verticals.

The most notable impact is the shift toward work-from-home culture. India Inc. has quickly adapted to the remote work culture, all thanks to digital technologies and the availability of cheaper data services from the carriers. Since the nationwide lockdown imposed in March, there have been 24-28% jump in demand for mobile and internet services in residential areas of tier two and three cities. As a result, the hiring of engineers and maintenance and repair executives has increased by 18-20%.

However, connectivity and bandwidth constraints are impacting the services in many places. Last mile connectivity is still a problem in sub-urban and rural areas. Telecom providers confront several regulatory hurdles such as RoW while rolling out fiber in many places. The myths associated with cell tower radiation have emerged as yet another roadblock for ensuring connectivity in both rural and urban areas. These concerns demand immediate attention from the authorities.

It won't be an exaggeration to say that the health of the country is decided by the health of its telecom network. In today's digital era, where every task is controlled by machines, and almost every machine is connected by telecom network, nation's progress rests on telecom infrastructure. Thus, we hope 2021 will be the year of Telecom and that the telecom industry gets the right deal from the government and regulatory body.

Will telcos take the shot at this century's top opportunity?

Throughout most of the 1900s computing has shifted becoming today an extension of our lives. However, the 21st century is going to be marked by a much deeper form of interaction between us and data. Dennis Chan, AVP – OTT, international Business, at HGC Global Communications, discusses edge computing and how telcos can ensure they survive a new wave of do or die for the sector.

By Dennis Chan, AVP – OTT, international Business, HGC Global Communications

Edge computing is much more than just a game to bring latency down. It is a shift in computing that is fundamentally altering the way we build and scale infrastructure, how we serve a market that is ever more global, and it calls for novelty and cutting-edge thinking in how the ICT industry works as one.

Even before the edge system technology become a hot topic, we were already seeing a lot of internet companies building the now so called "close to the end user platform" – often used as a definition of edge itself, processing power more locally. This is already especially true for gaming companies.

With 5G starting to be deployedon a mass scale and making data transfers faster than ever before, being closer to the end user is key to create a unique ecosystem to retain the customer on a given platform as long as possible. This is crucial to improve customer experience as well.

Even though right now edge still does not have a technical or official definition, we see a lot of attempts to define it with a lot of companies deploying their own edge.

On the other hand, edge computing is going to be driven by applications. That is an important part of the puzzle and a significant rewriting of how things are done. The application is always key because twomilliseconds or threemilliseconds are considered low latency, but if you look at the real deployment of 5G, from the mobile handset to the base station, in reality, we still have about eightmilliseconds of data journey times.

Dennis Chan, AVP – OTT, international Business, HGC Global Communications

What we can clearly see today is that use cases are different and that will be a determining point on the whole edge deployment and evolution

of edge itself in the coming years.

For some use cases, such as entertainment or cloud gaming, the urgency of deployment of the edge does not necessarily need to be so extreme compared to other verticals and use cases, for instance, autonomous driving or critical medical requirements.

In the future, edge computing will be built on different scenarios, depending on the use case. We are moving towards a bespoke infrastructure and software world, far from the days when IT was given "little choice" – little based on the opportunities with edge - between hardware and technologies.

Gaming as a disruptor

Cloud gaming is today one of the major motivation drivers for edge deployments. We have seen gaming companies deploying edge computing servers overseas to serve their cloud gaming platforms. This is not an up and coming trend, this is happening right now.

Research house Niko Partners expects 10 of Asia's top gaming markets - Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam, Taiwan, Japan, Korea, and India - to reach 826 million gamers and generate $42 billion in revenue by 2024. When considering China and the Asia-10, these represent more than 50% of the world's mobile games market revenue, and more than 60% of the world's PC game revenue. And this is only the Asian segment, there is a whole world out there where today, nearly three billion people are already regular online players.

Online gaming, cloud gaming, Esports, Gaming-as-a-Service, no matter what you call it, is indeed one of the main use cases that driving edge computing, especially with 5G becoming more extensively available. This is in part being driven by a rapid growth when it comes to people using their phones to play.

Another use case that I believe is about to make the business case for edge, is the internet of things (IoT). As a result of the massive smart IoT devices deployment, allied to the fast expanding mobile economy, the amount of data that needs to be processed in the main data centre will overload the systems. And this is obviously not cost effective.

Ultimately, a high level case for the edge is real time human interaction. This will be the key use case to energise edge. If you look at the cases of real time human interaction in gaming, for example, this is crucial to interact with other players and win. This will happen to serve a market where people are willing to pay the money for faster and real time connections.After all, the "as-a-Service" age is only at the beginning.

Telco's edge

Obviously, to serve any of the use cases, we can no longer 1) work in silos; 2) wait for demand to hit. Telecommunication companies, data centre providers, hyperscalers and the wider technology and software ecosystem must now join forces and adapt to this new age.

For telcos, in terms of infrastructure, from an edge perspective, they are bound to be the key ingredient for those edge ecosystems. For example, fibre networks and data centre/hosting sites worldwide are two main components to building up edge computing.

When it comes to edge computing, telecommunication companies need to start earlyexpanding the infrastructure covergae before the use cases and full-on demand kick in. We can see these sort of use cases already in some countries, and based on our own experience, it is proven that this model of preparing for demand, works. We cannot wait until the useris in the market looking to make use of our systems. We cannot start behind, so we must, as an industry, get the ball rolling fast.

Additionally, HGC has adopted a consultative approach and we are able to combine our network infrastructure and in-country business intelligence to provide one-stop shop solutions for the gaming industry and start-up businesses, especially for the mobile streaming game segment.

More specifically, we have built a robust portfolio on fine-tuned IP transit routes which allows us to deliver a least-hop, direct local connections that provide ultra-low latency. Such high quality connections are ideal for time-sensitive and location-aware use cases such as online gaming.

HGC, being one of the market-leading infrastructure and ICT solution providers in Asia, the all-encompassing network coverage with major ISPs, regional MNO, local Internet Exchange and local commercial/residual broadband providers internationally will also allow the company to optimise routing and facilitate service customisation to achieve ultra-low network latency.

On top of it, we also work with customers to understand how we can best serve them on the application layer. Again, fibre and data centres are enablers, but what drives the use case is the application.

Overall, I foresee telco companies are evolving more around the workload. The use case they will serve is the answer as to how they will help edge computing itself transform, and to let the market adopt edge as soon as possible before demand outpaces the industry's capability to cope.

Telco companies are eager to shift their models around the application layer to serve this edge computing century. Only with a vision, the can-do approach, solid infrastructure and connectivity, the world can embrace this new technology zeitgeist that is edge computing.

Guavus: Powering Innovations in Big Data Analytics

As the communications service provider (CSP) community is working towards stretching their network capacity and coverage to provide better customer experience and move to 5G – they need innovative, real-time analytics in order to drive success and deliver exactly what their customers need and exactly when they need it.

This is where Guavus plays a critical role with its Guavus-IQ big data analytics portfolio which helps CSPs get business-critical 'outside-in' and 'inside-out' insights on customer experience and network operations.
As part of the Disruptive Telecoms report - Alex Shevchenko, CEO of Guavus, speaks with Zia Askari from TelecomDrive.com about Guavus' key priorities today and why Big Data Analytics is going to play an even more critical role for operators and their customers in 2021.

What are the key priorities for Guavus today?

Our primary focus is on what we call 'outside-in' and 'inside-out' big data analytics for CSPs. We focus on two main aspects.

We help our customers to analyze in real-time how each of their subscribers is experiencing their network and services (bringing the outside perspective in) and how their network is impacting each of their subscribers (how their internal operations are impacting each subscriber). And we do this in a highly correlated way. Our Guavus-IQ portfolio is based on these two main pillars – Service-IQ, providing analytics on subscribers and devices, and Ops-IQ, providing analytics on network operations.

How important is Big Data Analytics for CSPs?

I think it is extremely important and we are in the midst of accelerating demand for analytics. Our industry has been talking about the digital transformation – the need for this transformation, the new technologies, the dawn of 5G in the telecom market – and then all of a sudden we have this pandemic, which is obviously a terrible thing but has managed to have a huge impact on the acceleration for digital transformation. The behavior of users has been changing significantly throughout 2020 – it's not just about the growth of GBs being consumed by all the people now working from home, it is a total change in user behavior. So CSPs have to deal with many more data requests, much higher demand for their services, and demand for higher SLAs. And in this new scenario, being able to look ahead and serve these changing user needs (vs. reacting later on) is what is going to differentiate the successful service providers from other. It means that as a service provider you need to react in real time to the changing patterns of your users' behavior, and on the other hand you need to intelligently deal with a dramatically increased load on your network. In both cases, we're already facing the threshold of the human capacity to do all that and that's where you definitely need the machine to help you. You need to have the most modern way of analyzing data in real-time – and make real-time decisions based on that data and to have systems that are self-evolving-- that's where AI and Machine Learning (ML) come into play.

How is Guavus driving more value for CSPs from this data revolution using AI and ML?

With this increasing demand in both the number of new services provided as well as higher SLAs -- driven by the pandemic, 5G and digital transformation – there is increased demand for more advanced insights on user behavior and reacting in real time. Our portfolio is ideally poised to serve these needs.

With our software, we are helping our customers, some of the leading CSPs in the world, to improve their customer experience by applying AI-based analytics to better understand on how each individual user of their network is acting and quickly react to the changes in their behavior. We provide the highly correlated 'outside-in' insights on their user experience and the 'inside-out' insights into the how their network operations are impacting each customer. And our solutions help their customer care, marketing and other teams take quick and automated actions, grouping dynamically the users of the network and taking immediate actions to improve and steer their user experience. Our technology allows our customers' networks to 'self improve' over time – increased data on user behavior enables more precise advice and actions, and ultimately a better user experience.

With the huge increase on the load of their networks, trying to meet enterprise-grade user demands and a more complex 5G infrastructure, operating networks become a lot more complex. At the same time, the readiness of users to pay more is not there and that becomes a P&L trap for CSPs – where cost is increasing higher than revenue. Not only finding new revenue sources but more fully optimizing the network are critical. That's where our Ops-IQ comes in – it analyzes the patterns of network behavior and all the data processed, detects anomalies, identifies root issues, and triggers action that target real issues -- or prevents and anticipates issues in the future. It focuses maintenance of the network on the right aspects, thereby reducing maintenance needs. All this leads to a decreased costs for operators.

How important is India as a market for Guavus?

The Indian market is extremely important for us, both business-wise as well as for our operations. We have a large R&D site, delivery teams, and a number of data scientists located in India.

India is the largest of three key office locations for Guavus worldwide, and our Indian site is the fastest growing. It is a great market for engineering but also for data science; we've seen a growing number of very high-quality data scientists in India.

And from the business side, India is one of the largest telecom markets in the world. The number of users is amazing. And India is a growing market for IoT, another big area of focus for us and our parent company, Thales.

There are also other initiatives which are not directly linked to telecom but where we have a presence through our CSP customers and through Thales. Vertical industry initiatives like smart cities, healthcare, and the utility business also have big potential for us because we are investing in technologies to enable preventive or 'smart' maintenance for any industry which requires telecom services.

What are some of the innovations or market disruptions that we can look forward to from Guavus in the coming months?

I will speak about the three main groups here. First, we will keep on implementing new use cases for our AI-based analytics portfolio for CSPs. Guavus-IQ has a strong roadmap and we will be rolling out a number of new products over the coming months. We've been working with our CSP customers on a lot of new use cases for subscriber analytics, network optimization, and many others.

Our products are tailored specifically for CSPs. There are plenty of analytics solutions targeting the enterprise market, and they're doing a good job at it. But with any generic or horizontal solution, they will have some weakness for CSPs – oeprators' needs are very different than most enterprises, and their networks much more complex and handling far greater data volumes. We've been solely focused on the providing analytics to the telecom market for 14+ years now. We continue to work with our telecom customers and know them better than most in the market, and together come up with new analytics use cases that drive new business and reduce costs.

The second key area for us is the Cloud. We recently announced the next phase in our relationship with Amazon Web Services (AWS). We have implemented our Guavus-IQ solution on AWS so that customers who use Amazon cloud services can easily plug-in the subscriber and network analytics into their solutions. It is important for us to not only be cloud-enabled but also to be cloud-native. So you'll see us announce more developments and partnerships in this space in 2021.

And the third key area of innovation for us is in 5G – AI-based big data analytics is core to 5G network design. It's no longer a nice-to-have, it's a must-have. It's critical to addressing the increased complexity and volume of data that comes with 5G. We are going to play a pioneering role in this space. We are already investing in having a dedicated offer for the Network Data Analytics Function (NWDAF), being defined as part of the 5G Core (5GC) architecture standard by 3GPP. So that when CSPs design their 5G networks, they don't have to struggle with how they are going to implement the analytics and how they are going to build system elements plugged into the analytics.

These are some of the key areas where we're going to innovate and offer new products in 2021.

What are some of the top trends in Big Data Analytics you expect to see in 2021?

I think CSPs will face an increasing challenge with user churn because there is a clear digitization of the user journey and users working from home still want enterprise-grade services.

So this means that users will look for better services and operators who can provide these services. And, hence, operators will face this as a challenge to contain this churn and at the same time be able to react quickly and deliver the right service to their users – before they go to their closest competitor.

And it is not only about digitization, it is also about having the ability to react in real-time. With the growing amount of data to deal with, more people working from home, accelerated digitization, and 5G -- CSPs cannot simply add more staff to deal with it all.

The leading players in the market will have to put the analytics through all the pillars of their business – and use analytics as their eyes and ears to be able to operate their networks and address all the challenges. There is also the need for real-time analytics in the cloud. All the products and solutions will have to be cloud-native. And there is this trend of integration with 5G standards within the telecom market.

Service providers will have to add more dimensions to their business and their offerings. They are already addressing various enterprise verticals like healthcare, automotive, transportation management, utility management...and I think this trend will increase in 2021.

And this will bring more convergence between IoT and less digitized industries and telecom. That is where CSPs need to have better analytics solutions that can allow them to work with their own telecom data but also work on data coming from each of the enterprise industries. We'll continue to work closely with Thales, a leading IT provider in many of these vertical industries, to offer innovative analytics solutions.

How Internet based Companies are Driving Innovation

If you ask me, what are the most profitable businesses – the answer is Internet based software companies and they are the ones driving most innovations and meaningful disruptions today

By Herb Levitin, President at WebShareSoftware, WholesaleConference and GoConference

Innovation is the most important factor in today's success for any business and yes most of the innovation we see today is driven by Internet based companies.

Keeping the above thought in mind, we designed and developed GoConference which is delivering a lot of innovation by enabling seamless teleconferencing services for our customers.

Our e-commerce software with the addition of our API that was written for GoToMeeting is now available to acquire. And we can offer toll-free teleconferencing and also free conferencing using PSTN numbers and direct VoIP connections over the Internet.

Our software has a global market to support toll-free, free and direct VoIP over the Internet teleconferencing services. We designed our software to be easily brandable and we have an extensive API that is used by web conferencing companies that is similar to the API provided by Twilio.

Our software can generate a residual income or it could be sold to Tier 2 web conferencing companies or large corporations wanting to reduce their teleconferencing costs to near zero. Now, a little background on how we entered this market.

Sixteen years agowe were running our own distribution business that sold Cisco routers and voice and data services from multiple carriers. We were also trying to sell large teleconferencing bridges from a company called Spectel that was later acquired by Avaya.

In Houston, Texas there was a branch of the global accounting firm Arthur Anderson. Arthur Anderson had a significant client in Houston named Enron. Enron was responsible for building many global infrastructure companies including a very large telecom consortium that built out a global fiber optic network. One of the 12 global facilities that Enron built was sold in a New York bankruptcy court to a Las Vegas based company that is now public corporation called Switch. Our equipment has been installed in the formerly Enron owned facility in Las Vegas now owned by Switch for over 16 years.

Enron it turns out was cooking the

books to make their profits look much better than they actually were. Quite a bit apparently. Arthur Anderson's Houston office was the accounting firm for the public company Enron. Enron collapsed in a very short period of time when it was realized that Enron's numbers were not real. All of Enron's employees lost their jobs and their pensions. Arthur Anderson also went out of business as public CPA firms have fiduciary responsibility to publish the truth. Felons need not apply for jobs with fiduciary responsibilities. Arthur Anderson went out of business and became Accenture.

Arthur Anderson's Houston office had a Spectel teleconference bridge which we acquired on Ebay. The global teleconference market is large but it requires not only a lot of capital to purchase the equipment, it requires your own software development team. It requires a complex set of software to turn a teleconference bridge into a residual income business. You have to provide real-time information and control to the client along with all the invoicing and credit card processing required of an Internet based business. We had to write our software using PHP, MySql, perl, java, C++, Python and use the SDK from Spectel that was full of major errors. Our e-commerce software was the first self-help solution for the teleconference market and is also very easy to create brands or private labels to large clients.

We are based in Santa Barbara, California which is also the home for the University of California Santa Barbara (UCSB). UCSB was one of the original nodes of the DARPA network which later became the Internet. A very bright fellow from Germany named Klaus Schauser came to UCSB to study Computer Science under Glen Culler, the professor in charge of the DARPA network project. Klaus Schauser received his PhD in Computer Science from UCSB.

When I met Klaus he had already sold his ExpertCity company to Citrix for around $240M and was expanding the web conferencing product now renamed as GoToMeeting. Included with a GoToMeeting subscription was free teleconferencing service. Klaus and our development team defined an API which we wrote and implemented. Remember I said Klaus was a very bright fellow? Besides selling ExpertCity to Citrix, Klaus had a contract with AOL to open up the German market to AOL. It was and is a very large market, but AOL did not pay Klaus. Klaus had to take AOL to the Santa Barbara county courthouse where he was awarded somewhere around $300M from AOL. A contract is a contract.

Herb Levitin, President at WebShareSoftware, WholesaleConference and GoConference

So, our e-commerce software with the addition of our API written for GoToMeeting is now available to acquire. We can offer toll-free teleconferencing and also free conferencing using PSTN numbers and direct VoIP connections over the Internet.

We also have thousands of teleconference ports of Avaya equipment. Our API was also used by Persony in their web conferencing software to integrate PSTN calls with their web conferences. The link to our video demo of our API working with the Persony web conferencing software can be found in our display ad in this issue.

The owner of Persony is from Taiwan and has many software patents including Apple QuickTimeVR, the world's first virtual reality software. I was also the virtual President of Persony and negotiated with Avaya to acquire Persony.

We also have recently integrated our API with a Tier 2 web conferencing company to dramatically lower their costs from Twilio™ from a variable price per minute to a flat rate fee. There are many more Tier 2 web conferencing companies trying to compete against GoToMeeting™, WebEx™ and Zoom™. There are also many global companies that would like to lower their current cost per minute for teleconferencing to a zero cost per minute solution.

Watch our video and give me a call. This is a unique opportunity to own an Internet based software company in a global market. Here is our link to the landing page that has our short video and API documentation:

https://www.goconference.com/opp

AB Handshake, the brand new A-number spoofing "vaccine" of choice for voice telecom operators!

By Andreas Hipp, CEO, Cataleya

Robocalling using spoofed A-numbers is not only annoying Americans but irritating consumers all over the world. Many other types of abuse cases are also prevalent in Europe, encouraged partly by carriers charging a fee on top of the termination rates for calls originating from outside of Europe. As one can imagine this practice is just ripe for fraud, as faking European A numbers has become a real challenge to contend with.

For years, operators are working hard to find solutions to identify this particular fraud scenario amongst many others, but no comprehensive solution is available that works across network technologies or does not involve complex look up or verification mechanisms that are expensive.

We at Cataleya have also worked for many years on providing efficient analytics solutions to our Session Border Controller customers that help identify various fraud types that can be identified by monitoring media and signaling flows. However, this only covers a limited set of call anomalies and A-number spoofing cannot be captured.

The arrival of the AB Handshake framework suddenly changes that landscape and paired with our own capabilities now provides an unparalleled "vaccine" for this "illness".

How does it work?

AB Handshake service enables calls validation and provides technological solution to support global cooperation at the market.

It connects originating and terminating operators via an encrypted HTTPS channel and makes it possible to exchange call details in real-time and compare the results to check if the call took place, was terminated to the end user and was received from the original number of the caller.

AB Handshake ensures that any voice call is validated by both the originating and terminating operator, making it impossible to commit fraud

that relies upon the manipulation of traffic by intermediaries. Processed in parallel to the call set-up, the "handshake" gives both the A and B parties confirmation that the call is connected as intended, otherwise it offers the choice to stop invalid calls

The calls validated by AB Handshake will be free from:

- International revenue share fraud (IRSF)
- Call stretching and short stopping
- PBX hacking
- Interconnect bypass
- Calling line identity (CLI) spoofing
- Robocalls, Wangiri, Wangiri 2.0, Scam calls

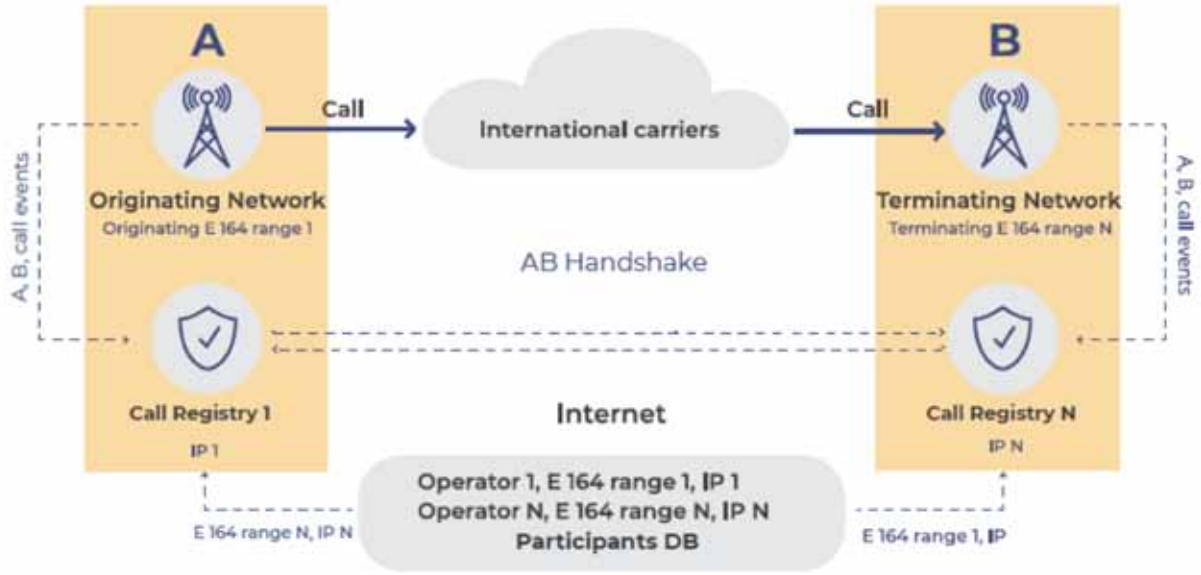
solving the enormous problem costing telecom operators tens of billions of dollars every year.

AB Handshake service enables global cooperation between all players in telecom traffic exchange

- Mobile operators,
- Fixed line operators,
- Mobile Virtual Network Operators,
- Virtual PBX service providers,
- Skype-like applications using SIP agents

AB Handshake is THE Global Validation Solution

AB handshake is essentially communication between operators using **HTTPS with TLS encryption** to check for alignment between active call registries maintained by each participant.



technology to integrate the handshake with existing signaling and accounting systems, the handshake works for all kinds of telcos across all kinds of networks (SIP and TDM), offering a truly universal and cost-effective solution to eliminate fraud.

In addition some key areas are addressed by the AB Handshake framework that are usually a big concern for operators and regulators such as:

Data Privacy: Currently international calls go from originating operator to terminating operator through a cloud of international carriers, and A and B numbers are transmitted in open text.

The system exchanges A and B numbers only between originating and terminating operators through the encrypted out-of-band channel. No intermediary will be involved or the data exposed to them.

Roaming: The system fully supports validation of roaming calls. When a roaming call is done, terminating network receives roaming call details and is reaching out to A-number's original network to check if it's in roaming status. A-number's original network confirms it, thus completing data necessary for call validation.

Interconnect Bypass: During Interconnect Bypass, Originating Operator and Terminating Operator are matching call details. During this check it's evident that the Terminating Operator didn't receive a call with an international A-number, yet received a call with a local A-number, that can't be confirmed either,with other call details being identical. We see these two mismatches and deduce it is anInterconnect Bypass/Sim Box.

Integration to existing switching platforms:AB Handshake provides different integration options. The system allows different types of network switching equipment such as switches, SBCs, SCPs and CAMEL gateways to communicate with Call registry via standard protocols: RADIUS, Diameter, HTTP API, SIGTRAN. SIP operators can integrate by placing the system's SIP proxy as b2bUA.

Pricing: AB Handshake only charges for verified calls which means that there are no fees if calls cannot be verified. We also offer an early adopter pricing plan that has no setup fees nor a monthly minimum charge.

In many cultures across the world a handshake is a gesture and sign of trust. The same principle applies to the antifraud framework of AB Handshake where originator and terminator shake "hands" and certify to each other that the call is an original call and can be trusted.

"It's great to know that with this partnership all customers of Cataleya will have swift and easy access to our validation service. We strongly believe that the fight against fraud should be a collective effort and we welcome such an expansion of our community," says Nadejda Papernaia, CEO, AB Handshake Corporation.

We are very pleased about this cooperation and proud to represent a solution that matches our philosophy, business practices and keen ambition to protect our customers business.

For further information please contact us via info@cataleya.com or our website.

Digital Transformation all About Transforming a Business Model

Propelled by new customer needs, an unpredictable demand and remote working scenario – telecoms and enterprise community is embracing digitization in an unprecedented way. Cyient is delivering innovative solutions for CSPs and enterprise to create technology-led opportunities in this new normal.
Rohit Kumar, General Manager – Strategy and Partnerships, Communications, Cyient speaks with Zia Askari from TelecomDrive.com about the company's current focus and its future plans.

From Digital Transformation, today we are moving toward Digital Acceleration and this pandemic situation has driven organizations to go for digitization at an exponential pace. How do you look at this trend and what are some of the big innovations that Cyient is bringing to the market today?

The global economy witnessed three fundamental changes since the outbreak of COVID-19—new customer behavior and needs, unpredictable demand, and a significantrise in remote working. All of these propelled a rapid migration to digitization across industries. The crisis also underlined the fact that telecom is the backbone of economic growth, and it will continue to be so in the future.

Cyient is a trusted partner for communication service providers (CSPs) as wefast track their 5G investments. We combine our network services with geospatial and AI/ML techniques to optimize site planning, deliver resilient network infrastructure, and manage operations intelligently for consistent and connected experiences.

Additionally, we partner with enterprises in their digital journey to bring the best-of-breed offerings from private networks to digital applications. Leveraging our data-driven solutions for asset tracking and management, predictive maintenance, connected equipment, AR, and VR, we help our telecom customers improve their supply chain reliability and responsiveness.

One such recent example is our association with the Telangana State Police to provide them with drone-based surveillance technology and help implement the COVID-19-related lockdown in Hyderabad. By providing situational awareness on a real-time basis, the technology gives the police the means to understand and deploy

resources very quickly to manage evolving situations. Equipped with surveillance cameras, thermal imaging payloads, and sky speakers for public announcements, Cyient's drone-based aerial inspection capability is positively augmenting the police's abilityto combat the spread of the pandemic.

Even though SMBs and other organizations want to embrace digitization–they still want to do it in a cost-efficient manner. How can Cyient help in this regard?

Digitization is the need of the hour for every organization, irrespective of itssize and the industry it comes from. While adopting digitization, organizations need to look at the overall ROI of going digital.

Cyient's continued commitment to deliver unparalleled productivity and cost savings has been recognized on multiple occasions. In recognition of our work for cost reduction, we recently received the Supplier Innovation Award for the seventh consecutive year and the Supplier Highest Productivity Award for the fourth year in a row.

For any business, the key to innovate and embrace digitization cost-effectively is collaboration with experienced players. Cyient's proofs-of-concept give our customers a risk-free source of innovation and enables them to avoid the costs of failures that are an inherent part of migrating to new technologies.

We develop customized testbeds for customers to make the evaluation of new technologies faster and more data-driven. Also, our knowledge of industry regulations enables us to deal with security restrictions and regulatory compliances effectively.

What are some of the most critical and important technologies when it comes to enabling digital transformation today?

A business wanting to go digital would have to look out for ways to re-pivot existing business models to achieve a connected ecosystem between individuals (customers, staff), business partners, other businesses, and things. It places the customer at the center of the business, offering new, varied, and highly-customized experiences in line with their growing expectations. Some of the most prominent disruptive technologies affecting telecom players today include mobility, cloud, IoT, digital twins, AI, and machine learning.

Mobility drives digital transformation with a radical rethinking of how an organization uses technology to pursue new business models or revenue streams. As mobile becomes more powerful with 5G, we will see ripple effects throughout the manufacturing industry through the increased adoption of automation and robotics in factories. It will also lead to quicker real-time analytics for data generated through field operations.

Cloud Computing is another tool for building the new, digitized business world. Cloud allows companies to scale their IT infrastructure as per changing business priorities while mitigating the risks of wasted resources that inhibited past investments in technology.

IoT is the digital link to connect with data and convert it into useful information for business. With insights and analytics coupled with IoT deployments, organizations can improve their operational efficiency, become more flexible in responding to market demands, and innovate their products and services in customized ways.

From telecom to healthcare, every entity's interaction with its customers involves physical objects or processes. Digital Twins can simulate any aspect of those objects/processes and help bring the software world's benefits onto physical assets. The simulation captures how anasset operates and is maintained throughout its lifecycle. While **Digital Twins** take several forms, they all capture and utilize data that represents the real world.

The possibilities of digitization are endless, and we are limited only by our imagination. Several path-breaking use cases continue to emerge and promise to transform business processes.

If you look at today's market scenario, what are some of the challenges (technology or non-technology) that you see are most important to be addressed? How do you plan to address these?

Digital transformation is all about transforming a business'model, processes, people, and operations using advanced digital technology solutions. It is about transforming the entire company, not just parts. However, such transformations should be undertaken with extreme care and due diligence not to affect the organization's steady-state revenue stream.

The top challenges can be classified as:

1. Lack of clear strategic plans

A considerable barrier that halts the digital transformation juggernaut's rollout is thelack of understanding of the levers for change, the overall evolution process, and how the end state would look like. Sticking to a defined methodology and adopting it is highly impractical, given ever-evolving customer expectations. Cyient helps customers bring accurate insights and foresight through AI/ML and analytics tools to enable better decision-making. We help our customerschoose business priorities wisely and,hence, navigate through their digital transformation journey successfully.

2. Limited digital expertise

Creating a winning solution requires a specialized approach and hands-on experience in devising a meticulous digital strategy, exposure to tools and technology, and successfully transforming a business. Through ourrich engineering experience across multiple industry verticals, expertise in digital technologies such as IoT, AI/ML, and building a holistic, connected experience through private networks, we, at Cyient, partner with ourcustomers to enable digital transformation from concept to deployment and maintenance.

3. Existing islands of technology infrastructure

The presence of large, monolith-based systems is perhaps the biggest impediment to digital transformation. An essential capability required to enable digital transformation is the ability to change these technology infrastructure islands into a connected, digital infrastructure that supports the rapid development and delivery of new services. Cyient not only helps in defining and implementing this roadmap, but also in obsolescence management to get better ROI from these initiatives.

Today more and more workforces are completely working from home and a lot of these workers might be required to work from home forever. How can an organization develop a future-ready strategy in such a scenario?

The health risks associated with the pandemic will change how we work and how the workforce is structured. Remote working has already become the new norm, and collaboration and regular engagement with employees and thought leaders within the organization can help employees understand and adapt themselves to new models. Businesses will need robust and secure processes to manage the new physical and virtual work environment.

Work-from-home models helped most companies navigate through the crisis while maintaining business continuity. However, to implement it as a long-term or permanent policy, they must specify the objectives they intend to achieve. These could be higher productivity, savings on office infrastructure maintenance, adjustment of cost-of-living payouts for workers,better work-life balance for employees, and/or higher retention rates. Accordingly, they can reorganize their technologies, resources, HR policies, and KPIs to keep achieving business outcomes.

Global supply chains will also need to be redesigned and optimized for the new operational realities. Technology, including Industry 4.0 and secured SD-WAN, will play a critical role in addressing these challenges.

All these developmentspresent a unique opportunity for CSPs to expand their revenue stream and relook at theirinternal processes to make them more autonomous and intelligent. They need to keep pace with these developing trends and make network rollouts faster, more secure, and highly resilient.

What does the future hold for Cyient? What are some of the areas where the company will be focusing in the coming months?

Even though saying that we are witnessing an unprecedented phase sounds like a cliché, it is true. History was not a guide as we faced the COVID-19 crisis. The combination of a global pandemic and a significantrecession has never occurred before. Therefore, the goal is to anticipate a range of possible scenarios and prepare to thrive in all of them.

We are working with enterprises across different verticals and are aligning our products and services in line with the new requirement. We, at Cyient, are focused on building and nurturing complex relationships, collaborating, and rapidly engaging with customers and partners in innovative ways.

As an engineering company supporting the telecom industry, Cyient's preparations would involve enabling ourcustomers to achieve more service differentiation for both B2B and B2C markets. They must develop capabilities for in-house automation and enhance customer experience through AI/ML tools. We are also helping them in unifying customer data from different channels for actionable insights.

Our focus on 5G will only becomemore intense from here on as the deployment of a newer, faster, more robust and effective network is the need of the hour.

GoConference

DO YOU HAVE THE DESIRE TO BE AN ENTREPRENEUR?

Here is an opportunity to own a software company

You can generate a very large revenue with our software solution for a global market.

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You can offer this innovative service to global clients, or sell the software to clients along with bridging hardware. This opportunity is based on 16 years of software development and does not require any programming staff.

To learn more about this opportunity to grow a global business click here:

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Telecom 2021: The Path Ahead

By James Kirby, SVP & Head of EMEA Business at CSG

As we come off a rough year, in which rapid transformation has been the key to survival for nearly every industry and company, telecom operators will need to view the year ahead as one that will continue to bring change and disruption. Much of this will be driven by 5G, which will evolve from today's trial deployments to real-world use cases that telcos can monetise. A fully digital customer experience and enhanced digital transformation will also be integral to navigating the road ahead.

5G will finally become a reality

New devices are already marking their way to the market, and 5G networks deploy on a larger scale, indicating that we will start to see real-world use cases appearing in 2021. As 5G becomes more of a reality, we will hear a lot more about 5G killer use cases beneficial to the region, such as improvements in oil and gas industry processes, cloud gaming and intelligent surveillance systems . We will also see more partnerships happening around ecosystems in 2021 and 2022, especially in the enterprise market.

The monetisation discussion will heat up too. We are going to see several factors required of 5G monetisation solutions, including proven scalability that seamlessly manages the billions of events per day at ultra-low latency and processes charging volumes with single-second latencies. However, one thing is obvious: operators will be looking for flexibility within their digital BSS solutions. They will want to know that they are future-proofing their billing for forthcoming 5G services, not just the ones they are working on right now.

Customer experience has been under the magnifying glass.

With most customer services moved online, the need for self-service options will continue to grow. Even after months of High Street shut down, consumer behaviours will continue to shift, and the end of the pandemic will not change this. Digital experiences have become embedded in everyday life, transforming consumer expectations. As such, operators will have to reassess how they do everything – from selling phones to offering contactless payments – and up the ante for servicing customers online and over the phone.

James Kirby, SVP & Head of EMEA Business at CSG

The global pandemic also accelerated the move to the cloud, and this is having a vast impact on CX as call-centre operators work from home. Because of this, 2021 will also bring an enhanced focus on consumer conversational artificial intelligence (AI) to support the increased influx of calls and customer service requests.

The pandemic called out companies who have yet to embrace digital.

In 2021, we will likely see two types of digital transformation projects. One performed by those who were behind in adapting to the pandemic. Next year, these businesses will begin adopting cloud-native business models that enable them to more easily pivot, expand their offerings, or adapt to global market conditions.

The second will be implemented by companies who have been attacking digital customer experience and use cases as needed but are finally reaching the tipping point where their legacy infrastructure is giving out. For them, it will make sense to go full-in on business evolution projects.

James Kirby is Senior Vice President & Head of EMEA at CSG, where he is responsible for go-to-market strategy and sales in the region. His expertise in international managed services and sales helps him craft service offerings that improve customer experience.James brings nearly 20 years of business building, customer excellence, sales and delivery experience to his role. He has previously held product management, sales and services roles within CSG.

11 Open RAN Predictions for 2021

By Eugina Jordan, VP Marketing, Parallel Wireless

Once seen as an "emerging" technology, Open RAN is maturing. Open RAN, which has been touted as one of the most significant trends to transform the telecom industry, took off in ways no one ever expected in 2020. The consolidation of the RAN supply chain and a ban on Chinese suppliers forced mobile operators around the globe to get creative and open up their network to Open RAN faster than any other new technology in the past. This was possible by Open RAN driven innovation, a promise of TCO savings of up to 40%, and enablement of supplier diversity with the disaggregation of hardware and software components.

From more Open RAN hardware to large Open RAN footprint buildouts and supporting brand-new use cases like urban deployments, here are **eleven** Open RAN trends we predict for 2021.

Prediction 1: Open RAN is here to stay. Nokia, Ericsson, NEC with their opening of a UK lab – all signs are pointing to Open RAN becoming a part of these big hardware vendors' product portfolios. Even legacy vendors are expecting a significant portion of their revenue in just two years to come from Open RAN. That brings us to the next prediction: how Open RAN will beevolving in 2021.

Prediction 2: 2021 is the inflection point for Open RAN adoption. 2021 will be a year of "disillusionment" as there will be more trials, more deployments, and more findings of challenges and opportunities that are faced with deploying Open RAN. Open RAN will be deployed more widely for new use cases like very dense urban.

And that is where our next prediction comes in.

Prediction 3:Large scale deployments and urban deployments. There will be more large-scale deployments of hundreds of sites in brownfield, 2G, 3G, and 4G networks. As we know, many service providers have been steadily adding Open RAN to their already established 2G, 3G and 4G mobile infrastructure. It goes without saying that carriers around the globe will be continuing their work aggressively deploying Open RAN to expand their 2G, 3G, 4G footprints and modernize their networks in an effort to be more competitive in the next five years, ensuring their overall network infrastructure is Open RAN, not just 5G. Proven in rural, Open RAN will be deployed in urban in 2021 with large-scale urban Open RAN deployments happening in 2022.3GPP, the global telecommunications standards body, agreed to a new extended timeline for the next 5G specification. Known as Release 17, the schedule now anticipates completion in 2022, with a freeze in March 2022, followed by coding protocols frozen and stable in June 2022. That is why we see that OpenRAN deployments in 2021 will be mostly for brownfield 2G 3G and 4G networks.

Prediction 4. In protected markets, Open RAN will thrive. This trend is fueled by Chinese supplier bans, and in those protected markets we'll see Open RAN flourishing faster and picking up even more steam in 2021. The UK government recently unveiled a series of projects designed to push the use of Open RAN to increase operator supply options, as it set a deadline of end-September 2021 for the last installations of Huawei 5G equipment. Rip and replace funding has been approved by the US government, so we will see an approved supplier list created in 2021 and we predict to see Open RAN suppliers, hardware and software, on that list. We also predict that other countries will impose similar bans, encouraging the Open RAN supply chain to avoid duopoly dictated pricing.

Prediction 5. Deployment cost will drive Open RAN adoption in emerging markets. We already see commitments from large operators like MTN, Orange, and Vodafone to use Open RAN to bring coverage in developing markets. Those deployments will be accelerating in 2021. We will see Open RAN used in emerging markets for any new 2G or 3G or 4G deployments: vendor choice, lowest TCO, easy upgradability – will help emerging market MNOs to bring

connectivity to more end users. In addition, it will help them to realize network ROI much faster– and that is why Open RAN will become a leading technology in developing regions in 2021 and beyond. This is where our next prediction comes in, covering on how the ecosystem will evolve to make this happen.

Prediction 6: Expanded ecosystem, beyond just hardware and software suppliers. To meet Open RAN deployment demands, more players will be joining the proverbial party. In addition to software and hardware players, we will see more system integrators and tower companies jumping in to support Open RAN as integrators or hosts. This will help to define new business and deployment models.

more critical is how an open RAN ecosystem is sustained through its market adoption curve. Today we have the innovators and possibly early adopters on board. But there is a chasm between these and the majority of operators buying this. True multi-vendor open RAN will require sustained investment from innovative operators and the building of strong partnerships and ecosystems between vendors.

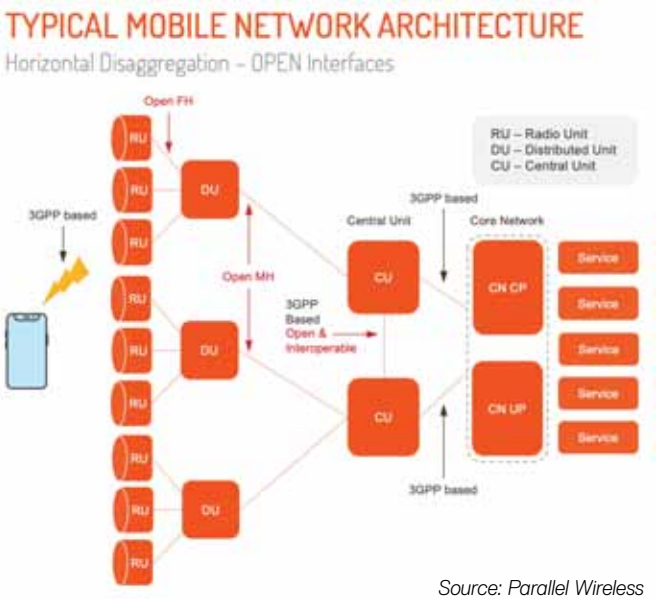
Prediction 7: CI/CD fuels edge computing and gets paired with Machine Learning (ML). Continuous integration and continuous development (CI/CD) will fuel edge computing, and mobile operators will start pairing it up with ML to improve site automation. A recent report stated that edge computing will drive approximately $7 billion in revenue by 2025. While as much as two-thirds of this revenue will accrue to the cloud players, mobile operators will play important roles in deploying and hosting RAN sites and providing connectivity to end users and businesses.

In their Predictions 2021 report, Forrester said, "Until now, edge computing was promising but still developing. In 2021, new business models will emerge that facilitate the deployment of edge in production."

And this is where CI/CD will come in. CI/CDwon't just be in the telecom data centeranymore -- it will be enabled to push software updates to the edge, to enableseamless and remote upgrades of Open RAN sites. As a result, this CI/CD trend will push along the ML trend in 2021. Forrester predicts that public cloud spending will slow in 2021 in favor of edge computing spending, and this is where we see ML coming in and being explored to take over some of the manual tasks like drive testing, helping not only reduce the labor cost but also to create powerful algorithms to speed up any siteadjustments and changes. In the long term, we predictthat automation and artificial intelligence will change the way mobile operators respond to customer and network problemsbefore the end-user even knows there is a problem.In the short-term, gains and developments will start happening in 2021.

Prediction 8: More Open RAN hardware from RUs to Massive MIMOs supporting 7.2 split. In 2021, we will see more hardware availability, especially supportingthe 7.2 split. Why? O-RAN interfaces come in where 3GPP interfaces don't exist. A requirement of vendors supporting split 7.2 will ensure vendor diversity and interoperability going forward and will allow the mixing and matching of RUs with CU and DU software that will be deployed on an x86.

Considering this, we believe more mobile operators will require their All G Open RAN solutions to support O-RAN 7.2 split. As we know, 2G and 3G will be here for a while, so learning from the past, MNOs will want to deploy a true Open RAN platform when modernizing their legacy systems – which is only possible when RUs and software are able to run over 7.2 radios. And this where our next prediction comes in.



Source: Parallel Wireless

Prediction 9: O-RAN support for 2G, 3G, and 4G. As more and more operators use Open RAN to modernize their networks, hardware and software vendors will be required to make Open RAN solutions available over 7.2 split radios. Withsteadier ramp-up to 5G consumer adoption, and therefore, slower-to-realize increases in revenue for MNOs, reducing overall network cost will be top of mind for mobile operators – and that includes 2G, 3G and 4G deployments, expansions or modernization. The strategy of modernizing or expanding legacy networks with Open RAN will improve economics, but supplier resilience can be only guaranteed with commonly supported interfaces (7.2 in this case).

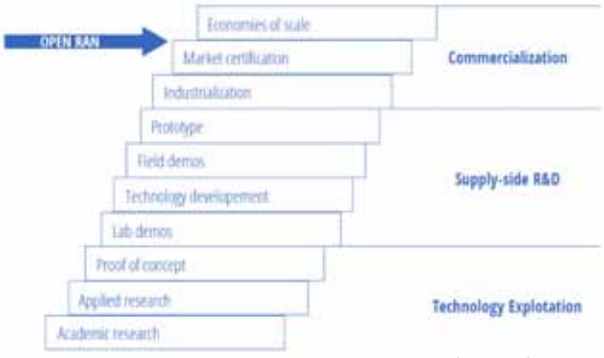
PricewaterhouseCoopers (PwC) notes that while device penetration has stalled at 4% for 5G enabled devices, it expects the market will hit atipping point in 2023 (!), where 5G devices will be more accessible.Before 2023, Open RAN will be used to modernize legacy cellular networks. The value of 5G will become increasingly mainstream in

the next few years when Open RAN technology and the supply chain will be more established and matured. So far, many operators have failed to get any tangible revenue from 5G. In the near term, many operators will continue to evolve their 5G capabilities, but a full-grown standalone 5G Open RAN technology implementation will take longer as we mentioned in our prediction 3.

What do we see as the mobile operator's "insurance policy" for RAN vendor diversity? Deployment of 7.2 compliant O-RAN architectures for legacy networks. Being able to run ALL Gsoftware over 7.2 Open RAN RUs won't be a choice; it will become a requirement. A fully O-RAN compliant 2G, 3G, 4G is needed to broaden any 5G Open RAN deployment at scale when the time comes.

Prediction 10: Open RAN security. Now more than ever, service providers are focused on their RAN TCO and are relying on Open RAN more and more as their infrastructure of choice. And as the Open RAN market is maturing, security is not just a part of the conversation heading into next year, it is a part of every single deployment or trial by default. Open RAN will enable intelligent and secure path control and traffic-steering based on the application, in rural and urban environments.

Eugina Jordan, VP Marketing, Parallel Wireless



Source: Omdia

Source: Omdia

Prediction 11: Role of the Cloud and DU/CU deployment. In 2021, as there will be more deployments, the answer to what to distribute and what to centralize will be addressed on a case by case basis. As DU functionality is real-time, it will be always co-located with RUs on site. There is no realbenefit of placing CU functionality, which is near-real-time, in the data center, and right now many of the OpenRAN deployments co-locate DU/CU software functionality on the same x86 server that is shared between multiple RUs on site. In theory, CU software can be hosted in a public cloud, and that could be an option for urban deployments.

In summary, there are many more operators looking to add Open RAN technology to their production networks in 2021, including AT&T, BT, the three major Chinese operators, Deutsche Telekom, Dish Network, NTT DoCoMo, Orange, Reliance Jio, SK Telecom, Telus, TIM, Turkcell, Verizon, Vodafone, MTN, Orange, Etisalat and Tier 2 and 3 operators in the US.

That's likely why industry analysts are becoming much more bullish about the prospects for the Open RAN market.

Dell'Oro Group had previously expected revenues from Open RAN hardware, baseband and software elements to hit about $200 million this year, but now expects that figure to be about $300 million. The firmpredicts that by 2024, operators will spend somewhere north of $3 billion on Open RAN products, which is a double-digit share of the market in the next five years.

By 2026, ABI Research predicts that for public outdoor networks, sales of Open RAN products will reach $40.7 billion, or 45% share. They also see OpenRAN approaching economics of scale in the next few years.

RAN Research, part of Rethink Research, is expecting Open RAN to "account for 58% of total RAN CAPEX (Open RAN hardware, software and services) spending at $32.3 billion and to be deployed at 65% of all sites by 2026."

Omdia's forecast on Open RAN has been raised significantly in the last few months. They now forecast Open RAN to see a year on year growth of 250% in 2020 to become a $3.2B market in 2024.

Though numbers vary between analyst firms as we can see, the future of Open RAN looks very hopeful for sure in the next five years, and 2021 will lay a good foundation for that future across the globe.

The Rise of ´as a Service´ Solutions: Your Shortcut to the Digital Telco!

By Said Zantout, Head of Solution Area OSS, Core and Cloud at Ericsson Middle East and Africa

Thanks to digital transformation, networks are becoming increasingly complex, as are the services delivered by them. Subscribers expect a network that scales to their needs, offers innovative digital services and is highly engaging. To meet this challenge, operators must embark on the journey to be a fully digital telco.

The current mainstream path for operators on this journey involves investing in rapidly changing technologies and building digital competence in-house to meet the demand. Ericsson is actively investing in technologies, developing products and participating in open source forums to help many of customers who are on this path.

While it is a fully viable path, for operators that are looking to leapfrog the transformation, there is an alternative path emerging: as-a-Service (aaS). With aaS, operators can consume the necessary network capabilities on demand to deliver services their subscribers need.

Several reasons have contributed to a rise in demand for 'as a Service' delivery. There has been an increase in general adoption of enterprise Software as a Service (SaaS) models, with more and more critical infrastructure being involved.

'As a Service' – why now?

At the same, cloud technologies are maturing at a rapid pace while Capex constraints are on the rise. Telecoms are increasingly looking for delivery models that are not Capex intensive. Finally, 'as a Service' allows operators to address rapidly evolving network requirements and achieve improved efficiencies by allowing frequent updates and essentially eliminating the worry of life-cycle management of the software.

Said Zantout, Head of Solution Area OSS, Core and Cloud at Ericsson Middle East and Africa

The benefits of 'as a Service' solutions

The benefits of 'as a Service' are well known including faster Time to Benefit (TTB), reduced Total Cost of Ownership (TCO), scalability, speed of deployment, and significantly lower risk. However, Ericsson differentiates its value with multiple additional benefits such as leveraging economies of scale, enabling frequent updates, market differentiation, rapid response to customer needs, as well as highly predictable revenues.

The question is, how can Ericsson help service providers evolve to a true digital operator.Well, there are four key steps through in the journey to become a true digital operator through four pillars:

- First, automate your operations.
- Second, upgrade your network to an elastic, scalable network.
- Third, fully digitalize your customer engagements.
- Finally, launch new digital services and build ecosystems together with other industry leaders.

The Ericsson 'as a Service' platform focuses on four main areas – Digital Engagement, Automated Operations, Digital Service and Ecosystems, and Programmable Networks.

Ericsson is an established leader in the telco aaS with offerings such as IoT Accelerator, eSIM Manager, Communication Accelerator and others. With Ericsson's aaS platform, operators are always on the greatest software release.

Given Ericsson's technology leadership and participation in various open source forums, our aaS platform bring the best of breed technologies on a secure and resilient infrastructure that is compliant with global regulations. Additionally, the services are continuously improved with platform analytics.

Private 5G and the Fourth Industrial Revolution

By Rajesh Mhapankar, Vice President, Product Management, Alepo Technologies

Digital innovation has led us into the fourth industrial revolution (4IR), which is changing the face of manufacturing across sectors. 4IR, or Industry 4.0, enables manufacturers of all sizes to boost operational efficiency and lower costs by implementing high-speed connectivity, high-end computerization, ultra-reliable infrastructure, and end-to-end process automation – advancements that are possible using private 5G networks.

Manufacturing is not unfamiliar with private networks – many enterprises currently operate on WiFi and/or LTE. But these networks are expensive to operate and do not adequately support breakthrough 4IR technologies such as machine-to-machine communication, the internet of things (IoT), artificial intelligence (AI), virtual reality (AR/VR), robotics, and more.

Private 5G provides a secure and controlled wireless network that leverages next-gen capabilities such as ultrafast speeds, ultra-low latency, reliability, flexibility, and automation, enabling all the smart features of 4IR. It facilitates high-capacity near-real-time connectivity anytime and anywhere, integration with industrial IoT (IIoT) devices, highly customized security solutions, and controlled SLAs.

How private 5G facilitates Industry 4.0

Deploying 4IR technologies over private 5G networks affords enterprises a host of benefits. With immersive technologies like AI, augmented reality, predictive analysis, robotics, automation, and IoT tools, a private 5G network helps build smart factories. This powerful combination of technologies helps businesses collect real-time data, manage production and business activities, and predict outcomes, helping increase productivity.

Manufacturing units with production running business-critical activities need infrastructure and applications that require low latency, high reliability, and incessant connectivity without a wired network. This helps them improve flexibility and keep production costs low, while ensuring they can quickly develop, configure, and maintain the infrastructure. They can minimize downtime and production line delays, monitor and manage the supply chain more efficiently, implement heightened quality checks, improve worker safety, and make decisions in real-time using the BI data and analytics available to them.

Some private 5G features that help enterprises realize their business goals:

Innovative use cases

Private 5G enables use cases such as smart factory floors, drones, human-robot collaboration, digital performance management of connected devices, digital twins, and more.

Agility

Private 5G does away with bulky and limiting cables. It operates entirely on wireless technology, enabling more flexible processes on the manufacturing floor.

Security

The large number of IIoT devices connected to the network demand added provisions to keep the network secure from cyberattacks and other potential security threats that are common with WiFi networks. Private 5G networks offer stringent security options that are constantly updated for threats.

Resource allocation

Enterprises can divide their private network into multiple slices, enabling each network function to operate as a separate entity and allocating different resources to each to improve overall efficiency.

Rajesh Mhapankar, Vice President, Product Management, Alepo Technologies

Customizable for different contexts

Private 5G networks can implement any combination of next-gen features to meet different enterprise goals. The network also scales for changing production requirements.

Private 5G applications across industries

Private 5G benefits various sectors: from healthcare, energy, and automotive production, to drones, autonomous vehicles, and entertainment, the possibilities are infinite. Some first movers, industrial and otherwise, include:

Autonomous vehicles

Autonomous vehicles let people more productively use the time they'd otherwise spend on driving, prevent the stress of navigating through traffic, and help reduce their carbon footprint with green mobility or eco-friendly cars. And these can be used in closed industrial campuses, where private 5G networks are viable. Private 5G supports the high bandwidth, speed, resilience, real-time data communication, and low latency they require. Vehicles connected to the 5G network also employ edge computing, AI, and IoT to scan traffic and make sound decisions to ensure passenger safety. Use cases like C-V2X, digital twins, smart traffic control with prioritization, airborne taxis, car infotainment, vehicle-to-vehicle communication, vehicle remote health monitoring, and prognostic maintenance system help

build sophisticated systems.

Energy and utilities

Technologies such as AI, machine learning (ML), and data analytics help build a next-gen digitalized smart grid, overcoming challenges the industry faces due to uncertain fuel prices, declining revenue, old infrastructure, stringent regulatory requirements, and so on. Thanks to the intelligence collected using 4IR technologies and IoT devices, utility suppliers have more control over the distributed generation, battery energy storage, and renewables, making it easier to transform to smart factories, reduce operational costs, increase agility, maximize ROI, and enhance customer digital experience. Use cases include smart street lighting, smart energy management, drone monitoring, electric vehicles, smart metering, smart grid, and predictive maintenance.

Entertainment and media

Private 5G finds applications in broadcasting and media production houses. It is also useful in the production of live events such as music festivals, for which a temporary network can be allocated by operators. Other use cases include immersive media (AR, VR, and cloud gaming), enhanced mobile advertising using videos and banners, enhanced mobile media (video, music, and games), and new media, which includes 3D holographic, in-car entertainment, connected haptic suits, and more.

Healthcare

Private 5G holds the potential to redefine the way hospitals, clinics, and other healthcare units operate. Coupled with IoT-enabled automation, it facilitates preventative and monitoring practices using e-health and mobile applications, personalized medicines, and connected devices. Features such as high-speed connectivity, real-time data streaming, network reliability, and low latency enable remote surgeries, implantable device monitoring, robot-assisted minimally invasive surgeries, telehealth, remote patient monitoring, AR/VR-enabled healthcare, wearables and ingestibles, and more.

Banks, financial services, and insurance

5G with its ultra-high reliability, higher data capacity, and low latency capabilities will help banks, finance, and insurance (BFSI) companies take customer experience to the next level. The integration of private 5G networks, along with IoT devices and systems, will help introduce use cases such as wearables for payment, internet of moving things, remote tellers, and more.

Retail

Private 5G will help upgrade the in-store and digital store experience for retails. Declining footfall in malls and with customers inclined towards online shopping, retailers are adopting digital technologies to improve customer experience and achieving operational excellence. 5G-ready radio-frequency identification (RFID) tags will help automate in-store transactions, facilitate autonomous check-out by attaching items in digitized in-store shopping carts, and enable the introduction of cashier-less or unmanned stores. Other use cases using immersive technologies include augmented reality, mixed reality, virtual reality are consumer 3D holograms, trial virtual reality experience, smart CRM, layout optimizations, inventory loss prevention, in-store personalized promotions, and more.

Looking ahead

While enterprises such as Volkswagen, BASF, Google Fi, and Siemens are among those procuring their own local 5G networks, many others are opting for operator deployments. At Alepo, we've been early movers in helping operators implement 5G technology globally, and we're confident that over the next few years, we will see many businesses, especially small and medium enterprises, acquiring their private 5G networks through operators, as they offer several unique benefits to enterprises. As an end-to-end solutions provider, we forge cross-industry partnerships, develop fool-proof cybersecurity plans, and ensure regulatory compliance, enabling our operator-clients to focus their attention on helping enterprises realize their business goals. Operators can deploy the network over licensed spectrum, their domain expertise means the networks they provide are more reliable, and they can also leverage network slicing capabilities to offer dedicated networks over shared infrastructure at competitive price points. And while the operator manages network activities, the enterprise can focus on their core business operations.

Rajesh Mhapankar, Vice President, Product Management, Alepo Technologies

A seasoned professional, technologist, innovator, and telecom expert. With over 20 years of experience in the software industry, Rajesh brings a strong track record of accelerating product innovations and development at Alepo. He supports the company's mission-critical BSS/OSS projects in LTE, WiFi, and broadband networks, including core policy, charging, and control elements.

The New Horizon: Software's Journey into the Unknown

By Rob Brunetti, Strategy Director, Nokia Software

COVID-19 may have stopped us from being able to "rock-out" at a live concert, but for those in the technology space, the coming decade is primed to rock. Get ready for a fist-pumping,heart-thumping ride. The roaring '20's arehere again, and opportunities will abound. Entering a new decade, we stand at a unique point in history. Trillions of dollars in economic output and value is up for grabs.

Technology faces the most dramatic period of innovation in a century with potentially six General Purpose Technologies (GPT's) converging -- think of 5G, blockchain, artificial intelligence, energy storage, robotics, and DNA sequencing– that hold the promise of supercharging economic growth and transforming the world we live in. The closest comparison to this time of innovation is the second half of the 20th century when the internal combustion engine, electricity and the telephone changed everything. This is now a huge impact on the demand for software.

From a socioeconomic perspective, there are major power shifts across geographies, demographics, consumption patterns, and business model innovation. Concern for the planet, its resources and sustainability dominate top-of-mind awareness. Change is coming fast as governments, corporations, investors, and consumers are positioned to redefine the world we live in.

As the world progresses into the unknown, software rises to the top as the catalyst for emerging technologies.However, the bar has been raised.

Challenging the Status Quo

New experiences defy the status quo. 2019 saw the launch of the first public company dedicated to space tourism,with a backlog of paying tourists to ride the near edge of space. Redefining value, a duo of DNA technologies demonstrated that certain longstanding incurable diseases can be cured. How much would we pay for a personalized pill or procedure that gives back decades of lost life? We may soon witness Life-as-a-Service (LIFEaaS) paid by monthly subscription.

Innovative technologies enable new levels of experience and value. Combined with other exponential technologies, the pace of disruption accelerates. The foundations of industry are shifting at hyper-speed, creating a vortex of change across everything we know. Some will capture the opportunity. Some are already dead and just don't know it.

As an industry, we must do better. In recent years, share price and market cap growth for telecoms have been subpar against the S&P 500. Despite the massive spending on communications services and the technology cycles of 3G, 4G, and now 5G, we must ask, "Where's the Beef?!" As crucial as connectivity is, we don't want to pay much for it.

Is technology nearing a plateau with 5G?As we approach limits on faster, we need to focus on smarter,

using software to innovate "within" connectivity instead of simply letting others innovate "with" connectivity.

In the 2020s, roaring louder and prouder than the 1920s means jumping past our comfort zones. Organizations must break the repetitive cycle of using buzzwords and table stakes to differentiate. Competitors seem to be building the same solutions and are depending on marketing to define the differentiation.

Champions of change approach rules with a new mindset, and when rules change, things that were impossible become possible. Connecting the unconnected was unrealistic without a rule change to rockets. The 30-second restaurant drive-thru remained a commuter dream until an innovator created a drive-thru serving digital orders only.

Black swans change the status quo. What black swans? The World Wide Web turned 30 in 2019. Twenty years ago, Google was in its infancy and Twitter and Facebook didn't even exist. While it could be argued that COVID-19 is not a classic black swan event, working remotely sparked a sharp turn toward the cloud, connectivity and advanced security. For our industry, the swans are already in flight.

Innovators see past the collective blind spots and accepted rules of industries. The Telecom industry cannot rest on its laurels.

The Digital Horizon

Nearly a decade into Marc Andreessen's proclamation, software continues to eat the world. We are entering a new horizon, a digital horizon. Innovative digital technology is everywhere, across all industries, and it's moving fast.

COVID-19 has only accelerated appetite for disruption. New technologies scaled overnight instead of years. In a few short months, we've adopted new behaviors for how we work, commute, shop, educate and learn, conduct financial transactions, seek healthcare, dine, entertain, and more. Software stepped in to solve some of the challenges caused by COVID-19, including our human need to connect.

Rob Brunetti, Strategy Director, Nokia Software

Who will reap the rewards? Despite the economic upheaval of COVID-19, the tech-heavy NASDAQ continues to set new highs as technology trends take hold. Is Wall Street disconnected from Main Street? Not really. The spoils belong to the innovators that harness software's power to redefine experiences and the meaning of value.

Companies and entire industries are in the crosshairs of disruptive innovation and formative shifts. As we journey into the unknown, we know smarter software will play a leading role and drive change at hyper speed. Companies embracing change, innovating by design, and creating human-centered experiences will thrive. Understanding what digital transformation means and moving customers into the fast lane of innovation and disruption is critical to success.Software is hungry for telecom. Now is the time to challenge the status quo.

Are you ready to rock!?

Rob Brunetti, Strategy Director, Nokia Software

With a passion for Strategy, Rob has held various leadership positions over the years spanning ideation, design, development, portfolio and M&A.As Strategy Director, Rob contributes to the creation, evangelism, and evolution of Nokia Software's strategy and vision. He conducts research and analysis to help set strategic direction and drive product and solution strategies. Rob is a Chicago native, where he continues to live today with his wife and two children. Besides focusing on his children's futures, Rob enjoys roundtable discussions with his investment group debating over technologies and companies shaping our future.

Strategies for Meeting Network Demand

The current pandemic is giving us all an unprecedented glimpse into the future of network bandwidth demand.

By Tom Cloonan, Chief Technology Officer, Broadband Networks, CommScope

In our conversations with customers and through our devices in the field, we've seen two key trends emerge from the past few weeks when the world has been sheltering in place:

- Heavy network usage, which used to spike between 8pm-12am (4 hours) now occurs from 8am-2am (18 hours).
- Downstream traffic has increased by 26-86% in the daytime and by 12-32% at night. Meanwhile, upstream traffic has increased by 30-150% during the day and by 14-50% at night.

In other words, bandwidth is not only spiking; it's spiking over much longer periods of time. And for the upstream, those spikes are much higher than they used to be.

First, the good news: We've seen minimal impact to quality of experience for the vast majority of subscribers. That's due in large part to the forward-looking design of modern networks. For example, we built in plenty of headroom to absorb downstream SLA bursts, and this is now being used for both bandwidth bursts and quiescent operating levels. The cable modem termination system (CMTS) scheduling algorithms are doing a very good job spreading out bandwidth use over time.

Effectively, these measures are helping us flatten the BW curve whenever short bursts do occur.

But now, the bad news (rather,

the opportunity): Subscribers are rapidly hitting data caps, download and upload times are increasing, and packet delays and drops are interrupting some experiences. This is a taste of what's to come in the future if we (as an industry) do not begin to upgrade and expand the capacities on our networks.

The takeaway for cable operators is clear: In the short-term, maximizing current capacity can go a long way towards serving the immediate demands of consumers, but the only long-term solution is to increase available capacity per subscriber in both the downstream and upstream.

Luckily, for cable operators, there is a clear path to achieving future-ready capacity while meeting the extraordinary demands of our current situation.

The following is a checklist of short-term, mid-term, and long-term solutions for cable operators of all sizes to make the transition from managing today's massive influx of pandemic-induced traffic to delivering the 10G speeds of the future.

Tom Cloonan, Chief Technology Officer, Broadband Networks, CommScope

Short-Term Solutions

The fixes outlined below show some examples of ways to maximize the current infrastructure and will likely provide between 5-66% improvement in bandwidth capacity. For example, transitioning upstream spectrum from 64-QAM Advanced Time Division Multiple Access (ATDMA) to 1024-QAM orthogonal frequency-division multiple access (OFDMA) would represent a 66% capacity increase.

- CMTS Configuration Changes
  - Add additional DOCSIS channels
- RF Changes
  - Perform Virtual Node Segmentation (This provides for double the upstream bandwidth)
    - This is the single biggest change to rapidly increase significant bandwidth
  - Cable Modem (CM) Changes
    - Add additional DOCSIS 3.1 CMs utilizing OFDMA spectrum to leverage higher spectral efficiencies

Mid-Term Solutions

The solutions below focus primarily on making larger-scale plant and CMTS configuration changes as well as investing in building network capacity. While these revolve around more complex strategies for network upgrade, they have the potential to more broadly increase capacity and strengthen the network.

- Plant Clean-up Changes
  - Convert Single Carrier-QAM (SC-QAM) channels, e.g. 32-QAM to 64-QAM operation
- Upstream and Downstream Investments
  - Perform Physical Node-Splits

Long-Term Solutions

The following solutions are examples of some larger investments in network infrastructure that will set the stage for next-generation networks and ensure superior capacity well into the future. While they are also the most costly and complex solutions to implement, they represent the evolutionary step forward for operator networks.

- Long-Term Upstream & Downstream Proposals
  - Perform 85MHz Mid-Splits (helps with Average and Burst BW growth)
  - Perform 204MHz High-Splits (helps with Average and Burst BW growth)
- Longer-Term Proposals (DOCSIS 4.0, 10G Initiative)
  - Add Ultra-High-Splits or Full Duplex DOCSIS FDX (helps with Average and Burst BW growth in the US)
  - Add Extended Spectrum DOCSIS (helps with Average and Burst BW growth in the DS)

We are living in unprecedented times, but they also represent an unprecedented opportunity to see ahead and plan tomorrow's networks.

Finance in the cloud: how the financial sector uses cloud technologies

6 use cases for cloud-based companies in the financial sector

By Vsevolod Vayner, G-Core Labs Cloud Platform Department Head

It's no secret that the financial services market has changed dramatically over the past decade. Thanks to digitalization, many banks and insurance companies have partially or completely switched from providing services offline to digital. In 2020, according to PWC analysts, it is online services that are the priority for financial sector players, and cybersecurity threats that are the main risk for them. Digital analytics has almost completely replaced other market forecasting tools, and the public cloud will become the main infrastructure model.

Experts from IBM say the same, noting a new trend among banks, insurance companies, and financial technology companies. It is called the cloud-first strategy, where clouds are given priority in the business infrastructure. Let's describe several scenarios in which cloud technologies are used by financial sector players to solve their daily tasks.

1. Speeding up development and release of products and services

In large organizations with traditional IT systems, developers often face the issue of waiting for resources. It can often take several weeks or months from the initial application to obtain the required capacities. This gives the competitors time to bring new services and features to market. However, thanks to the cloud infrastructure, developer access to the necessary resources is streamlined: By going to a self-service portal, they can get capacities in minutes, not months. At the end of the reporting period, the service provider simply issues a detailed invoice for actually used virtual machines with per-minute billing.

The Royal Bank of Canada, the largest Canadian bank, has been using cloud infrastructure since 2018 to speed up the development of its software products. It is noteworthy that this project is not just a consequence of optimization, but part of the implementation of the bank's global strategy to transfer business to the Data-Driven Enterprise segment.

The demand for cloud solutions to speed up development is highly relevant to G-Core Labs customers. This is especially true for large companies, where security is a strong focus, and giving new employees and external partners access to internal resources takes longer than getting virtual machines in the cloud.

2. Ensuring infrastructure stability

As a business grows, so do the requirements for infrastructure, its reliability and speed of recovery in case of failures. Data loss can result in large financial and reputation loss for a company, so the ability to quickly back up data is critical for most platforms—from billing systems to websites. A backup may be also needed to protect against employee errors and to quickly deploy services in the event of force majeure.

Sound Community Bank, one of the largest banks in the state of Washington (USA), began using the cloud in May to back up its archives. The bank manages $715 million for customers from more than 15,000 companies and households. Sean Bornicke, head of technical support at Sound Community Bank, said that the constant growth of user and customer data, and the limited capacity of the bank's own storage, made it difficult to update the local backup system, creating risks for the smooth operation of the business.

That's why it was decided to migrate to the cloud, with which the bank is completely satisfied.

3. Quick infrastructure scaling

Financial companies can face an explosion in user data or transactions as a result of changes in market conditions, new products, or emergencies. At the same time, it is seldom possible to predict when such growth will occur, so financial institutions must be able to quickly scale their infrastructure, expanding processor capacity and RAM.

The G-Core Labs cloud can provide this opportunity at any time. With its help, a customer can deploy infrastructure for new business units in a few clicks, connect additional virtual machines to "hold" the website during periods of high demand, scale the payment platform, and so on. Solving such problems by purchasing one's own backup equipment, on the one hand, requires significantly large financial investment and time. It also creates an increase in the operational load on the IT department, which must maintain and support these additional capacities which will be idle for a large portion of time.

4. Deploying AI and Big Data applications

Thanks to the cloud, banks, insurance, and fintech companies can gain access to the enormous computing power needed to build heavy AI and Big Data applications. This does not require creating or building up one's own IT infrastructure and hiring additional staff. For example, Shanghai-based SPD Bank was recently made an honorary member of the Cloud Native Computing Foundation for its active use of cloud technology in application development. Using the cloud since 2017, the bank has been able to develop and implement more than 60 applications that use artificial intelligence, including critical ones.

Vsevolod Vayner, G-Core Labs Cloud Platform Department Head

G-Core Labs sees great promise in the development of applications based on big data and artificial intelligence. Therefore, within our cloud, we are developing an AI platform that provides every developer and data scientist the ability to quickly create, train, and deploy machine learning models. Within the cloud AI platform, in addition to supporting full cycle machine learning, users have access to a catalog of ready-made templates and models with continuous delivery and real-time technical support. On the model of the G-Core Labs cloud, it will soon be possible to deploy Big Data applications based on Hadoop clusters.

5. Placing virtual desktops

Deploying call centers, customer support services, and a back office for temporary and seasonal projects usually require a large number of remote employees. The advantage of a virtual desktop is that it's much easier and faster to deploy or remove as needed. In addition, the introduction of virtual desktops greatly facilitates the process of centralized team management and control over work performance.

Another advantage of the cloud workplace is saving money by not purchasing expensive equipment, which is especially important in times of crisis. For example, The State Bank Group, an American bank with a net worth of over $230 million, was forced to move 70 % of its employees to remote workplaces as a result of the pandemic. This step allowed the company to not only avoid massive layoffs, but also to adapt the business to the new realities in the shortest time possible.

6. Working with user data

Cloud infrastructure significantly reduces the cost of storing user data, but the question remains, how reliable is the protection of personal information about customers and partners of banks and insurance companies? In this regard, today, so-called hybrid clouds are being actively introduced in the financial sector, allowing for the separate storage of anonymized and private data. Primerica, one of the leaders in the US insurance market, uses a hybrid cloud for more flexible management of various categories of personal data.

G-Core Labs also offers its customers the option to deploy hybrid solutions, or to provide a secure loop in the public cloud located in the customer's own security perimeter.

The digital transformation that we've seen in the finance sector in recent years has certainly received a new impetus as a result of the pandemic. It's now forcing companies to significantly reconsider their approach to storing and working with data. The range of application of cloud solutions for finance companies is very wide; they allow reducing the time to market for new products and services, reducing costs, quickly organizing remote work of hundreds and thousands of employees, increasing the transparency of personnel outsourcing schemes, and quickly adapting to changing market conditions. As a result, the development of cloud infrastructure creates a competitive environment that contributes to the growth and development of the finance sector.

ALEPO'S PRIVATE 5G SOLUTION

Leverage the benefits of Industry 4.0

- Low-footprint compact core solution
- Launch 5G use cases rapidly
- Cloud, on-premise, and hybrid options
- Converged 4G and 5G support

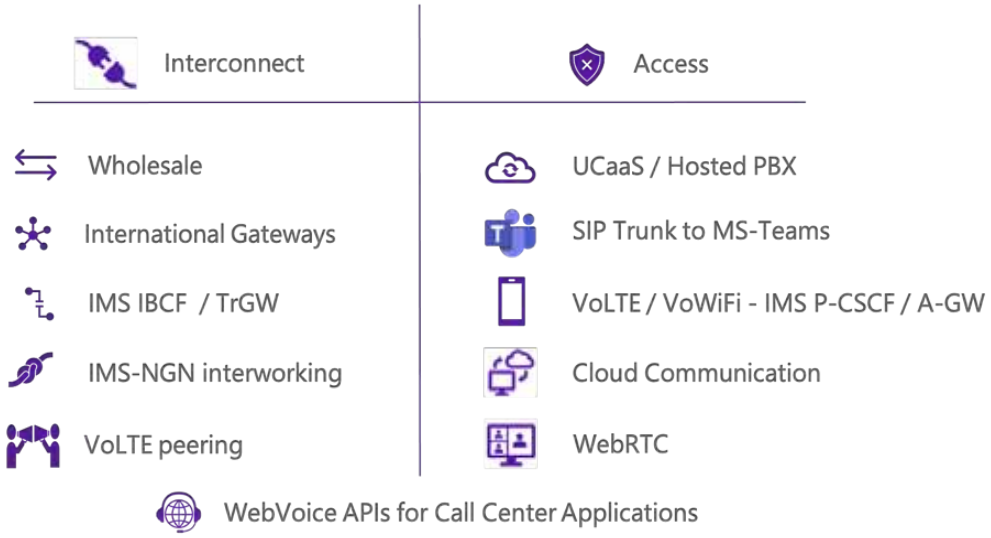
Alepo Technologies Inc. (www.alepo.com)
USA HQ | Global presence in all regions
Reach out to our experts now: sales@alepo.com

orchid link

Session Border Controller

Build Your Own SBC

One Platform – Any Use Case



Our platform is a fully-featured, all-in-one Session Border Controller for those seeking to deploy outstanding technology in a simplified and cost effective manner.

The software-based platform enables you to build a scalable and reliable voice network no matter the deployment method, the scalability needed and the use case or function it is assigned to.

Our SBC Platform addresses all aspects of SIP based class 4 voice requirements and offers an easy-to use web portal for your team to manage the daily operation or fully integrate to your existing OSS and BSS systems via our rich set of APIs.

For more information, contact us at **info@cataleya.com**

Cataleya's Orchid Link SBC is for you!

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