TELECOM Review

THE TELECOMS INDUSTRY MEDIA PLATFORM

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CYBER SECURITY COUNCIL

ADAPTIVE, PROACTIVE AND DYNAMIC: The UAE's Cybersecurity Scene

HE. DR. MOHAMED AL-KUWAITI
Head of Cybersecurity for the UAE Government

Will **Cloud Take Data Centers Underwater?**

Chip Talk: Where Have the Wafers Gone?

Plotting **5G Monetization Opportunities**


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Toni Eid,
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Metaverse From Science Fiction to Reality: How Real Is the Metaverse?

It was in the 1992 science fiction novel Snow Crash by author Neal Stephenson that we were first introduced to the term "metaverse," complete with human avatars. And it is here that we first started to visualize how software agents can interact in a three-dimensional virtual space.

Now, the metaverse is becoming a reality, acting as a digital landscape that combines aspects of social media, online gaming, augmented reality (AR), virtual reality (VR) and cryptocurrencies and allows users to interact virtually.

The metaverse is today a virtual world managed by millions of e-transactions generated by huge computers with extended capacity in the cloud.

Though this virtual space has attracted a lot of interest, the crash of cryptocurrencies did slow the hype a bit, as crypto was one of the main successful models of the metaverse.

Indeed, the metaverse will include more remarkable technologies as we go forward, but this will require seamless connectivity – over 6G, for instance – and high cloud capacity. Another challenge is ensuring energy efficiency when operating in this virtual world, especially in light of the lessons learned from crypto servers' consumption issues.

HE. Dr. Mohamed Al-Kuwaiti, Head of Cybersecurity for the UAE Government

Adaptive, Proactive and Dynamic: The UAE's Cybersecurity Scene

Cybersecurity in the UAE has always maintained a credible record. In the latest Global Cybersecurity Index (GCI 2020) issued by the International Telecommunication Union (ITU), the UAE came in fifth. In an exclusive interview with Telecom Review, His Excellency Dr. Mohamed Al-Kuwaiti, Head of Cybersecurity for the UAE Government, shares insightful information on the cybersecurity scene in the UAE and highlights his goals and aspirations.

Maintaining cybersecurity over the long term is an indispensable 11th pillar in the UAE "Principles for the 50". As the Head of Cybersecurity in UAE government, why would you consider it important to have a position specifically dedicated to cybersecurity in a country? And how critical is sustaining cybersecurity in enabling the UAE to continue telling its success story?

Historically, cybersecurity has always been neglected and only triggered by negative events, such as data leakage, disrupted work due to cyberattacks. However, as the assets of any organization are increasingly digitized and that many critical infrastructure such as energy, utilities, healthcare and telecommunications are also digitized, this also means that cybersecurity takes the front seat.

> It is paramount that we at the Cybersecurity Council shall safeguard all UAE assets and plot a safe passage in the midst of treacherous cyber tsunami as we set sail towards the end of the world to claim the crown of top globally trusted hub

Cybersecurity has pretty much evolved from being a nuisance, an inconvenience to weapon of mass disruption, and lately potentially a weapon of mass destruction. As such, it is important to take a proactive approach to manage cybersecurity so as not only to stem the problem at the root, but leveraging on cybersecurity to build trust and resiliency thereby achieve a competitive advantage and enables business. As such, to establish UAE as a leading global hub, we have to first build the UAE into a globally trusted digital oasis.

The role of the Cybersecurity Council depends heavily on external environment factors and is subjected to revision based on strategies update and feedback from major stakeholders especially on fine tuning our efforts. Our goal is quite clear, which is to establish a more secure and resilient digital oasis in the UAE. That's why the Council must always take proactive measures in mitigating any current and upcoming things that negatively impact our digital transformation, cyber space security and stable and reliable digital services etc.

Consequently, due to the continuous efforts and interaction with many other stakeholders, the role of the Council will take the path of evolution from a static regulatory authority to a more adaptive, proactive and dynamic cybersecurity leader globally. Towards that end, we have the ITU Global Cybersecurity index's 5th ranking to show our progress, having advanced 42 positions from the prior ranking exercise.

Without question, we shall continue to build and not rest on our laurels. We need to work with the different sectors and stakeholders to clarify risks and externalize these risks and their treatment in our National Cybersecurity Strategy supported by policies and guidance that will be constantly updated to reflect the future needs, in a Public-Private-Partnership or PPP model that embraces the principles of openness and collaboration, that will endeavor to deliver the best outcome by harnessing the collective expertise of relevant stakeholders so that we can continue to tell our story in the next 50.

How do you rate the cybersecurity scene in the UAE? What cybersecurity initiatives that you have already implemented or shall be implemented in the near future? Do you agree that talent pool and cybersecurity professionals are key success factors for our future in the new digital era?
I would like to take a different approach to answer this question by first highlighting the vibrant cybersecurity ecosystem that we are building right now under the PPP model that I have described earlier, where all the stakeholders come together to solve problem statements, whether at the national level, emirate level or any sectoral levels. What I am trying to say here is we no longer work in silos, that should be the case even before I come on board. Hence, the Council will play a critical role here, as the hub that will enable all these coordination, information sharing and enforcement of UAE National cybersecurity strategy that is under my mandate and the policies that we shall be pushing under this strategy.

As evident over years, with continuous effort invested into cybersecurity development, cybersecurity in

> We shall contribute our knowledge and help other nations harness the raw power of the cloud to benefit their communities, as "we support all countries who share our values of peace and cooperation to ensure prosperity"

the UAE has always maintained a credible record. In the latest Global Cybersecurity Index (GCI 2020) issued by the International Telecommunication Union (ITU), the UAE came in fifth, noting that the GCI is a trusted reference that measures the commitment of countries to cybersecurity at a global level. Some of the notable track record in cybersecurity include establishing the UAE Cybersecurity Council, as well as Electronic Federal Network (FEDNet) and the UAE Smart Cloud, supported by several e-safety initiatives, digital citizenship certificates and cybersecurity strategies.

The UAE's leading position in the index is the fruit of the UAE's digitalization strategies and policies, and the integrated and smart operational ecosystem, which helped bolster performance across all sectors. And this achievement would not have been possible without the cooperation of local entities, the coordination between public and private entities, and the high level of efficiency achieved by national cadres.

And the UAE has always been committed to building the most advanced digital economy in the world. We have identified telecommunication and cloud computing as the key fundamental pillars that will support digitalization, where telecommunication will address the element of unlimited bandwidth while cloud computing, the elements of unlimited computing and storage as we eliminate these assumptions that will limit the growth of the digital economy. Given that these are core critical infrastructure that will impact the success of the development of UAE digitalization efforts and whatever applications that sits on top of them, It is paramount that we at the Cybersecurity Council shall safeguard all UAE assets and plot a safe passage in the midst of treacherous cyber tsunami as we set sail towards the end of the world to claim the crown of top globally trusted hub.

Having said that, we have embarked on a comprehensive initiative to build policies, guidance and best practices to support building a safe harbor for the proliferation of advanced, next generation telecommunication services and cloud computing capabilities as baseline services supporting the development of next generation digital era and the herald of the Metaverse.

With regard to the cloud computing space, we have developed a policy supported by a cloud security framework that we aim to deliver as a cloud security-in-a-box service that will not only benefit organizations and companies within the UAE, but our regional partners and even globally. We are currently in the midst of working with a partner nation as co-chairs to establish the first Cloud Security Working Group under OIC-CERT for the benefit of OIC nation states and the entire Islamic community globally where we shall contribute our knowledge and help other nations harness the raw power of the cloud to benefit their communities, as "we support all countries who share our values of peace and cooperation to ensure prosperity", as what our President, His Highness Sheikh Mohamed bin Zayed Al Nahyan said in his address to the Nation on 13 July 2022.

On the other hand, cutting-edge telecommunication (telecom) technologies such as 5G, 5G applications defined under 5G2B and Edge Computing have always been recognized as a cornerstone for the proliferation of big data and Artificial Intelligence (AI), as well as being the enabler for the adoption of other cutting-edge technologies, including Internet of Things (IoT), Fintech (blockchain, cryptocurrency and e-wallet), autonomous vehicles, and drones.

Consequently, to ensure telecom cybersecurity, trust and resiliency are critical to enable the UAE to continue telling our story in the Metaverse for the next 50 years, while maintaining its leading position globally in telecom.

> To ensure telecom cybersecurity, trust and resiliency are critical to enable the UAE to continue telling our story in the Metaverse for the next 50 years

Since 2019, we have the fastest speed in 5G. According to the data based on field tests by vpnMentor, the network speed in the UAE puts it at the top of the global list, ahead of Saudi Arabia and Norway, and according to Ookla, the UAE has the fastest internet speed on Android 5G devices globally. However, as our Nation's happiness and growth depend heavier and heavier on our telecom infrastructure, the entire Nation could be held at ransom if cybersecurity of the telecom infrastructure is compromised.

As such, we have developed a UAE Telecom Cybersecurity Guidance that is currently under review, where it will efficiently strengthen the UAE telecom cybersecurity in a holistic and systematic way, which involves governance and management, implementation and improvement of a secure, resilient and self-healing telecom network. Comprised of 2 parts, the Guidance defines a defense-in-depth, zero-trusted driven multi-layered framework based on OIC-CERT 5G Security Framework, that builds security incrementally from physical layer security to application layer security based on internationally recognized standards and best practices where the first layer on equipment security looks at mandating GSMA/3GPP NESAS/SCAS certification as a baseline requirement in the first part to defining a world-first telecom information security management system or T-ISMS based mainly on GSMA 5G Cybersecurity Knowledge Base and other global standards such as ISO 27001, the original ISMS. The development of T-ISMS is called for to develop an ISMS that is specially designed for the telecom sector, with specific guidelines that are otherwise missing in a traditional ISMS that tends to be overly generic and therefore losing its relevancy in a critical infrastructure such as telecom. Our experience in harnessing 5G shall be shared with other OIC member nations as well as GSMA as we look towards not only contributing our experience back to the industry but also putting the UAE in a good stead to set pace for further development in the telecom space for future adoption of the next generation technology.

Thus, in order to implement these strategies and initiatives that we talked about, we need a team to execute them. It is imperative to consider Emiratization as a key factor that will boost the cybersecurity talent pool in the UAE and the availability of top talent for the industry to plug the talent gap. With the announcement of 100 coders a day initiative under Projects of the 50s, it is clear that we need to have a clear and executable cybersecurity capacity building strategy. A strong cybersecurity posture for the UAE can only be achieved if we can address the talent piece, because cybersecurity is all about bringing people, process and technology together where people is always the weakest link.

Therefore, this is why the Cybersecurity Council will be signing an MOU with Khalifa University and supporting initiatives such as establishing the soon-to-be-opened Cyber Pulse Innovation Center at the Abu Dhabi Polytechnic so that we can pursue cybersecurity talent incubation right from the start before the next talent pool enters the job market, and enhance cybersecurity talent pool resiliency, and to keep them within the eco-system by establishing a professional association to take care of cybersecurity professionals in the country. In fact, a cybersecurity competency roadmap can be built and a career roadmap can be defined for all cybersecurity roles within our country that will have global relevancy and retain talent within our system while continuing to attract new talents to join us globally and more residents to enter the profession. This will be critical not only for us to build our competitive advantage but more pragmatically, to grab as much of the pie in a global manpower shortage of cybersecurity professionals, where the gap was estimated to be as much as 3 million, that was revealed in the 2021 (ISC)2 cybersecurity workforce study where (ISC)2 is the world largest IT security organization, a non-profit organization specialized in training and certification for cybersecurity professionals.

Towards that end, supported by DWTC, we shall be launching the CISO (Chief Information Security Officer) Circle, which is a gathering of the crème de la crème of CISOs based in the UAE; a group of the most senior executives in charge of cybersecurity in all organizations, both

> We are defining a world-first telecom information security management system or T-ISMS based mainly on GSMA 5G Cybersecurity Knowledge Base and other global standards such as ISO 27001

public and private sectors alike. The CISOs will come together in fellowship to drive the buy-in and recognition of our human resource efforts as we define the cybersecurity competency roadmap for years to come, to build, reinforce and anchor the new professional association for cybersecurity professionals. And we want it to be an industry-led effort where companies will not only hire based on the criteria set, but also build a career progression guidance internally based on this competency roadmap that we shall develop, spearheaded by the CISO Circle. The first CISO Circle meeting shall be hosted during GITEX, to be chaired by myself as the patron.

What is the core of the cybersecurity strategy that you strive to implement? In addition to adopting internationally recognized cyber security standards and best practices, what will be the most effective technologies that help in the fight against cyber threats that the country will face? Can we be truly independent and have the capability to respond to these threats? What would be the key success factors for our future in the new digital era? What do we need to do to be safe against these threats, today and tomorrow? What do you envisioned UAE cybersecurity will develop and evolve into?

Generally speaking, governments and industries share similar goals of mitigating cybersecurity threats to network infrastructures, preventing cyberattacks, and reducing the impact of malicious cyber behaviors. Also, PPP should be leveraged to ensure that both industries and governments achieve at the desired policy outcome of more secure digital environment. It is imperative that multiple parties work together to fully understand and assess potential threats in order to take appropriate mitigation measures.

In his address to the Nation on 13 July 2022, our President, His Highness Sheikh Mohamed bin Zayed Al Nahyan said the following:

"We will continue to pursue our pivotal role in building bridges, promoting dialogue and establishing active and balanced relations that are based on transparency and mutual respect with other countries"; "We need to double the efforts to safeguard the UAE's capabilities and achievements. Our top priority is the UAE and its people"; and "We need to accelerate our economic development and we will continue to enhance our economic competitiveness and top global indicators. Our priority is to develop our capabilities in science and technology".

As such, it is critical that we pivot our PPP model to accommodate and address his vision. As such, the Cybersecurity Council's mission is to:

1. Create world-class standards for cyber security;
2. Ensure the privacy of individuals;
3. Secure our critical national infrastructure;
4. Foster cyber innovation; and
5. Develop a highly skilled cyber workforce.

And our objective is to promote a safe cyberspace backed up these core values:

1. To help to charter the journey towards a cyber smart society;
2. Engage in constructive collaboration and knowledge sharing so as to establish the UAE as a leading cybersecurity hub globally;
3. Provide the necessary thought leadership globally as we move into a new digital era and the metaverse;
4. Build a robust, secure and resilient infrastructure that supports digital transformation and provides the foundation to provide leadership globally by being the beacon of light safeguarding against any cyber tsunami as we chart forward into the digital future.

Thus, to achieve our mission our remit are as follows based on the current National Cybersecurity Strategy:

1. Proposing and preparing legislations, policies and standards necessary to enhance cyber security for all targeted sectors in the country
2. Submitting the legislation, policies and standards to the Council of Ministers for ratification
3. Develop an integrated national incident response plan which includes attacks and threats, and assessing readiness
4. Establishing the mechanism and general framework governing the exchange of information related to cyber security between different entities and sectors, locally and internationally.

Earlier, I have eluded that the role of the Council will take the path of evolution from a static regulatory authority to a more adaptive, proactive and dynamic cybersecurity leader globally that builds on openness and collaboration. I would say that is a key strategy as we want to play the role of a trusted partner to all entities within the UAE and work more closely internationally with other Nation States and international organization, to play a more important role as we shall aim to influence proceedings through open collaboration, for example with the OIC and OIC-CERT, UN and UN bodies such as ITU and even establishing new partnerships and collaboration models leveraging on key platforms that we have built and nurtured over the years such as GISEC, GITEX and the World Government Summit.

However, we must be mindful that traditionally, cybersecurity is viewed as a gatekeeper and therefore in some situation can be a show stopper where projects are known to be slowed down for the reason of not meeting compliance requirement. At the same time, for the reason of compliance, especially now that the UAE has enacted a personal privacy act, that sometimes, things are not moving due to stricter controls or maybe just due to the lack of understanding of what it takes to meet the requirements of the new law. Cybersecurity should not be viewed as an inhibitor towards adoption of any emerging technologies and innovation, it should instead chaperon the proliferation of these new deep technologies. As such, besides encouraging the entire nation to leverage cybersecurity, it can be used as a conversation starter, to stimulate business and strike a balance between supporting business and supporting lives. My mandate also includes creating cybersecurity as a key industry as well. Towards that end, the Cybersecurity Council together with the Ministry of Industry and Advanced Technology's introduced a National In-Country Value (ICV) Programme providing incentives and growth opportunities for the cybersecurity industry. After all, Prime Minister His Excellency Sheikh Mohammed Bin Rashid Al Maktoum declared at the inauguration of Cybersecurity Council, that the "country's security in the digital space was as important as security in the other

> The old adage "the Sky is the Limit" no longer holds truth, but "Space is the new limit"

areas". He also said on another occasion that "the race for excellence has no finish line".

Therefore, we shall witness the first cybersecurity unicorn born in this country, and many to come. But first, we shall play the role of the super-connector. Only by "building bridges and promoting dialogue", that we can be successful as a key player on the international stage where the old adage "the Sky is the Limit" no longer holds truth, but "Space is the new limit", as what my daughter has exclaimed to me the other day when we had this conversation that have confounded me. In her, I see future for the next 50, and in order to achieve that, I must safeguard our children's journey towards the digital future right here, right now, right now, where here is one small step for her, one giant leap for the UAE.

Awards and Achievements in Year 2022

1. On 23 March 2022, The UAE Cybersecurity Council hosted 120 entities in the largest bug bounty competition in Dubai, UAE.
2. On 28 April, 2022, the most users in a cyber capture the flag (CTF) video hangout is 674, and was achieved by UAE Cybersecurity Council, in Dubai, UAE.
3. As part of Expo 2020 Dubai, the UAE Cybersecurity Council, Expo 2020 Dubai, and ITU jointly held Cyber 193 virtual exercise and was attended by more than 140 countries.
4. UAE Cybersecurity Council received the 2022 (ISC)² Government Professional Award for MEA region TR

Talent and Technology Lay the Foundation for the Digital Economies in the Middle East

In this digital era, ICT, a leading industry in the digital economy, faces some challenges in accelerating digital transformation. As the industry transforms, the key to maintaining rapid development, seizing opportunities and making progress in the new era is treating talent as the foundation of digital economies.

A recent report by the World Bank indicates that fully digitalizing the economy could lead to a rise in GDP per capita of at least 46% over 30 years, or in dollar terms, a long-term gain of at least $1.6 trillion. During the first year, this GDP per capita gain for the MENA region would be almost $300 billion, the report estimates.

In this digital economy landscape, ICT skills are vital to support long-term national plans for economic expansion and diversification. This calls for a long-term strategy to equip the youth with the capacity to make a difference while contributing to the socioeconomic growth of nations. The Organization for Economic Cooperation and Development (OECD) cites digital literacy as a fundamental competency for future education.

Evolving this talent development model will require a shift in how we approach education. We must recognize the talent gaps that exist between classroom education and industry needs. Technology companies, which

typically work with all stakeholders, are in an ideal position to help bridge the institutions that produce talent and the organizations that need them.

Huawei was among the first global tech companies to leverage its technology and expertise to help plug the talent gap, launching what is today its flagship CSR initiative, Seeds for the Future, in 2008. The program supports the development of local ICT talent by enhancing international knowledge transfer amongst students, promoting a greater understanding of and interest in the technology field and encouraging participation in the region's growing digital economy.

The program is more relevant than ever. Organizations are reluctant to adopt next-generation technologies such as AI, cloud, IoT, Big Data, 5G, etc., at scale without a clear picture of the digital skills landscape as the world faces a severe tech talent crunch. In a 2022 survey by PwC, 75% of Middle East business leaders said the shortage of essential digital skills is a business threat.

Huawei launched the 2022 edition of the Seeds for the Future in August across the region. During an intensive eight-day program, participants received entry-level and advanced courses on key technologies, including 5G, cloud computing and A.I. As a platform for also sharing cultural experiences, participants additionally had an opportunity to experience virtual tours of Chinese scenic spots or fast-growing companies. The experience included a glimpse at Huawei's history and technological developments, including a virtual exploration of Huawei exhibition halls, campus and stores. Huawei experts, entrepreneurs, professors and scientists were also on hand to share perspectives on a wide range of topics, from cybersecurity to the aerospace industry. The program culminated in a competition where young regional innovators vied for prizes with the other technological projects created by their global peers.

Technology's true success is measured by its impact on society. This awareness inspired Huawei's

Tech4Good global competition, held alongside Seeds for the Future again this year, inviting young people to explore how digital technologies can address social issues. Through group projects, Tech4Good wants to increase social entrepreneurship, build problem-solving and leadership skills through teamwork and deepen a sense of social responsibility. As of August 2022, the Seeds for the Future program has been implemented in 137 countries and regions, reaching more than 12,413 students from over 500 universities and gaining endorsement from more than 189 heads of state and high-level government officials globally.

Seeds for the Future has garnered support from the highest echelons of governments across the region. In Oman, for instance, the 2022 Seeds for the Future was launched in partnership with the Ministry of Higher Education, Scientific Research and Innovation, with the Minister, H.E. Prof. Rahma bint Ibrahim Al Mahrooqi, in attendance; and in Bahrain, the 2022 Seeds for the Future was launched under the patronage of the Ministry of Youth and Sport Affairs and Ministry of Labor.

ICT talent demand continues to rise, and more skills development efforts are required. Besides Seeds for the Future, Huawei has set up 163 Huawei ICT Academies in the region through which the company holds the annual Huawei ICT Competition. Additionally, over 17,000 students have obtained Huawei certification. Overall, Huawei has trained over 120,000 ICT talents for the Middle East.

Today's trainees are tomorrow's public sector, technology and business leaders. Investing in their growth now is the only path to a prosperous future. However, a strong talent ecosystem requires joint effort from governments, industries, educational institutions and so on. As a global technology provider, therefore, we must advocate for an open, shared ICT talent ecosystem that benefits all parties. We will continue to invest in ICT talent development in the region, and we will continue to support partners, customers and nations to help build a fully connected, intelligent world. TR

By Shunli Wang, Vice President of Huawei Middle East

Six Things You Need to Know About Enterprise 5G

5G is key to industrial transformation, but 5G providers must boost levels of ambition and confidence among their enterprise customers.

In brief

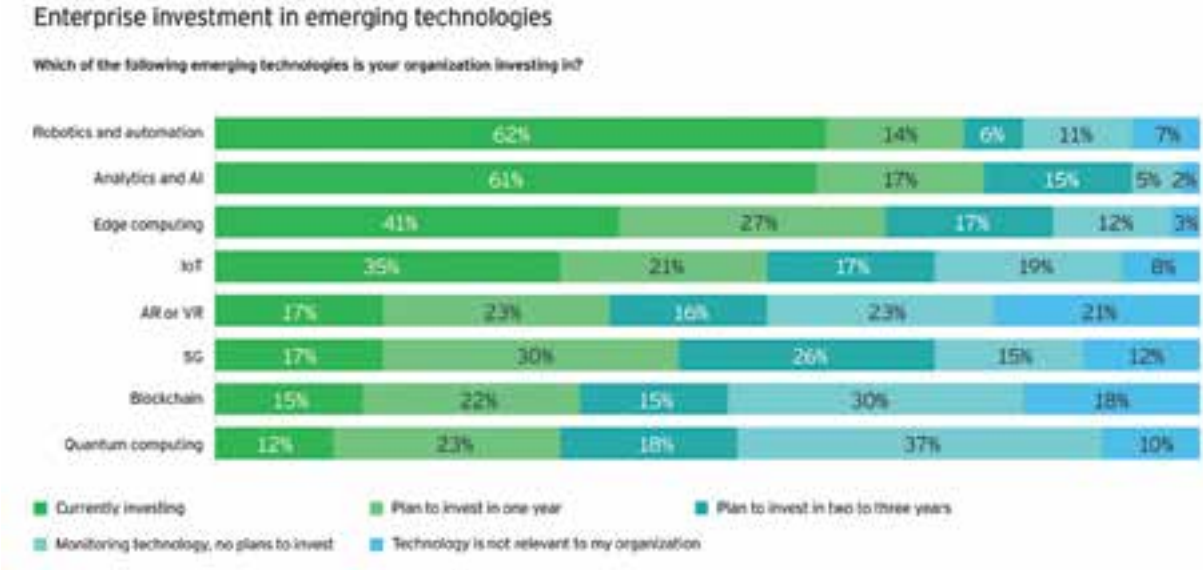
- The 5G investment outlook remains strong in 2022 among enterprises across industry verticals.
- However, only a quarter of enterprises are very confident in their ability to successfully implement 5G.
- As sustainability continues to top the corporate agenda, 5G providers must ensure that 5G and IoT use cases better address sustainability needs.

Despite healthy levels of current and future spending on a range of emerging technologies and interest in use cases that can deliver resilience during the pandemic, the world of industrial 5G faces some significant challenges. The degree to which enterprises are convinced about the 5G opportunity is in question as the latest EY Reimagining Industry Futures study (pdf) reveals only 24% of respondents are truly confident that their organization can successfully implement 5G.

It's therefore more important than ever that 5G providers step up to help enterprises address their critical pain points, solidify ecosystem partnerships, drive positive financial outcomes and implement 5G and related technologies with confidence.

To do this, it is vital to understand what enterprises really think about 5G, so that service providers can truly position themselves as trusted business partners. The latest EY Reimagining Industry Futures study (pdf) reveals six invaluable insights that all vendors should consider.

1. Spending Intentions Are Strong but 5G Adoption Is Not Guaranteed



The outlook is bright for enterprises' adoption of emerging technologies over the next three years. Our research finds that current and planned investments are rising in five out of eight emerging technology categories, with only automation and blockchain showing year-on-year decline.

Future spending intentions are highest in 5G, with its role in responding to environmental, societal and governance (ESG) risks top of mind. Organizations are more interested than before in 5G use cases that can help them meet sustainability goals (68%) and improve supply chain management (65%).

Yet, long-term adoption of 5G is not guaranteed, and vendors should not be complacent. The number of Asian companies planning to invest in 5G is down nearly 10% from last year. Technology providers should recognize that, even as 5G becomes more mainstream, some organizations may become less receptive to it.

2. Enterprises' 5G Vision Has Become More Defensive

A more defensive mindset toward 5G and IoT has taken hold — one that prizes efficiency and optimization ahead of entering adjacent markets and driving top-line growth. Increasing IoT's contribution to operational efficiency is enterprises' top IoT priority, cited by a greater proportion of respondents compared with last year.

Mirroring these findings, fewer enterprises compared with last year regard new products and service creation as a rationale for spending on IoT, and sophisticated 5G use cases featuring virtual reality (VR) or augmented reality (AR) are rated as a key application by only 28% of respondents.

Meanwhile, the same ESG considerations that are fueling greater interest in 5G are also translating into new demands on technology providers, who are under pressure to respond. Among respondents, 47% of businesses don't think the use cases offered by vendors adequately address their sustainability needs.

5G providers should take these attitudes on board and provide a more compelling vision of 5G's potential to drive top-line growth while ensuring that their use cases meet organizations' near-term needs.

3. Enterprises Are Receptive to New Ways of Purchasing and Deploying 5G

Enterprises are receptive to 5G solutions that are delivered through disruptive business models. The study revealed that 77% of businesses are interested in using private networks to support the implementation of 5G and IoT use cases. In addition, 50% of respondents rate the purchase of private network capabilities as an important 5G investment strategy for their business, citing a range of benefits led by greater network control (68%) and improved network reliability (64%).

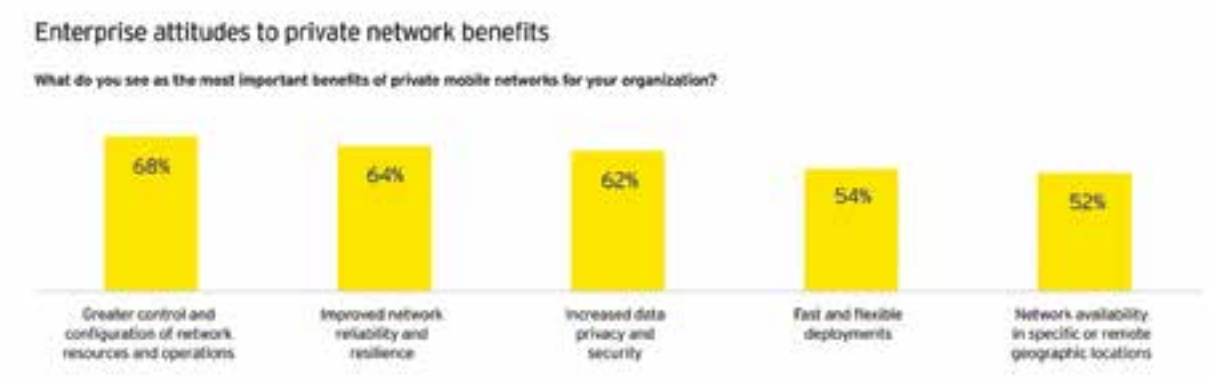
At the same time, 71% of businesses would consider purchasing 5G through an intermediary such as a mobile virtual network operator (MVNO), and 64% say that directly acquiring 5G spectrum could be important for them.

Taken together, these disruptive customer signals suggest that telcos' traditional relationships with enterprise customers are under pressure — and that more agile go-to-market strategies are essential in the world of 5G-powered IoT.

4. 5G's Relationship to Other Technologies Is in Focus but Cyber Risks Receive Less Attention

Businesses cite poor understanding of 5G's relationship to other emerging technologies as their number one internal challenge, up from fifth last year. Looking ahead, exploring 5G's relationship to other technologies is also their top priority. This underlines their desire to exploit a mutually beneficial combination of "frontier" technologies and implies that organizations would benefit from ongoing education around the basics of emerging technologies.

Interestingly, only 22% of organizations view mitigating cyber threats as a priority within their IoT agenda — ranking lowest — and mitigating cyber risks ranks only sixth as a 5G priority. Given the range of potential attack surfaces present in Industry 4.0, enterprises should ensure that "security by design" principles underpin their 5G and IoT deployments, as this could become a dangerous blind spot if this trend continues.



5. Network Vendors Are Gaining Trust as Transformation Experts While Telcos Are Lagging

As enterprises look to their technology and telecoms providers to support their 5G journeys, our findings cast an interesting light on the selection criteria they apply. Competitive pricing dominates as the top attribute currently sought by enterprises in vendors, overtaking speed of execution. And looking to the future, enterprises rate suppliers' ability to co-create and customize solutions as the two most desirable attributes.

The importance of collaboration underlines how enterprises are looking for transformation partners, not just technology suppliers. However, enterprises' opinions are divided on which suppliers have digital transformation expertise. Application and platform vendors lead with 55%, narrowly ahead of professional services firms (53%), while network equipment vendors (30%) are gaining ground year-on-year.

Telcos lag behind as only 19% of enterprises regard them as digital transformation experts. Although they top score as IoT experts (54%), they are much less trusted to deliver transformation through new forms of connectivity. Improving their credibility as enablers of positive business outcomes is essential.

6. Enterprises' Ecosystem Strategies Are Becoming More Ambitious

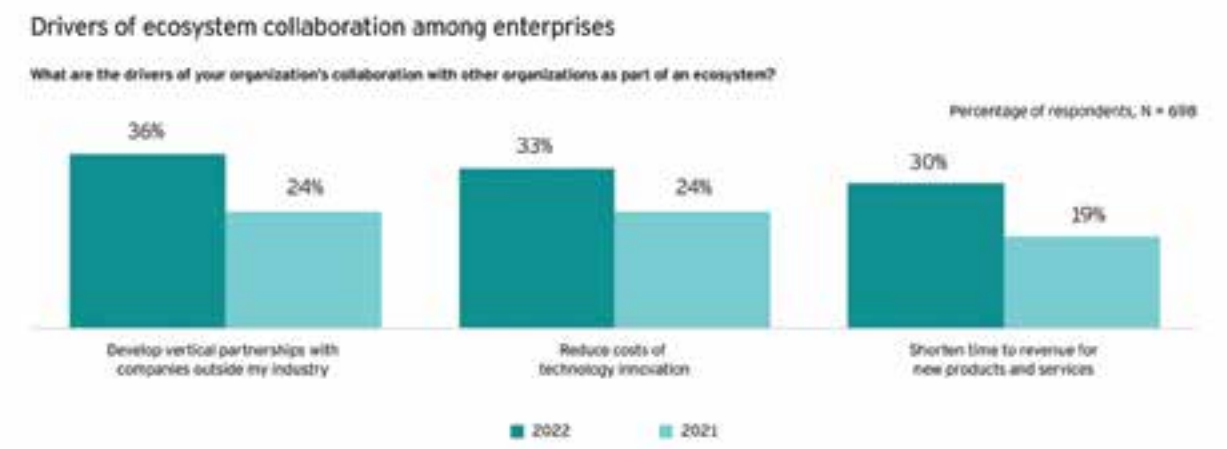
Ecosystem collaboration stands out as an essential route toward new skills and knowledge among enterprises as they look to take advantage of new technologies. 69% already collaborate with other organizations within business ecosystems, and even more (75%) believe ecosystem strategies will be central to their five-year growth outlook.

Crucially, the drivers of ecosystem strategies are becoming more ambitious, with a growing emphasis on rationales such as developing cross-sector partnerships and shortening time to revenue for new products and services.

Critically, 73% of respondents say they'll prioritize suppliers that can offer relevant ecosystem relationships as part of their 5G capabilities. As a result, 5G providers must be able to tap into fast-changing corporate ecosystems if they are to meet their customers' evolving expectations.

Summary

5G remains highly relevant to organizations, particularly as they look to build greater resilience in the wake of the pandemic. Yet, businesses may be overlooking opportunities for growth, and they need more support from their suppliers if they are to make the most of Industry 4.0. TR



Saudi Supports ITU in Developing Global AI Readiness Frameworks

The International Telecommunication Union (ITU) and the Saudi Data and Artificial Intelligence Authority (SDAIA) signed an agreement to create a set of "Global AI Readiness Frameworks" for key socio-economic domains that could help countries adopt best practices in harnessing AI's full potential.

Developed by the ITU with funding support from SDAIA, the frameworks could help understand where AI is being used most effectively and help any country to build its own AI economy.

SDAIA President HE Dr. Abdullah bin Sharaf Alghamdi remarked, "We truly believe that nations should collaborate and exchange as much of the AI know-how and best practices as possible to maximize the efficiency and effectiveness of national efforts."

Based on its technical focus groups on AI, ITU will leverage its AI for Good multi-stakeholder community of experts to define the methodology and conduct the study to develop the set of "Global AI Readiness Frameworks."

ITU Secretary-General Houlin Zhao said, "Continuous AI innovation will be required to achieve the Sustainable Development Goals (SDGs). The set of frameworks will help to level the playing field, allowing more governments around the world to learn best practices both to use AI to be more effective with their resources and to help foster economic growth by supporting AI startups within their borders."

Dubai Sets Up R&D Program for its Future Plans

Dubai Future Foundation (DFF) has launched the Dubai Research and Development (R&D) programme to support key economic sectors and create new opportunities for growth by providing a comprehensive framework for research, development and innovation across the emirate.

The launch took place in the presence of H.H. Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, crown prince of Dubai and chairman of Dubai Executive Council, and chairman of the Board of Trustees of Dubai Future Foundation (DFF).

The programme's key focus areas include health and well-being, environmental technology, smart built infrastructure, and space and augmented human-machine intelligence. The initiatives in these areas will be supported by the adoption of disruptive technologies such as artificial intelligence (AI), big data, Internet of Things (IoT), blockchain, robotics, drones, 3D printing, and others.

The programme supports Dubai's future vision to create knowledge and innovation-driven solutions for the most significant local and global challenges, and increase the productivity of existing sectors by providing new paths to enhance their economic value. It also identifies significant radical changes and ways to address them.

The Dubai R&D programme will be guided by four core principles:

- Providing a roadmap and a comprehensive governance model
- Setting top priorities for R&D
- Governing funding and investments
- Increasing Dubai's R&D expenditure and maximizing the private sector's engagement.

"Maximzing the private sector's engagement in R&D is crucial to achieving our future goals in Dubai. Major economies and leading global cities have made great strides throughout history due to their focus on R&D. Therefore, boosting scientific and technological research is pivotal to achieving Dubai's vision for the future economy," Sheikh Hamdan noted.

He also highlighted the importance of harnessing Dubai's growth potential in the sector by encouraging international companies to conduct R&D activities in the emirate, adopting innovative ideas and methodologies, capturing future opportunities, and focusing on the knowledge-based economy and advanced technologies.

Sheikh Hamdan directed the establishment of the "Dubai Research and Development Council", which has the mission of overseeing the progress of the programme's targeted objectives in line with national strategies to enhance innovation.

The R&D programme will also develop a comprehensive approach for setting up funding procedures, facilitating investment opportunities and related collaborations, and supporting innovative projects and initiatives aligned with key priorities. Additionally, it will increase the private sector's R&D activities and attract international companies to invest in Dubai.

Samar Mittal, Head of Cloud and Network Services, Nokia MEA

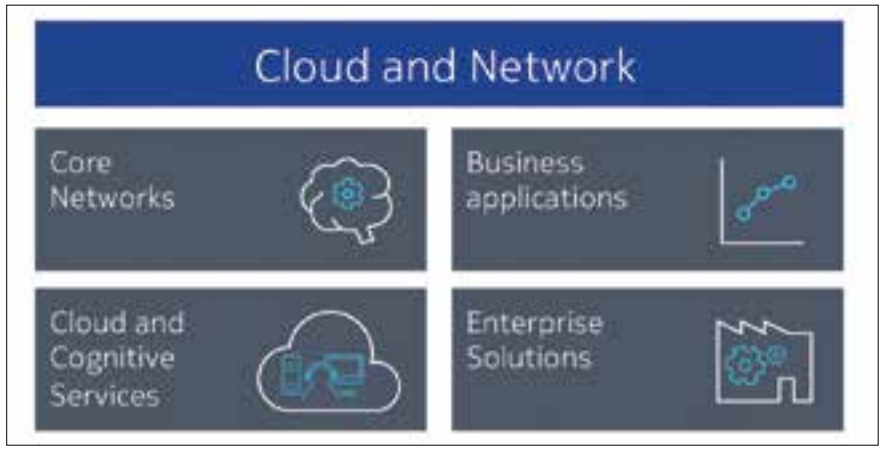
Nokia: Three Key Pillars Behind Unlocking CSPs' Network Value

Telecom Review sat down with Samar Mittal, Head of Cloud and Network Services, Nokia MEA, to talk about his new position, the company's role in helping CSPs unlock their network value, as well as the main business trends in the region and Nokia's complimentary business-centric solutions.

Congratulations on your recent appointment as head of CNS, Nokia MEA. Can you tell us more about your new role in the MEA region?

Thanks for your kind wishes, I have been in the region for just about three months, and I am now even more excited than I was before taking this new role as I meet customers in the region and discuss their challenges in navigating various phases of their growth journey. Some already have a matured 5G launch and are looking towards new revenue streams through 5G SA; some are preparing for 5G while others still see 4G as their mainstream revenue driver.

There is one common theme resonating across the spectrum. Customers are looking for growth beyond connectivity, exploring new revenue verticals and business models. They are also looking at ways to enhance personalized experience while securing network. I am very excited to see that Cloud and Network strategy and portfolio fully align with customer aspirations, and we are helping them achieve success.



As a global leader in telecom network technologies, Nokia has built networks for CSPs the length and breadth of the MEA region. How can they now fully unlock the value of their networks?

CSPs invest heavily in building their networks. Their investments are primarily directed towards keeping pace with technology evolution, capacity and coverage demand. However, many CSPs struggle with the value realization of their investment. From that angle, I would argue that three key pillars that require proper CSP attention to unlock the value of their network are reputation, revenue and productivity.

CSPs' reputation pillar is all about protecting their brand, boosting their

customer experience and NPS. As the complexity of the network increases and the network moves towards edge, the mission of safeguarding CSPs' reputation requires revisiting the security and analytics domain. Recent events in the North American and European markets have exposed latent vulnerabilities; it is a topic worth attention.

Secondly, from a revenue perspective, CSPs are facing challenges with the connectivity business. The connectivity market is at a stall, with less than 6% yearly growth, while the digital ecosystem market is growing at 30% to 40% per year. CSPs must figure out how to participate beyond just connectivity and build capability for the network to be part of a service chain to tap into digital ecosystem opportunity. This requires a new business model. CSPs are revisiting this domain to involve developers in driving consumption of the network as code via hyperscale ecosystems, and API's would be the new currency!

And finally, productivity through automation – maximizing human capital. As CSPs align their strategies to become part of the new value creation shift in the market driven by digital ecosystem and service chain revolution, they will ultimately need to consider another parallel paradigm shift on how they architect and operate their networks. CSPs underlying 4G/5G infrastructure of RAN, Transport and Core needs to be connected to their digital front-end, which faces their enterprise customers and consumer. Between these two layers lies a lot of friction, and there is a need for extreme automation to make this frictionless.

What are the main business trends that you identify in the Middle East market?

I see three major trends emerging out of the MEA:

- Convergence between the CSPs & application providers – Post Covid, the trend of zero-touch and paperless transactions has gone up multifold, and CSPs are looking for solutions to stay relevant in this space. Nokia CNS strategy of Network as a Code and API's as a currency enables this strategy, and operators are now defining their future architecture with this being their end goal.
- Shift in connectivity value and new business model – Connectivity has become a commodity and is limiting growth potential as per industry analysts. We are seeing a generational shift with the emergence of new service chains based on infrastructure, networks and applications. Services are provided by a single company, paid as subscription and delivered as a software download. CSPs are starting to become part of this service chain, gaming and media being two examples.
- Emergence of solutions for new experience on major events – With the FIFA World Cup being hosted within the region, a lot of innovation will lead us into a new era to provide a different experience to customers and new monetization opportunities for event organizers. This domain will see a major value shift.

How are Nokia's solutions helping its customers in the MEA region to fully achieve their business goals?

We create technology that helps the world act together. CNS helps CSPs and enterprises to navigate through the major industry transition of introduction of 5G networks and cloud-native software.

These transitions place demands on organizations to find new ways to monetize digital assets, optimize costs, navigate complexity and mitigate security risks for their mission-critical network.

Nokia's leading core network software gives CSPs the flexibility, intelligence, and automation required to securely deliver advanced 5G services and does so without being boxed into any solution, cloud infrastructure or vendor. CSPs can deploy their network as software on any cloud – private, public or hybrid cloud.

Business application (BA) portfolio helps CSPs to automate, secure and monetize their networks using data insights. It provides broader telecom software ranging from OSS/BSS to analytics, security and device management. Its software can run on any cloud environment, with multiple SaaS use cases already available.

Cloud and Cognitive Services (CCS) help manage complexity, technology and value creation through high-end expertise and automation in operations, including niche Managed Security Services and Multi-vendor Managed Performance Services.

Network Furcation as a Service (NFaaS) provides IOT connectivity and data market solutions to customers in aaS mode with WING and Nokia Data Marketplace delivered on subscription or consumption basis.

Nokia's Enterprise Solutions enable Industry 4.0 through the digitalization of asset-intensive industries, governments, and cities, as well as webscale businesses with mission-critical E2E solutions. Solutions comprise of campus private wireless connectivity, Nokia MX Industrial Edge applications and Nokia industrial user equipment. TR

Why Diversification Will Be Key to Delivering FIFA World Cup Qatar 2022

November 20th marks the start of the 2022 FIFA World Cup, a tournament regarded by many as the pinnacle of sport. For four weeks, the eyes of football fans across the globe will be on Qatar, with billions of people expected to tune in to enjoy a festival of national pride, passion, joy and, sometimes, despair as their country's teams compete to take home the prestigious golden trophy.

In recent years, the way we consume football has evolved far beyond just watching the games. We have greater access to teams and individual players, and whether it's through following them on social media, expert analysis from pundits or online fantasy leagues, there are several ways for fans to engage with the game.

As we look ahead to this year's competition, the first to be held in the Middle East and the first to be held outside of its traditional summer slot, it's important to consider how every aspect of the event will be made accessible to everyone. While the in-game action will undoubtedly make the headlines, one of the hidden heroes of the tournament will be the connectivity that enables that accessibility.

The Benefits of Diversification

Almost all subsea cables and traffic between West Asia, South Asia and East Asia pass through Egypt and the Mediterranean Sea to Europe. This means all Europe-Asia connectivity is heavily dependent on a single route through Egypt and the Suez Canal. This can create potentially costly bottlenecks, with any outages and high latency impacting individuals, businesses and entire countries. Adding diversification to existing terrestrial routes through different countries provides redundancy, though, meaning users will remain connected in the event of an outage. By diversifying routes through the Middle East region, providers can ensure availability, quality and stability even during times of high demand.

Diversification of cable networks will therefore have a significant role in ensuring the World Cup is accessible by everyone across the world and for the ongoing flow of data between Asia and Europe once the tournament is over. Leveraging cables in Asia and Gulf nations to carry traffic via diverse terrestrial networks to Europe will provide a range of benefits, not least keeping football on our screens during the World Cup.

A significant amount of internet traffic is related to social platforms and streaming services – key means of accessing World Cup-related content. As data-hungry users expect more from their devices every day, the popularity of these services shows no signs of slowing. So it's little surprise that many global content providers, including Meta, Google, Microsoft

> Qatar is investing more than $300 billion in modernizing its national infrastructure ahead of this year's event

and Amazon, are prioritizing diversification and investing in the Middle East. Diversified routes and locally hosted data centers are at the top of their agenda to ensure growing connectivity demands can be met.

Perhaps most importantly, as far as the Middle East is concerned, once the dust has settled on the World Cup, a more diversified cable route to and from the region means it won't be left out of the ever-evolving global digital economy.

Putting Qatar on the Map

As billions of people from all over the world tune in to watch the tournament unfold, there will undoubtedly be a short-term hike in connectivity demands. The 2018 World Cup in Russia saw a total global reach of 3.87 billion, with an average of 190.5 million live match viewers per game. This year, FIFA President Gianni Infantino expects the number of viewers to reach five billion.

Given the size of the potential audience and a forecasted 67 percent year-on-year growth in the use of data in sports venues, it's vital that connectivity providers in the Middle East are prepared to provide fully assured services. Indeed, the success of the event depends on it. Providers in the region will need to elevate capabilities, capacity and availability to ensure no goals are missed.

It's not just audience expectations that matter either. Hassan Al Thawadi, Secretary General of the Supreme Committee for Delivery and Legacy – the organization responsible for the planning and delivery of the event – predicts the "contribution to the economy would be around $20 billion," equivalent to approximately 11 percent of Qatar's GDP in 2019. The legacy of the World Cup will have far-reaching effects on the country's economy. Investments in the mobile and IP-based networks needed to cater for the increase in demand will serve as a catalyst to drive further development in the host nation.

Qatar, for instance, is investing more than $300 billion in modernizing its national infrastructure ahead of this year's event. According to its National Vision for the future, the aim is that, by 2030, "it would be an advanced society capable of sustaining its development and providing a high standard of living for its people."

The stakes, then, are extremely high for connectivity providers across the region. The solution lies in diversification.

Global Connectivity Hub

One of the most watched sporting events in the world, the 2022 FIFA World Cup will be Qatar's opportunity to shine and demonstrate why the Middle East is best placed to connect the world. TR

By Brendan Press, CCO, GBI

The Innovation Power of O3b mPOWER

Stewart Sanders, executive vice president of technology and O3b mPOWER program manager, SES

The first system of its kind, O3b mPOWER, built on the commercial success of SES's current O3b MEO (Middle Earth Orbit) system, is able to constantly evolve, adapt and change to address new customer needs during its lifetime.

Since its unveiling in 2017, O3b mPOWER has been a strategic initiative and major undertaking for SES, from its own engineering and product management to collaboration with a wide range of hardware, software and services partners. Leading the charge from a technology perspective is Stewart Sanders, SES's executive vice president of technology and O3b mPOWER program manager. With the launch of the initial O3b mPOWER constellation only months away, we spoke with Stewart to better understand the power and potential of the O3b mPOWER ecosystem.

From your perspective of being at the forefront of O3b mPOWER development, what makes it so unique and exciting?

What really excites me in O3b mPOWER is that it was conceived as a holistic system that encompasses space, ground and software with unprecedented flexibility to deliver services nearly anywhere and on-demand. With the constellation's capacity and flexibility being the first in the industry, O3b mPOWER opens

up entirely new capabilities and applications for customers in terms of satellite-based connectivity.

O3b mPOWER's real superpower is its software, which is spanning the satellites, ground stations, modems, antennas and even the cloud. Our vision for the future of satellite-based connectivity is that customers are able to simply order what they need depending on locations, capacity and other service parameters – and the software-driven orchestration implements the service automatically in real-time.

There are many different elements coming together in the O3b mPOWER ecosystem. To start with space, what can you tell us about the satellites?
The ecosystem vision was the driving force behind the design of O3b mPOWER, and we knew from day one that it was something that would require the collaboration, engineering expertise and insights of a wide range of partners to make it a reality.

So, space is indeed one of the fundamental parts of this ecosystem. To build the satellites, we worked closely with Boeing to create the first fully digitized and beam-forming aircraft, including an initial constellation of 11 satellites in medium-earth orbit (MEO) that will cover 96 percent of the population and areas where connectivity is needed most. It will have significantly more capacity than the previous generation of MEO.

What about the ground segment?
This is another fundamental part of the equation, specifically the new ground stations we are building, modem technologies, new edge compute capabilities and the ability to land traffic at a managed or private gateway or even directly into Azure or another cloud data center.

For ground, the key area of focus has been on working on next-gen customer terminals and antennas – from flat panels to multi-beam antennas – to suit a wide range of market segments and customer business requirements. We've been actively testing antennas for the various segments from multiple providers, such as Isotropic Systems, Intellian, Comtech, Gilat, ST Engineering iDirect and Orbit, among others.

You mentioned that software is the real superpower of O3b mPOWER. What does that mean in practice?
Software is implemented across all the key elements of O3b mPOWER. In fact, we are holistically integrating a range of cutting-edge software that forms a system to give us the flexible, real-time control, supporting our fully automated vision. We worked with partners like Microsoft, for instance, but also with many others, leaders in their specific domain.

A great example of this is the Adaptive Resource Control (ARC) that we are developing with Kythera Space Solutions. ARC enables control and optimisation of power, throughput, beams and frequency allocation across O3b mPOWER's space and ground assets – as well as our next-generation GEO satellites. This allows unprecedented levels of automation, revolutionary for the industry.

You've already announced a number of O3b mPOWER customers; what are some of the early applications the market expects to see?
As more new customers turn towards satellite connectivity, the overall market trend is that they are also looking for resiliency and the ability to benefit from the multi-orbit technology. Today, we are the only provider of multi-orbit solutions, and our customers value the performance of MEO, including its ideal balance between reach, as well as low latency and high throughput.

In terms of uses, we see a lot of interest from government customers, including those looking to set up sovereign networks or use it to bolster ISR capabilities, bringing them to a new level. For fixed data customers, there is strong demand for using it for cellular backhaul – like Orange plans to – as well as expanding cloud domains to new locations. And, of course, maritime, where our cruise clients like Carnival will use added capacity to create new customer experiences on ships and bring better connectivity on more routes. We're also seeing connectivity increasingly added to different classes of maritime vessels.

What can we expect next in the O3b mPOWER journey?
It's an exciting time for us as our satellites are undergoing a series of testing, just months away from launch time. From an ecosystem perspective, we continue expanding our partnerships around new antennas and adding more ground stations. These developments create an impressive momentum. Most importantly, we'll continue to invest and collaborate on new software capabilities as O3b mPOWER is the first system that will not have static features locked in at launch but rather systems that can evolve, adapt and change through software to address new customer needs. TR

> O3b mPOWER opens up entirely new capabilities and applications for customers in terms of satellite-based connectivity

Kuwait:

A Modern Metropolis Advancing Its Horizons

Kuwait, lying within the North-Western corner of the Arabian Gulf, is home to over 4 million people and an emerging financial, commercial and cultural hub, both regionally and globally. It is among the richest countries in the world by gross national income per capita, with the Kuwaiti dinar rated as the world's strongest currency.

Ranking second within the ICT use index for Gulf countries in 2021, the New Kuwait 2035 vision goes beyond the realm of infrastructure mega-projects to challenge Kuwaitis, especially the youth, to boost their role in the economy and in society. Laying out new long-term development plans for the country, ICT rightfully sits at the heart of the government's strategy for the New Kuwait plan.

Pushing ahead with modernization policies and institutional reforms, Kuwait is a catalyst for economic diversification, sustainable growth and social progress. It is one of the top ten most improved economies in the World Bank's Ease of Doing Business report, rising from 97th in 2019 to 83rd in 2020, as well as the most improved in the MENA region based on the UN Global Competitiveness Report 2019.

Kuwait enjoys high living standards in a 100% urbanized environment. In fact, the WIPO Global Innovation Index found that Kuwait ranks relatively high for its innovation efficiency ratio – the

amount of innovation output a country receives for its inputs.

The Kuwaiti government has made the digital transformation of both public and private sectors a priority. Because of this, Kuwait's expenditure on ICT is expected to grow to almost $11 billion by 2024, based on the adoption of various technologies such as 5G, artificial intelligence (AI) and the Internet of Things (IoT). The expected growth drivers for the country's digital transformation are mobility, cloud computing and data analytics.

ICT Development

According to the UN Kuwait Technology & Innovation Index 2021, Kuwait ranks high in the ICT dimension. ICT projects in Kuwait are mostly concentrated in the service applications and platforms categories, the Arab Digital Development Report 2019 stated. Entrepreneurs are now embracing the advanced resources required for cutting-edge technological projects.

With no gender exclusion, Kuwait has provided access to public information via the different channels afforded by the Internet, with online services provided by ISPs and telecommunication companies and regulated by the Communications and Information Technology Regulatory Authority (CITRA). This covers the digital needs of society, along with those establishments where Wi-Fi and open networks are available.

As a developing nation, Kuwait has progressed extensively in the ICT field to remain competitive and advanced. In line with this, Sheikh Mohammed Al-Abdullah Al-Mubarak Al-Sabah, former State Minister of Cabinet Affairs said, "As we live today in the age of information and communication technology (ICT), information and the internet play a major role in our daily lives not only at the level of individuals and society but also at the level of businesses and government institutions…"

- **Telecoms**

The telecom landscape in Kuwait is widespread and robust, with 4G covering the entire population and 99.4% of citizens connecting to the internet at home. 5G is reaching about 97% of the people in Kuwait due to the pioneering move of the MNOs – Zain, stc, and Ooredoo – together with the the government to introduce 5G as part of their digital strategies.

Since mid-2019, these three MNOs have been offering commercial 5G services. They score highly on multi-gigabit speeds and claim near-universal population coverage. As of May 2022, Kuwait ranked fifth globally in Ookla's Speedtest Global Index for mobile performance, with a 104.47 Mbps median speed.

stc was the first operator in Kuwait to launch an end-to-end 5G SA network based on a cloud-native core, while Ooredoo is hailed as the fastest operator in 2021. Additionally, Zain successfully completed the first live trial in the region of open and virtual radio access networks (ORAN/VRAN) in Kuwait. In June 2022, Virgin Mobile Kuwait became the first MVNO to enter the market and the fourth service provider in the country.

In terms of affordability of internet access, including price and competitive environment, Kuwait ranks first at the regional level. This means that the cost of access is the lowest and the competitiveness is the highest among Arab countries. The UN Broadband Commission's target of entry-level broadband access at less than 2% of GNI by 2025 has already been achieved in Kuwait, with the advertised download speeds below 2 Mbit/s.

Analysys Mason estimates that 5G will drive a cumulative increase of more than $1 billion in Kuwait's GDP between 2018–2025, and will create almost 25,000 new jobs cumulatively by the end of the period. Rapid 5G investments are also increasing the total investments in data centers in Kuwait.

Moreover, data from Future Market Insights indicates that the global B2B telecom market is set to reach $107 billion by 2026, driven by the high demand for cloud, IoT, video and enterprise applications. Initially, 5G services in Kuwait were mainly targeted at residential users and mobile broadband consumers, but operators expanded their offerings to develop more business-focused services.

- **Emerging Tech**

CITRA confirmed the importance of adopting artificial intelligence (AI) and cloud computing techniques in contributing to the achievement of New Kuwait 2035 objectives. In fact, the increase in the adoption of cloud-based technologies is correlated to the surge in the adoption of AI in the country.

Companies in Kuwait across verticals are expected to open vast new corridors for the growth and integration of AI and to ramp up market growth in the forthcoming years. By using the most advanced Internet of Things (IoT) technologies, unprecedented advantages that boost speed and operational efficiency will be attained.

At a time when cloud services are considered one of the modern and important technological revolutions to facilitate business procedures, the increasing adoption of cloud computing services is also leading to the growth of colocation services in the country.

Ooredoo is the first telecom in Kuwait to obtain a cloud service provider license from CITRA. This is a result of an extensive review of the company's technical capabilities, cloud infrastructure robustness, security policies and safeguards, data handling and storage procedures, as well as its technical and security certifications. Prior to this more recent review, Kuwait's Cloud Computing Regulatory Framework was published in September 2021.

Other ICT initiatives for emerging tech include an Amazon Web Services (AWS) office opening in the country. Sheikh Dr. Meshaal Jaber Al Ahmad Al Sabah, Director General for Kuwait Direct Investment Promotion Authority (KDIPA), commented, "The adoption

of technologies is an important factor in developing and supporting the country's digital transformation initiatives in line with Kuwait's Vision 2035."

Also, the newly formed partnership between solutions by stc and LEAN provides local cloud infrastructure in Kuwait, the option to localize data, in-depth knowledge and technical know-how, and customer support services.

- **Cybersecurity**

Kuwait is amongst the most targeted countries for cyber-attacks in the Gulf region. In 2017 alone, the country lost approximately $1 billion to cybercrime. Raising its bar for cybersecurity, Kuwait is moving towards a more structured approach to managing cyber threats and vulnerabilities.

Between 2017-2020, the National Cybersecurity Strategy of the State (NCSS) emerged as a response from the Kuwaiti government due to the extent of cyber threats and challenges. Following this, a new national cybersecurity framework was defined for Kuwait and a national cybersecurity operating model was developed in conjunction with CITRA.

Current legislation in Kuwait includes laws on IT crimes and e-transactions. In addition, the Department of Combating Electronic Crime within the Ministry of the Interior of Kuwait is in charge of combating cybercrime by enforcing the law and spreading awareness to the public via social media.

In early 2022, the Kuwaiti government established the national center for cybersecurity (NCSC), a platform that aims to exchange data and enhance cybersecurity between government agencies in order to take precautionary measures before any cyber-attack occurs.

Digital Transformation

Connecting the future to a new Kuwait, the National Knowledge Economy Center is one of the key cornerstones for digital and knowledge economy transformation plans in Kuwait. The Central Agency for Information Technology (CAIT) is also participating in the GCC Executive E-Government Committee to help in developing e-government projects to achieve mutual goals.

By utilizing smart technologies in different economic sectors, the country is fulfilling the need for an innovation ecosystem. With an emphasis on digitalization, digital economy services have been on the rise, as governments and enterprises across the Arab States region have adopted new digital strategies, policies and plans. According to the UN E-Government Survey 2020, Kuwait is among the highest-ranking across the GCC.

Launched 10 years ago, the Kuwait Government Online portal has seen monthly visits grow to over one million by January 2021. The portal lists both information and e-services for all Kuwaiti government agencies, with the most frequently used e-services involving civil ID, utility payments and appointments for foreign workers.

In January 2019, Kuwait announced a government fund worth $200 million, one of the largest in the region, specifically for investment in technology companies. This is a strategic move in paving the way towards a more digital economy. Some of the digitalization initiatives include the installment of fiber-optic networks and the adoption of the cloud ecosystem to gather and analyze airport data; the digital transformation of one of Kuwait's largest manufacturers to boost growth, efficiency and connectivity; and the implementation of a fully-automated workflow system by the Kuwait Finance House (KFH), the region's first company in the financial services industry.

Interestingly, the National Bank of Kuwait (NBK) has launched its blockchain-based product NBK Direct Remit while KFH has also successfully launched an instant cross-border payments service to KFH-Turkey using Ripple's blockchain technology.

Almost half a decade ago, the Kuwaiti government announced the implementation of smart city strategies covering intelligent infrastructure networks, security and virtual systems. As part of Vision 2035, the Kuwaiti government is building a 'smart city' from scratch, transforming what was once a tire graveyard into the South Saad Al Abdullah city. Labeled as the Middle East's first development focusing on green, smart technology, this billion-dollar project will eventually be home to 400,000 people.

By and large, the Kuwait Vision 2035 promises to strengthen the digital ecosystem and transform the country's digital infrastructure, all while diversifying the economy and transforming it from an oil-based economy to one that is knowledge-based. Kuwait is well-positioned to embrace the 4IR, as more look to invest in disruptive technology and as the ICT market booms. TR

> Kuwait is well-positioned to embrace the 4IR, as more look to invest in disruptive technology and as the ICT market booms

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Laurence Miao, vice president, Rosenberger Asia Pacific

Rosenberger: Refocus for Today and Future

Many people in the industry have been very much interested in knowing about the latest developments of Rosenberger, the high-tech telecommunications leader, especially after the spinoff of its Antenna and DAS wireless coverage product portfolio. Laurence Miao, the vice president of Rosenberger Asia Pacific, was interviewed by Telecom Review to outline his insights, together with the outlook for growing Rosenberger's business in the region.

Why did Rosenberger decide to spin off the antenna and DAS wireless coverage business? What has been the progress made thus far?

The communication markets are being driven by high growth dynamics. This situation requires the business activities to be realigned with a clear and purposeful focus for the organization. The spin-off of the Antenna and DAS wireless coverage business will enable Rosenberger to focus more on both its long-tradition connectivity and related interconnect solution business, together, to continuously increase R&D investment

in such fields of focus, build more dedicated teams and establish a resilient and more efficient supply chain for providing the best services for global and local customers. In terms of the progress of spinoff, due to the lockdown in some administration bureaus, there was a delay in the formal steps to be accomplished. But now, the formal and legal steps which need to be documented and registered in various legislation are reaching their closing point.

What are the main business segments and solutions of Rosenberger today and in the future?

In addition to the continued efforts to expand the existing automotive as well as semicon and test businesses, Rosenberger has integrated the following businesses and created a new global "Business Area of Interconnect" with the aim of consolidating Rosenberger's global resources, enhancing global synergy and collaboration, advancing the progress and efficiency of R&D, improving responsiveness to customers and, most importantly, further strengthening our global and local services.

- Leading RF, FO, Power and Data connectivity for all industries
- Site solution for mobile radio infrastructures
- Datacenter and edge computing solutions
- Telecom and communication solutions
- Medical and industrial solutions
- Telematics/IoT solutions
- Spaceflight and aerospace solutions

Particularly in the segment of mobile communication, Rosenberger will continue to offer comprehensive site solutions for radio infrastructures, including interconnect products and all types of installation materials. For whichever 4G, advanced 5G or future 6G mobile networks that are requiring higher bandwidth, lower latency and higher speed, as well as for the disaggregated cloud-RAN and mobile edge computing networks, we at Rosenberger have the know-how in place. We will uphold our mission statement to develop the most innovative and advanced technology in the fields of our expertise by delivering quality products and services to achieve the greatest customer satisfaction.

What is the sales coverage for Rosenberger in the APAC region? How does it continuously provide better service to the local customers?

We realize and understand the importance of customer service, and have sales coverage in the entire Asia-Pacific region, including South-East Asia, South Asia, Oceania, Japan, Korea, China and the Mid-East, with the applicable professional local teams. We have also developed partners and distributors in various countries in order to further enhance our local services.

Meanwhile, our regional team is fully connected with our headquarters in Germany and also with the Rosenberger customer team across the world, with support from over 20 manufacturing and supply bases located in Germany, Hungary, Sweden, India, China, the US, Brazil and Mexico, respectively. We do our best to improve customer satisfaction in the strategy of global for local/global and local for local/global.

What are Rosenberger's key competencies?

Rosenberger has been one of the leading solution providers in connectivity and interconnect business areas. Our strengths and competitiveness are:

- As a trusted partner with more than 20 years of experience in vertical development and site service of interconnect business, Rosenberger can provide customers the one-stop service from idea through implementation.
- Rosenberger maintains continuous innovation and R&D in the fields of RF, FO, Power, High-speed data and High-voltage connectors and interconnect solutions and stays at the forefront of the industry.
- Rosenberger keeps up to date with the latest production and manufacturing technology in pursuit of the highest quality and zero-defect products.
- Based on more than 50 years of international operations experience, Rosenberger fully understands and can meet the diversified requirements of global and local customers.

What is Rosenberger's outlook for the related market segments and your business, especially in the APAC region?

Rosenberger is fully committed to and even more focused on providing innovative solutions, the highest technology expertise and enhanced service to its customers. Besides the existing R&D centers and manufacturing facilities across the world in Europe, China, India, the US and Brazil, we have invested in and built a new manufacturing site in Changzhou, China to increase production capacity and support the rapid market growth and customer expectations. Meanwhile, we are also modernizing our existing manufacturing sites in Kunshan, Shanghai and Beijing in China to support connectivity and interconnect business.

The COVID-19 epidemic has also made digital transformation more urgent than before. Most things can be connected by science and technology, and the application of cutting-edge technologies such as artificial intelligence, big data and block chain will be deployed more widely. This trend requires more extensive, diversified, virtualized and advanced networks, which will provide us with long-term growth opportunities.

Asia Pacific is one of the fastest growing markets in the world, especially in the segment of mobile communication and datacenter network, and we firmly believe that we will continue to grow with Rosenberger's re-focus strategy. We are open and willing to establish strategic partnerships with more valuable customers, including operators, service providers, equipment manufacturers, system integrators and other verticals in the ICT industry. The goal is to achieve long-term win-win cooperation and to build a greener, lower carbon-consumption, safer and more efficient network together. TR

Must Like Long Walks and 2G Sunsets by 2025

Sunsets are among the most pleasant things in our world – beams of light casting a mix of ever-changing colors across the sky as the sun slowly sinks below the horizon. They are the triumphant end to the day that heralds the approach of night and foreshadows the bright rays of the new day to follow.

But for many of the world's unconnected, there is a different type of sunset on the horizon, one that threatens to widen the connectivity divide and leave them in digital darkness even as 4G and 5G networks deliver increased coverage and access to the internet through mobile broadband networks.

As momentum grows for 4G and 5G networks, mobile network operators (MNOs) are beginning to shut down, or sunset, their older 2G and 3G networks, reforming and re-licensing the spectrum while also realizing significant cost savings. In many instances, the push to sunset these older networks is being encouraged by national governments, with many countries mandating the shutdown of legacy networks between 2025 and 2030. While in many countries, this sunsetting will hardly be noticed, in some regions of the world, such a drawdown could prove detrimental to the poorest segments of society.

4G networks account for slightly more than 50% of global mobile connections and are starting to overtake 3G network adoption. This rise in 4G has helped reduce the coverage gap, bringing internet access through mobile broadband networks to roughly 97% of the world's population. But there is still a long way to go. Even as MNOs work to move their subscriber base from 2G and 3G networks, many are not willing to part with their current feature phones due to the relatively higher cost of a 4G replacement as well as the cost of availing digital services.

The Challenge – Customer Retention While Bridging the Digital Divide
For the world's unconnected, one of the major barriers to mobile internet adoption remains the affordability of handsets and data plans. For many, even a $20 phone is a significant cost, and an entry-level internet-enabled phone can account for 120% of the subscriber's monthly income in some parts of the world.

A GSMA study found that 86% of smartphone users regularly use data for mobile internet access and were more likely to utilize more mobile internet features, compared with only 12% of lower-cost basic phone users. Even with lower-cost devices, these subscribers use very little data and do not see their phone as a device to connect them to the internet or the rest of the world. As a result, MNOs often face a difficult challenge in getting these users to mentally transition from merely using their phones for voice-only functions to adopting a new and richer digital lifestyle.

Replicating Jio's Success

As the global 2G and 3G sunset progresses, there is uncertainty among operators regarding how to migrate and retain subscribers during the transition. Radisys has successfully ushered many operators through the same evolution all around the world. Radisys has the expertise to solve complex communication and deployment challenges. Backed by the strength of its parent company, Reliance Industries Limited's subsidiary Jio Platforms Limited, Radisys employs proven best practices to help MNOs plan and successfully execute 2G and 3G subscriber migrations.

Without an affordable option for customers, successfully transitioning subscribers from the legacy networks to a 4G network will be virtually impossible for MNOs.

To make the transition attractive, MNOs must disrupt the market and dramatically improve the user experience. They need to keep users connected and informed; find ways to build emotional connections through enhanced capabilities such as video calls with family members; and promote internet usage with easy-to-use, consumable apps and digital services.

4G Handsets Accessible for Everyone

Providing an affordable handset is central to the disruptive plan. Unfortunately, when many subscribers hear about affordable handsets, they often think of the cheap, low-quality handsets that have flooded the market. These substandard options regularly use inferior materials and are poorly constructed, have poor battery life and offer limited features.

Radisys offers a full suite of high-quality, affordably priced handsets aimed at migrating 2G and 3G users to 4G and introducing a full spectrum of digital capabilities that will grow MNOs' revenues while elevating the customer experience. Radisys' handsets deliver:

- A mobile network operator (MNO) brandable device that builds association and loyalty to the MNO with best-in-class quality and performance that is priced for the masses.
- An available selection of habit-forming applications, exclusive media bundles and a customizable user interface to distinguish an MNO's brand.
- Superior economics to maximize MNOs' return on investment .
- An improved user experience that leads to greater subscriber retention and customer delight.

While all these elements are helpful for MNOs, the Radisys portfolio of handsets also provides a familiar feature phone device for consumers that unlocks a simple path toward a more robust 4G experience while saving them the anxiety of learning and engaging with a new and unfamiliar device. Whether the handset is a lite version of the Radisys smart feature phone that delivers voice and basic texting and a starter 4G device experience; the Radisys smart feature phone that brings leading-edge features and capabilities including video calling as well as video on demand and music streaming; or the Radisys smart phone with full touch screen capabilities and a range of smart phone apps, these Radisys handsets are premium quality devices priced for the masses.

Conclusion

Ultimately, MNOs can help their subscribers migrate to 4G networks by offering an affordable smart feature phone that meets their customers' needs. But that is just the start of the disruptive plan. Working together, Radisys' proven success and affordable handsets can help MNOs secure their current subscriber base and transition them smoothly to a 4G network. TR

Radisys employs proven best practices to help MNOs plan and successfully execute 2G and 3G subscriber migrations

Hallmark of Modern Telcos

Time waits for no one, including the telcos. We have seen time and again that companies that fail to change with the times risk being hurled into a void of mediocrity. Considering the advancements in technology today, telcos face more disruption than they've bargained for. Indeed, the rise of the OTT model may be seen as a prime example of how new players have managed to gobble up a huge chunk of the telecom market pie. However, behind every challenge lies an opportunity for those who welcome the unexpected.

By embracing innovation and clear-headed decision-making, some telcos have managed to hold their ground in a dynamic ICT sector, being relevant not just as data conduits, but as enablers of digital transformation. Still, with the changing behavior of customers and the steady introduction of new technologies such as cloud computing, big data, AI and other applications, even the most innovative carriers face untold challenges. And this comes just as the pace of 5G deployments is gaining strong momentum, with 5G networks set to carry over 30 billion connected devices by 2025, according to one market survey report.

The world has already embarked on this digital journey, giving greater significance to digital infrastructure, digital skills, digital businesses and digital public services. Connectivity ranks among the key areas of engagement; all technologies (fixed, wireless and a combination of both) can play a role in reaching our digital goals, all while bridging the digital divide. Let us consider some areas

where modern telcos can't afford to lose focus:

- Network expansion is crucial for any operator's growth strategy. However, managing expansive networks is not an easy feat. Hence, autonomous networks must be a key component of the telco's operations. AI- and ML-based automation can empower software-defined networks with autonomous decision-making capabilities, thus minimizing the need for human intervention. The self-provisioning, self-diagnosing and self-healing capabilities of such networks will enable operators to improve the end-user experience while cutting operating costs. Autonomous networks enable telcos to provide network as a service, ensuring greater flexibility, reconfiguration, security and enhanced functionalities for network consistency and reliability across industry verticals.

- A tight asset management strategy is imperative for telco growth. Transferring capabilities and infrastructure to specialist players has been an effective and profitable way of moving from fixed to variable costs while boosting agility and focusing on core capabilities. However, a holistic approach encompassing re-evaluation of core and non-core operations around different assets is key for aligning the strategic enablers and outcomes. Telecom operators must rethink their strategies related to acquisitions, disposals, joint ventures and collaborative partnerships to gain scale and momentum. Failure to do so will weigh heavily on their progress. Moves such as tower sale-and-leasebacks, network-sharing agreements, partnering with hyperscalers, etc. can help telcos sustain their steep CAPEX commitments for rolling network infrastructure. Mergers and acquisitions can maximize shareholder value and strengthen a global presence.

- The need for talent incubation programs in telecom companies cannot be overlooked at any cost. Cloud, automation, emerging technologies and new business models are transforming the talent pool ecosystem in the ICT sector. Traditional talent acquisition processes may not suffice when it comes to hiring the right personnel who are proficient in the new technologies driving digital transformation that telcos look to provide. The strategy of up-skilling employees must be utilized to maintain the company's long-term workforce objectives, not just on the technology front but within the overall operations, including administration and design as well as customer-facing roles. Telcos also must address the issue of "brain drain" to circumvent any potential output delays or stoppages in their entirety.

- Diversification and Customer Experience are perhaps the most impactful aspects that telcos can build upon for their growth beyond connectivity. Today's dynamic digital market landscape gives operators the chance to deploy several important assets in the building of new, non-core businesses. From voice and video calling, streaming and payment services to mega projects and smart city innovation, telcos stand at the juncture of digitalization with their ecosystem of broad networks. Telcos command the advantage of huge and historic data sets of their customers, providing rich information for building accurate consumer profiles, behavioral predictions, and any number of related microsegments, thus boosting targeted marketing efforts and decreasing customer acquisition costs. Telcos can enhance the customer experience by harnessing the power of analytics and AI to offer personalized experiences across all digital and physical channels.

According to a McKinsey study earlier this year, from 2010 to 2020, operators created less value despite making huge capital investments to enable 3G and 4G technology. However, in the last two years, since the onset of the Covid-19 pandemic, telcos once again assumed the driver's seat, as digital services worldwide played a crucial and historic role. The telecom sector kept most business enterprises in operation and rescued the world from an indefinite recession. One of the biggest challenges for telcos remains, however, the connecting of rural and remote areas with the rest of the world, ensuring access to affordable connectivity services for all. Per recent market research, the telecommunication market size was valued at $1,638.78 million in 2021 and is predicted to reach $2,346.69 billion by 2028, at a CAGR of 4.95% between 2022–2028. The global telecommunication market is expected to continue such strong growth in the coming years, providing ample opportunities for companies that can capitalize on the trends driving this expansion. By analyzing the above considerations, telcos can channel their potential for greater standing in the modern ICT ecosystem. TR

Unraveling the Next-Gen Internet Ecosystem

There is no denying that technology-driven forces are shaping our world immensely. New technologies including 5G Advanced, 6G, IPv6+ and advanced computing technologies will further enable new applications moving forward, and indeed, the internet is the engine of this digitization.

Today, such advancement has become a critical component of our economies as well as our daily lives. However, the internet is an inherently insecure channel for information exchange with a high risk of intrusion or fraud, including phishing, online viruses, trojans, ransomware or even physical disruption.

Global cybercrime rates have been increasing by the day. Threat intelligence reports have identified the rise of cybercrime entities such as Lockbit 3.0, Hiveleaks, BlackBasta, Lazarus Group, etc., which have managed to create a sinister atmosphere for public and private organizations. Many methods are being tried and tested to fight these threats, including encryption, dual authentication, integrated endpoint security solutions and more, but without much effect. Many countries have funded research projects on the new-generation Internet, such as GENI, FIND, FIRE and CNGI, in an effort to solve these challenges.

Due to the vulnerabilities associated with the use of the internet, organizations such as the European Commission hope to find a dynamic solution to this debilitating issue. "We envision that the information age will be an era that brings out the best in all of us. We want to enable human potential and creativity at the largest possible scale. To preserve and expand the European way of life, we must shape a value-centric, human-inclusive internet for all," says Georgios Tselentis, scientific project officer at the European Commission.

As such, The Next Generation Internet (NGI) – a European Commission initiative – aims to shape the

development and evolution of the "Internet into an Internet of Humans"—an internet that responds to people's fundamental needs, including trust, security and inclusion. "The NGI initiative is a unique opportunity for European innovators for future internet researchers and organizations in Europe and also worldwide to be able to refine the internet of the future in a way that it can respond to the needs of citizens and humans. We have to deal with the internet of today; it's not going to be possible to throw away everything and build from scratch. We need to incrementally understand what are the parts that we have to capitalize on and where we have to disrupt," says Monique Calisti, executive director and partner of Martel Innovate, coordinator of the HUB4NGI project.

Erosion of Trust and Space

The distinction between the real world and the digital world is blurring with the continued growth in connectivity. With the introduction of technologies such as edge computing, the Internet of Things (IoT), multimedia content and social media, the internet offers unparalleled access to data and online services. Data mining using AI is being utilized to analyze information for various purposes ranging from customer care services to remote healthcare. There is progress in fully autonomous networks for connected objects and services. However, the internet has encountered a "trust issue" concerning personal data security, cybercrimes and the spread of disinformation via online channels. Apart from the security issue, the IP address space in the current standard Internet Protocol Version 4 (IPv4) – approximately 4.3 billion IP address spaces – is rapidly filling up. Internet engineers have been working on the new standard called Internet Protocol Version 6 (IPv6), which has an internet address allotment of 80,000 trillion.

Tomorrow's Internet

The NGI initiative aims to build the key technology blocks of a human-centric internet, which gives end-users full control of their data. Through advanced technologies, new decentralized business and social models will ensure secure and trustworthy access for all. The mission of NGI is to "re-imagine and re-engineer the Internet." It promotes that the information age should "enable human potential, mobility and creativity" in an inclusive way while dealing responsibly with natural resources.

As for its new digital economy, China's state planners have identified four broad areas to focus on. The first is the development of its digital economy sector to leverage the next wave of technological revolution and opportunities. Secondly, data management must be considered a critical factor in developing the digital economy. Third is the digitizing of services for its citizens, and lastly, is the regulating of a healthy and sustainable digital economy.

Meanwhile, the US National Broadband Plan states that, among other goals, the United States should lead the world in mobile innovation, as it has the fastest and most extensive wireless networks of any nation.

With such varying expectations throughout the world, it's easy to see that the complexity of the internet is growing both virtually and physically. Hence, a valid question comes to mind.

Can the Internet Be Re-engineered?

Early networking research community engaged in the new Internet conversation has talked about two broad approaches – evolutionary and clean slate. The evolutionary approach looks at the existing Internet architecture to solve the major technical challenges. A suitable example of the evolutionary approach is the Internet Engineering Task Force's (IETF) IPv6. The clean slate approach, as the name suggests, looks at developing a new Internet architecture entirely such as the projects conducted by the National Science Foundation's FIND and GENI program. Internet innovators across the globe are finding ways to bolster information trustworthiness, the validity of information processing and exchange, personal data protection and copyright. Among the new technologies, blockchain technology is being considered with great interest by virtue of its recording of transactions and other activities in a distributed ledger format by which every stakeholder can be held accountable.

Moreover, the Web3 revolution, moving beyond the Web2 version of the internet, is promising to decentralize data governance from big industry players such as Meta, Google, Microsoft, etc., who have benefited from surveillance advertising – a business model based on persistent and invasive data collection. Web3 features decentralized blockchain networks and disaggregated data, allowing users to have independent ownership. As such, blockchain and distributed ledger technologies can help reduce costs while increasing trust, traceability and security. They have huge potential for making social and economic online transactions more secure by guarding against attacks and removing the need for middlemen. Along with the threats associated with a hyper-connected world, there is also the concern of internet sovereignty or the "splinternet" concept. The term "splinternet" has come to denote the co-existence of various internet networks based on different standards and technologies, which would result in the fragmentation of the World Wide Web at a conceptual level. Other terms such as "decoupling" and "bifurcation of the internet" refer to the same idea.

The fact of the matter is that we live in a global economy, and its stability is directly proportionate to our existence. Facilitating today's global trade requires a robust digital infrastructure supported by a thorough understanding of the value of data as well as its collection, storage and analysis. Such understanding will ensure security, business growth and sustainability. Continued improvements in regulatory frameworks by global authorities – with a special focus on the physical development of internet hubs, internet backbone and subsea cables – are a must for the future of the internet.

The new age of the internet will have to include greater democratic accountability, scalability, equitable distribution of power and balanced compliance to the demands of both the market and the people. TR

Will Cloud Take Data Centers Underwater?

Data centers are at the heart of whatever we do online. There are an estimated 8 million data centers globally processing our online activities. Data centers (DCs) provide the computing and storage of incoming as well as outgoing data from IT network traffic and applications. The increase in the use of mobile and related technologies such as Cloud computing has accelerated the growth of DCs to support online activities from internet browsing to various autonomous operations and more.

There are broadly four categories of DCs:

1. Colocation Data Centers are facilities that are rented with the servers managed by clients. The facility owner is responsible for power, cooling, resiliency, security and other environmental support.
2. Managed Service Data Centers are similar to cloud providers but also give users access at the physical server level.
3. Enterprise Data Centers are built and maintained by a single company using its servers. These range from smaller on-premise facilities to multi-level hyperscale centers.
4. Cloud Data Centers are operated by hyperscalers such as Amazon, Microsoft and Google. Clients use them for storage and computing but do not have access to the physical servers. We will mostly focus on the last category in this article.

There is no fixed shape or size of DCs – they may be a tiny single room serving a small organization or massive warehouses processing the data for internet giants such as AWS, Google and Facebook. As data processing machines, they consume huge amounts of energy and are responsible for immense volumes of heat generated from both the running and cooling of the involved equipment. For perspective, DCs consume 10 to 50 times the energy per floor space of a typical commercial office building.

And the processing (and subsequent energy usage) is growing. The global data center market was valued at $187.35 billion in 2020 and is projected to reach $517.17 billion by 2030, at CAGR of 10.5% from 2021 to 2030, according to market research. Combined, global data centers process and manage roughly 2.5 quintillion bytes of data created each

day by individuals and businesses. The DC operations are continually on the run, and they must function as efficiently as possible, ideally with minimal or no outage.

The energy consumption for a typical data center can be divided into around 50% being used by IT equipment, 35% on cooling and HVAC, 10% on electrical infrastructure and support and 5% on lighting. The electrical demand for data centers varies from just a few kilowatts up to many megawatts, depending on the size and location. Data centers contribute around 0.3% to overall carbon emissions, while the entire ICT technology ecosystem accounts for more than 2%. With the global push to achieve net-zero carbon emissions by 2050, data centers are finding ways to decarbonize their operations.

Hence, DCs are looking at a cooling-cost reduction from natural means such as location selection. This is fast joining other important determining factors including security, network proximity, tax incentives, access to renewable energy, etc. Hyperscaler data centers have been located in Arctic regions for effective natural cooling. Moreover, countries with additional renewable electricity, such as Canada, Finland, Sweden, etc., are also being seen as suitable locations for building data centers.

Why Go Underwater?

A start-up cloud provider, Subsea Cloud, is proposing to place servers 3,000m deep into the ocean "to make physical security breaches extremely difficult." As CEO Maxie Reynolds, a marine engineer cum computer scientist turned ethical hacker explained in an industry podcast, "You can't do it with divers. You're going to need some very disruptive equipment. You can't do it with a submarine, they don't go deep enough. So you're going to need a remote operated vehicle (ROV) and those are very trackable. It takes care of a lot of the physical side of security, and what I'm finding is that a lot of military industries want to use these for their physical security." Subsea Cloud has stated that its data centers will support healthcare, finance and the military, and will not use water or electrical cooling.

Other underwater data center projects include China's Highlander and Microsoft's Natick, which use gas-filled vessels in shallow coastal waters at depths of around 120m (400ft).

The concept of an underwater data center began as a way to provide quick cloud services to coastal communities and save overall energy use. Microsoft's Natick project, for example, was tested in the Northern Isles in the Pacific Ocean off the coast of Scotland's Orkney Island. The location's relatively cool waters were perfect for the experiment. The power grids supplying the electricity for these centers can be sourced from solar and wind power, thus aligning with energy-saving objectives. The waters can consistently cool all the immersed equipment without the risk of overheating. Moreover, as has been observed at "lights-out" or unmanned data centers (fully automated facilities that can operate in the dark without onsite staff), the absence of staff can boost reliability. The logic is in making these centers free from human interference and thus eliminating human error from data center maintenance and operations.

Successful underwater data center experiments could pave the way for achieving carbon-negative data center operations in the future. With their potential to be cooled by ocean waters and thus perform with less energy, combined with the use of renewable energy sources for power supplies, underwater data centers could become the ultimate display of faster data processing speeds and heightened security, all at optimal sustainability. TR

Successful underwater data center experiments could pave the way for achieving carbon-negative data center operations in the future

The Power of Private Wireless Networks

Today's enterprises can't help but address the ever-growing pressure on their networks, the result of both streaming videos as well as applications requiring ultra-low latency, capacity, reliability and, above all, robust security. To achieve optimum business function, enterprises have the option of setting up private mobile networks to address these challenges efficiently.

Conversely, public 5G networks that support 5G-enabled devices have limited coverage, and their bandwidth may be used by millions. This makes them vulnerable to disruptions as the control over the network, even within the perimeter, could be compromised. On the other hand, private mobile network infrastructure is used exclusively by devices authorized by the end-user organization. The network locations are themselves owned or occupied by the end-user organization to deliver targeted coverage, capacity and other capabilities. Devices that are registered on public mobile networks will not work on the private network except where specifically authorized. Private 5G networks are best suited for mission-critical applications that demand seamless low-latency data transfers. The advantages of private 5G will also bring significant transformations in areas such as e-agriculture, smart buildings and smart cities, etc.

Additionally, satellite and cellular technologies are evolving to improve performance and reduce costs, enabling new deployment possibilities for enterprise private networks in remote areas, including the energy, mining and transportation sectors. As the cost of launching satellites continues to fall, low-earth orbit (LEO) satellites promise to further reduce latency to between 70-100 msec while providing capacity reaching into the terabits per second. Such developments reinforce the potential of private networks to heavy lift the various enterprise requirements.

In May, Nokia announced the expansion of its private wireless ecosystem with newly added capabilities and collaborations that would advance

the digital transformation of more industries. Indeed, Nokia offers a comprehensive private wireless portfolio to allow such transformation. This includes the Nokia Digital Automated Cloud (DAC) end-to-end industry-grade application platform, Modular Private Wireless (MPW), MX Industrial Edge, the Nokia Industrial portfolio of ruggedized 4G and 5G devices, as well as applications for seamless data management.

Last year, Ericsson built the first commercial dedicated network in Russia for Polymetal, one of the world's largest producers of gold and silver. Ericsson brings a complete portfolio of products and solutions for LTE / 5G dedicated networks in all frequency bands, expertise in deploying networks for the needs of enterprises from different sectors and an extensive global network of industrial partners.

Similarly, Huawei has been lending its private network expertise for edge interconnection, robust campus networks, and customized network slicing for varied services and thus accelerating 5G development and industrial digitalization across global markets.

Even the hyperscalers are testing the private network waters already. Amazon's cloud division AWS has launched a new service designed to help companies deploy their own private 5G networks. AWS's US customers in the East and West regions can now avail of the services, albeit on 4GLTE for the time being. AWS Private 5G will provide the hardware (a radio unit) and special SIM cards as well as all the necessary software and APIs (application programming interfaces) to help businesses to set up their own private mobile networks on-site. Additionally, their AWS Management Console allows users to specify their network location and capacity, with AWS automating the network setup and deployment once the customer has activated their small-cell radio units.

Growth Prospect

The global private 5G networks' market size was estimated at $554.61 million in 2021 and is projected to reach $3,044.48 million by 2028, at a CAGR of 27.54% during the forecast period. "The whole business case of enterprise building on private networks is driven by self-designed, service level agreement (SLAs) cost structure, as spectrum is not a public-shared resource anymore, in addition to offering cellular-grade security and data sovereignty with data ideally not leaving the premises," says Neil Shah, Vice President of Research, Counterpoint Research.

In the UAE, Nokia and Etisalat UAE have signed an agreement to deploy 5G private wireless networks to support enterprises across Abu Dhabi. The two companies will work together to support businesses in various industries including ports, oil and gas, government and critical infrastructure by digitally transforming their operations and embracing Industry 4.0 through 5G use cases.

"We are committed to supporting the government's vision to accelerate the digital transformation of businesses so they can capture emerging opportunities. This collaboration with our long-term partner Nokia is in line with this vision and will provide our customers with best-in-class solutions. 5G private wireless networks will allow them to boost productivity, enhance operational efficiency, and grow revenue while improving customer experience," states Khalid Murshed, Chief Technology and Information Officer at Etisalat UAE.

Deployment Headwinds

However, setting up private mobile network deployments is easier said than done. Enterprises may have to invest considerable time, money and effort to design their network for anticipated peak capacity. Even procuring and integrating software and hardware components from multiple vendors can be demanding. However, considerable advances are being made when it comes to efficient regulation of enterprise private networks, including availability of spectrum across geographies, device and network equipment, detailed information on use cases from different industry verticals, as the momentum of digital transformation only seems to be accelerating.

5G is better suited than LTE for MNOs seeking to penetrate the enterprise market because 5G is more flexible than LTE in distributing network functions. We all know that the 5G ecosystem for enterprises is being developed with 4GLTE to suit price points. However, sooner or later, the 5G cost structure will be competitive with today's LTE prices. Enterprises need to evaluate the private mobile network pricing models to understand the options that best suit their budgets.

5G will undoubtedly bring significant contributions to the development of Industry 4.0 and strengthen the competitiveness of enterprises globally. MNOs must train their resources – IT, human talents and capital – to innovate private networks and increase their revenue-earning capacity with 5G technologies and its diverse use cases. TR

Plotting 5G Monetization Opportunities

Whenever we think about 5G, we normally associate it with mobile phones with better connectivity, higher data rates and enhanced customer experience. As much as this is true, it is not the only area where 5G is generating excitement among its believers. 5G use cases are set to encompass sectors ranging from manufacturing, automotive and education to entertainment, whereby services such as remote medical assistance or even long-distance, real-time guitar lessons in high definition could become a reality.

5G use cases are many and varied, but turning them into a viable business strategy warrants planning and proactive action to both understand and maximize the technology's potential.

Looking at it growth-wise, about 70 million new 5G subscriptions were added globally during the second financial quarter (April, May, and June) of 2022, taking the total number of 5G subscriptions to 690 million, according to the latest Ericsson Mobility Report.

To address 5G use cases and deliver the full of 5G, CSPs must evolve their business support systems (BSS) together with their 5G implementation, or trail behind in the quest for profitable 5Gservices. As is the case, 5G deployments are capital-intensive operations, and telcos must find innovative ways to reap the benefits of their investments in 5G connectivity.

Here are some areas that telcos should consider to generate revenue beyond their traditional income routes.

Elevating Industry 4.0

The 4IR technology is transforming how the global production and supply chain network operates through automation, using smart technology, extensive machine-to-machine communication (M2M) and the internet of things (IoT). This integration results in increasing automation, improving communication and self-monitoring, and utilizing AI that can analyze and diagnose issues without the need for human intervention. As an example, operators can provide services such as Edge-as-a-Service as a managed edge computing platform to give enterprises the ability to quickly deploy, manage and monitor applications closer to the edge, as an integrated solution that accelerates business process automation. The near-zero latency for enterprise applications can support cost optimization and enhance end-user experiences in a protected environment for multiple industries, including manufacturing, retail, logistics and entertainment. Various 5G-enabled capabilities such as network slicing, network automation, edge cloud, Massive Internet of Things (mIoT), etc., can be leveraged to provide the efficiency needed to drive productivity in industries.

Gaming, Entertainment & Work

5G enables enhanced mobile broadband (eMBB) that can deliver high bandwidth and speeds of up to 10 gigabytes per second to enable ultra-high-definition video and data volumes. High-speed mobile broadband enables applications that require rich data transfer in both upstream and downstream directions, like virtual reality and extended reality (XR). Investing in gaming platforms will not only benefit the telcos but also support various communities of content creators and solution providers in the ICT ecosystem. The global gaming market is projected to reach $435 billion by 2028. Meanwhile, the growing remote work culture and substantial demand for over-the-top (OTT) content are contributing to the uptake at the edge of the network. Further, 5G core empowers telcos to offer flexible plans that allow customers to make on-demand consumption to upgrade network performance. With 5G, operators can also introduce business pack plans, which feature premium network conditions around the clock.

Cross-industry Collaborations

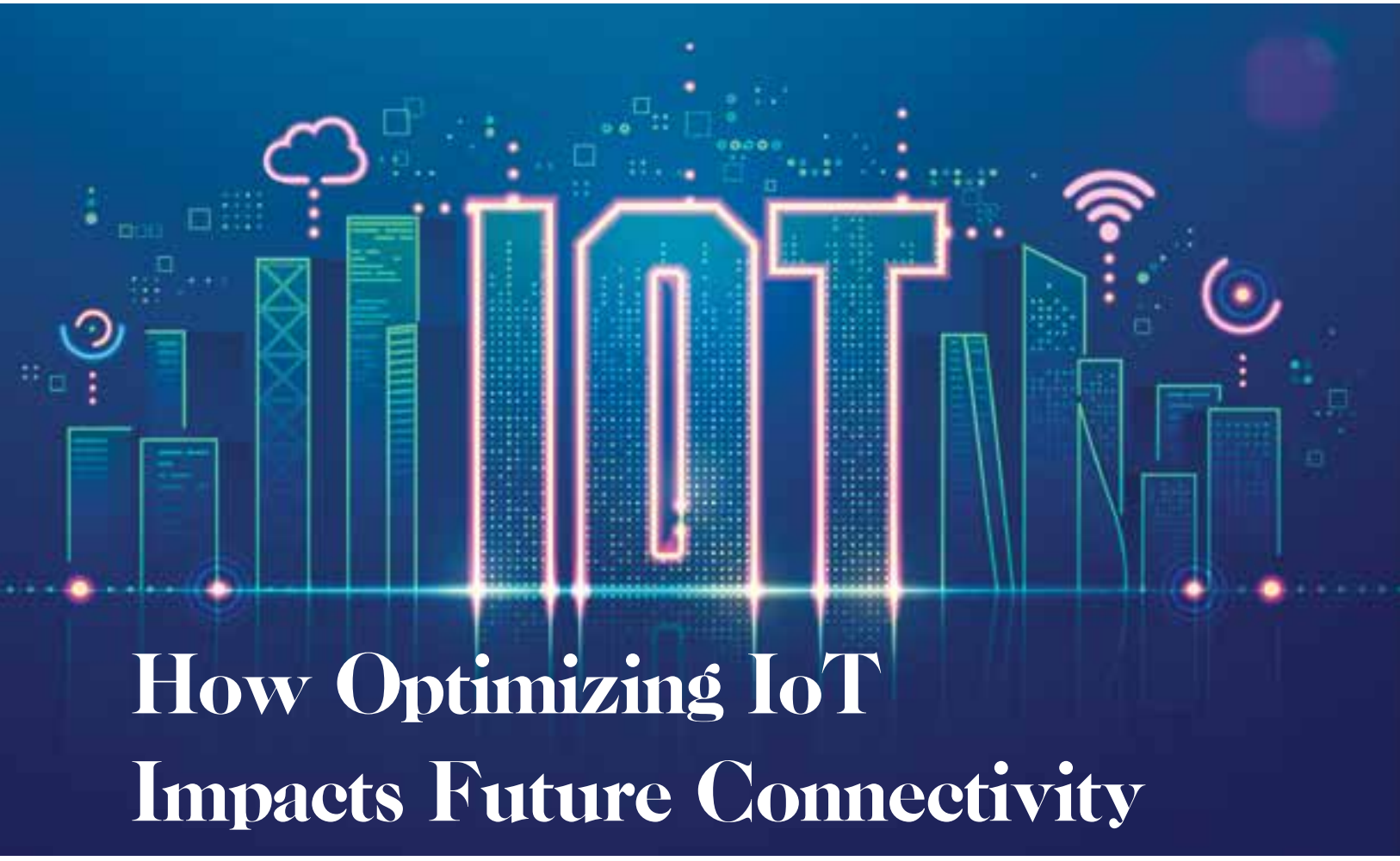
Digital transformation is touching every sector in the global market. Rather than creating a vertical 5G applications for each sector themselves, telcos can develop strong cross-industry partnerships and benefit from the value generated from new use cases. For instance, telcos can provide a 5G campus network with mobile edge core solutions that will provide uninterrupted high-speed connectivity and massive bandwidth to enhance the high-precision quality control needed in specific operations – be it in automotive, oil and gas, finance, manufacturing, healthcare, etc. Additionally, investing in intelligent networking processes will allow telcos to stream additional revenue from the value-added services provided by other industries to their customers. Telcos can even benefit from collaborative operations to provide robust networks that will offer reliable, low-latency internet connectivity services through highly resilient, diverse routes in the market, even across borders.

Marketing Offers

The technological advancements provided by 5G may be most resounding to those directly involved with its development; however, some barriers to its quicker adoption remain. One such prevalent issue is that with 5G, consumer awareness of its promise is relatively low despite prominent players rolling out their offers and sounding the call. What will be required is a comprehensive framework and business support system that can bring strategic partners together, set up offerings, bundle and deliver services to the target audience and apply a revenue share across the partner ecosystem. Telcos can jointly market their offerings through coordinated co-innovation, collaborative sales strategies and business development. By creating highly personalized and targeted offers, highlighting "experiences" as opposed to connectivity and pursuing B2B2C partnerships, telcos have the potential to triple or even quadruple gains, as per industry experts.

To best monetize the opportunities presented by the global 5G rollout – which is estimated to generate $13.2 trillion in global economic value by 2035 – telcos must invest in optimizing their network technology and enhance existing strategies for future customer and partner relationships. TR

> "5G deployments are capital-intensive operations, and telcos must find innovative ways to reap the benefits of their investments in 5G connectivity"



How Optimizing IoT Impacts Future Connectivity

The Internet of Things (IoT) is undoubtedly one of the largest enablers of digital transformation. It serves as the convergence of several technologies within the Industry 4.0 era, like artificial intelligence, cloud computing and wireless networks.

The IoT industry encompasses mass connectivity and transparency and, through these processes, generates huge amounts of data. It is very heterogeneous by nature, with applications existing in many industry verticals. More competitive than ever, its development of cross-industry solutions brings conventional industries and players together with cutting-edge access.

New IoT applications have emerged with 5G, a growth that will continue further with 6G and subsequent wireless generations, requiring more flexibility across protocols. Hence, it is imperative that the whole of the industry agrees on designing and deploying IoT applications sustainably and in the best interests of telco operators, end users and the entire supply chain.

With the internet being the most effective invention of modern times, connecting billions of people and devices throughout the world in an instant, we are witnessing today a digital social revolution. This new epoch involves a vast network of wireless objects, equipped with sensors and actuators, interacting seamlessly while utilizing readily available wireless infrastructure.

Protocol Enhancements

The hyper-connectivity of IoT devices extends to modern everyday "things", such as industrial robots, connected cars, smart homes and intelligent healthcare, to name a few. Despite the undeniable benefits that IoT offers, several key factors are needed for its sustainability. These include adequate and affordable wireless connectivity, interoperability and common standards.

The IoT ecosystems' design must focus on security, reliability, scalability,

latency and the level of individual control on connectivity parameters. Put simply, the current design of telecom networks operates on the principle of packet forwarding between devices and network nodes to fulfill data or content requests from both ends. Yet current network protocols, such as TCP/IP, are no longer efficient in terms of performance or energy consumption.

Improvements in new IP protocols must continue through an advanced packet structure that includes flexible and expandable addressing, services with different quality-of-service (QoS) specifications, service accountability, security and support for both IPv4 and IPv6 addresses.

The focus on IoT routing in the network layer is very important in wireless sensor nodes (WSN) as it can determine the best network path and transmission mode of data with most sensor nodes having limited energy. This will increase the network lifetime by maximizing energy utilization.

WSNs communicate with the internet and different applications through the IEEE 802.15.4 standard for low-rate wireless personal area networks (LRWPANs) implemented on IPv6. As a result, a huge number of applications communicate seamlessly.

By default, standards within IoT are best suited for static routing, making the implementation of mobility routing challenging. Single metric routing protocols are not able to handle the overwhelmingly higher growth of IoT routing demands.

Nodes participating in IoT communication allow different applications to have varying requirements, from static devices to mobile devices and even from energy-constrained to battery-operated devices.

Due to the ever-growing extent of IoT, 6LoWPAN, which stands for "Internet Protocol version 6 over Low-power Wireless Area Network," is one of the potential technologies to support a large number of IoT devices with low power consumption. It designs an adaptation layer under the network layer to compress the IPv6 header and, at the same time, dramatically increases the demands on storage and computation resources.

To maximize the functionality of domestic and corporate IoT networks, IPv6 can be utilized as the modern standard of wireless network data transmission.

Every node of a 6LoWPAN protocol has its own IPv6 address, which means devices can directly connect to the internet using open standard IoT protocols like HTTP, UDP, CoAP and MQTT.

Big Tech has already begun paving the way for 6LoWPAN to become the standard wireless networking protocol across devices. By expanding the breadth of device-to-application solutions with IPv6, the IoT market is also broadened to include internet-based standards, which are required in use cases like smart electricity metering and smart manufacturing.

The new IPv6 adaptation layer also facilitates and accelerates the development of secure and interoperable applications over LoRaWAN, a LoPWAN protocol designed to connect battery-operated "things" to the internet in regional, national or global networks. IP-based solutions can also be integrated with cloud infrastructures, saving time and costs.

Optimizing IoT Devices

Optimization is a powerful tool in virtually every discipline, leading to a rigorous, systematic method for zeroing in on the most innovative, cost-effective solutions. This is highly applicable within the IoT for improving traffic management and operating efficiency while conserving energy and reducing latency, etc.

GSMA has given the context that for IoT applications, devices typically need to communicate with a specific set of servers only. To limit any potential threat, it is therefore good security practice to restrict a device's communication with other servers. Such restrictions could be implemented using a whitelist of IP addresses or URLs.

An AWS solutions architect has stated that for a high-level sustainable IoT architecture, the following main capabilities should be present: remote device management; over-the-air (OTA) updates; and cloud service integration to access further processing capabilities while ensuring the security of devices and data, either at rest or in motion.

Generally, IoT devices are designed to stably and reliably serve one predefined purpose and are equipped for peak resource usage. But as they become more advanced, the interoperability aspect comes into play, and IoT devices should remain lean, efficient and durable to be used flexibly in the long run.

A smaller resource footprint and more efficient software allow organizations to improve operational efficiency, realizing a positive impact on emissions by minimizing a device's carbon footprint throughout its lifecycle.

Moreover, extensive design and testing throughout all stages of the IoT development process will help ensure the IoT device will meet design expectations for the target operating environment. Understanding how an IoT device spends its power when operating in real-world conditions is also critical for optimization. Correlating the device's current consumption to a specific RF event makes it easier to identify which subsystems or events must be maximized.

A final important thing to consider is the capability of different wireless standards and applications to share the same frequency bands. Standards-based traffic, intensive use of spectrum and high-density device deployments can all cause unavoidable interference. Experts recommend coexistence testing on the IoT device to ensure its robustness and capacity to work with consistent and predictable performance at any time. TR

etisalat by e& Says New 'Business Pro' Will Empower Businesses

Etisalat UAE, branded as etisalat by e&, has launched the all-new business proposition "Business Pro" that aims to meet the digital needs of businesses through facilitating office, remote and hybrid working.

Business Pro offers the next generation of internet solutions that are holistically designed to deliver high-speed internet based on the size of the workforce as well as user-specific benefits. The proposition is an all-in-one solution crafted to ensure complete business mobility by equipping each employee to work remotely or in a hybrid working environment. Employees will have access to user packs comprising a host of collaborative communication, productivity and security tools.

Commenting on the launch, Esam Mahmoud, senior vice president, SMB, etisalat by e&, said, "Businesses undergoing a digital transformation are constantly looking at how they can add more value to their customers. Business Pro is an evolution of the previous customer propositions where we've built in more benefits at the same cost. The launch of the next generation of internet solutions is part of etisalat by e&'s continuous efforts to empower businesses with scalable and advanced solutions, thereby growing their business, managing costs optimally and increasing revenue."

Business Pro enables office, remote and hybrid working models and is built based on the number of users in the business. The benefits for both businesses and employees include high-speed internet, firewall, managed devices, landline-on-the-go, website builder and other benefits to boost business productivity and optimize operations.

e& Joins Formula 1 Etihad Airways Abu Dhabi Grand Prix as Founding Partner

e&, formerly known as Etisalat Group, announced a multi-year strategic partnership with Abu Dhabi Motorsports Management as a founding partner of the Formula 1 Etihad Airways Abu Dhabi Grand Prix, the biggest sporting event in the Middle East that brings the best in entertainment and digital experiences for residents and motorsport enthusiasts alike.

As a founding partner for the signature event, e& will work closely with Abu Dhabi Motorsports Management and Formula 1® in driving consumer engagement with digital experiences.

Since e&'s global transformation to a technology and investment conglomerate earlier this year, the company has continued its journey with steady progress in creating innovative solutions using next-generation technologies. This has created limitless possibilities built on connections, connectivity and collaboration. Through its specialized business pillars, the group continues to bring more power, freedom and joy to its customers, delivering technology solutions that create and enable platforms for smart connectivity, holistic digital experiences and entertainment.

e& Group CEO Hatem Dowidar said, "These are exciting times for us and we are delighted to partner with the Formula 1 Etihad Airways Abu Dhabi Grand Prix, the season finale and world-renowned motorsports event that brings the best of global sport and entertainment to UAE. Our multi-year strategic partnership with such a premium global brand offers us multiple opportunities to not only build new relationships and enhance customer experiences but also to seal our brand positioning as the global technology and investment conglomerate that digitally empowers societies."

"Today, the country is a global destination of sports; given the world-class facilities and diverse landscape, the UAE and the Emirate of Abu Dhabi will be more prevalent on the world's sporting calendar. We are proud to be part of this global show alongside other reputed global brands, a next-generation, technology-driven sport appealing to a broad and ever-growing audience that resonates with the values of e& and its ambitions of transforming into a global technology and investment conglomerate. The event will give us an opportunity to explore possibilities that will elevate the visitor experience in the most innovative way at Formula 1 Etihad Airways Abu Dhabi Grand Prix," added Dowidar.

Abu Dhabi Motorsports Management CEO Saif Al Noaimi said, "We are proud and honored to announce e& as a founding partner to the Formula 1 Etihad Airways Abu Dhabi Grand Prix. Having the world's eyes on Abu Dhabi during Race Week provides e& an excellent platform for the brand to tell its global transformation story, as it grows and evolves. The 14th edition of the Abu Dhabi Grand Prix promises to be a fantastic event, with exceptional demand following last year's record-breaking race weekend; we look forward to welcoming thousands of global F1 fans to Yas Island and Abu Dhabi, [and] we will once again create some unforgettable memories for visitors from around the world in front of our biggest ever crowds. We look forward to e& joining us on that journey."

du Redefines Fire Safety Experience in the UAE Using IoT

In a bid to make the United Arab Emirates (UAE) the safest country in the world, du, part of Emirates Integrated Telecommunications Company (EITC), and Injazat have selected Software AG's Cumulocity IoT platform for the Ministry of Interior's "Hassantuk" system to speed up response time and maintain the highest standards of fire safety.

With the upgraded platform, buildings and properties will continue to be monitored for smoke and fire detection 24/7. This is in keeping with the country's smart city initiatives, which incorporate public safety, building protection and citizen-centric experiences to enhance both safety and quality of life in the country.

The newly enhanced solution connects more than 25,000 buildings to the Hassantuk Alarm Receiving Center (ARC) via the Alarm Transmission Equipment (ATE), which is installed in all the buildings. In the event of a fire or a life-threatening event, the ATE will immediately send the alarm to the Hassantuk IoT platform, which will provide all the communication to the Hassantuk Command and Control Center, enabling them to act and pass it on to the Civil Defense Command and Control Center if required. The system will strengthen emergency response and management, providing added protection to lives, property and the environment in the country.

Hassantuk General Manager Ayman Alsebeyi stated, "In our continued work to optimize emergency response capabilities, we are delighted to partner with advanced technology solution providers, du and Software AG, who share a common vision of driving the highest levels of prevention, safety and emergency readiness across the nation, in line with international best practices, making UAE one of the safest countries in the world."

du Chief ICT Officer Martin Tarr added, "du has been at the forefront of accelerating progress and driving the digital transformation of industries. IoT is enabling vital advancements for industry-wide security, including fire safety, and the Software AG IoT platform takes this protection to the next level. With advanced products and cutting-edge technology, du demonstrates a sustainable commitment to supporting the public sector in protecting people and contributes to the technological advancement in the fire safety industry in the UAE.

Ooredoo Oman Continues to Expand ICT Capabilities

Continuing to strengthen and expand its ICT capabilities, Ooredoo has signed a strategic partnership with Starlink for the distribution of co-branded ICT solutions across Oman.

Under the partnership, both parties will collaborate to provide a host of smart technology solutions including connectivity, hardware, software, implementation and managed services to B2B customers in Oman.

This is the latest in a series of partnerships Ooredoo has entered into, as it seeks to harness technological innovation and transform businesses while contributing to Oman's digital development.

Sultan Ahmed Al Wahaibi, chief business and wholesale officer at Ooredoo, said, "In line with our strategy, we have been investing heavily to position Ooredoo as a prominent ICT player and building resilience across people, process and technology. By partnering with Starlink, we are leveraging each other's vast experience across many areas of expertise. Together, we are offering world-class solutions and services that have the potential to play an integral role in enabling organizations – of whatever size and sector – to drive their digital transformation and unlock new competencies and value propositions, all with the excellent customer experience they have come to expect from Ooredoo."

Starlink CEO Munera Al-Dosari added, "As the latest in an extensive list of partnerships that extends across the region, our collaboration with Ooredoo represents the beginning of a strategic alignment that has the potential to open new doors for Oman's tech industry. With our ICT expertise and Ooredoo's leadership in the communications sector, we will be able to deliver innovative and value-added solutions that both empower customers to fulfill their business objectives and accelerate their digital transformation."

Starlink is part of the Ooredoo Group of companies, established in 2006. Beginning as the first retailer for mobile and accessories, they have since branched out to become one of the largest outsource-managed services providers in multiple areas such as IT, installations, maintenance and contact centers.

As a data experience leader, Ooredoo continues to offer businesses smart solutions to enhance their IT infrastructure while keeping them connected, working and engaged every day. Capitalizing on its seamless network and customer-centric approach, its innovative products include cloud services, video conferencing, email collaboration suite, cloud storage and contact center solutions. Serving customers across a multitude of economic sectors, the company's tailored solutions are shaped to transform businesses of all sizes to help them achieve growth and contribute to Oman's development.

Digital Transformation: An Evolving Journey

In the recently concluded webinar hosted by Telecom Review, industry experts convened to make an intensive discussion on digital transformation.

Entitled "Outcomes of Digital Transformation: Ongoing Mission and Vision," the session involved the participation of Karim Benkirane, chief commercial officer, du; Danial Mausoof, head of sales for mobile networks in the Middle East and Africa, Nokia; Yahia Sefraoui, director of digital transformation, inwi; Dr. Abdulhadi Mahmoud AbouAlmal, director of technology standardization & spectrum management, etisalat by e&; with Amitoj Arya, partner, telecom consulting, MENA, EY as the panel moderator.

Kickstarting the discourse, Arya addressed the panelists regarding the journey of digital transformation over the years and its key drivers. He asked them, "From your perspective, how did this journey evolve and what would it mean to us for the next three to five years?"

Going Digital for Customers

Benkirane mentioned that the digital transformation journey was tough for the telecom industry. Despite that, he believes that they have demonstrated the capability to empower customers. "This is the digital transformation from my view — putting an app in the hands of the customer to better understand what they're buying and get access to various functionalities. Through this, we change and simplify the life of customers in general."

He explained that there had been challenges to upskill people and change the usual waterfall approach to operations and collaboration between business, IT and other stakeholders.

From a Moroccan point of view, the digital transformation journey started out as a business prospect where companies were pushing it as opposed to a demand coming from the customers. However, there has been a shift as it has become the "means to adapt to an ever-changing environment."

Customer behaviors have dramatically changed. "For instance, if we put out a self-care application or any digital offer on websites, we are getting compared systematically to digital-native companies," Sefraoui pointed out. With this in mind, digital becomes a matter of survival. "Today, we're not going to survive as an industry if we don't adapt to the new behaviors and requirements coming from the customers," he firmly expressed.

Indeed, there are a number of challenges that cannot be ignored, but the key

is having the commitment toward cultural innovation in the market and building the capabilities that will enable digital transformation for societal and economic benefits.

e&'s major role in empowering customers' digital experience within Expo 2020 is a testimony of this commitment.

"By improving the customer experience, we will enable the sort of experience and interaction wherever they are. This will continue to be one of our major focuses, supported by the strategic partnerships we have across market players like telcos, hyperscalers and OTTs. We may compete in other areas, but we collaborate for the benefit of all," Dr. AbouAlmal expounded.

Where Transformation is Happening
"There are many drivers pushing digital transformation, but it's all changed now," said Mausoof. He emphasized that the main driver is unpredictability, seen from the impact of COVID-19 and the changing geopolitical situation. "This comes from everywhere and we need to respond quickly from this."

Elements of the supply chain are also changing, coupled with high energy demands, pushing people to actually start acting on sustainability.

Nokia has transformed its internal operations as well as managed services for many of its partner operators. Algorithms are already used for years to enhance network performance. Moving to the next stage, they have delved into the convergence of AI, automation and analytics, "using the network data to ultimately improve network performance, improving the productivity of the people running the operations and producing best-in-class customer experience."

Aside from customers being a core driver of digital transformation, the rapid adoption of data and analytics, among other technologies, also requires a lot of agility and flexibility.

"It's not anymore about digital transformation; it's about transforming experience," Dr. AbouAlmal construed.

This transformation journey started many years back but was accelerated by COVID-19. Since the pandemic hit, digital transformation has become a part of our lifestyle, accommodating dynamic needs and requirements.

e&'s massive transformation shows how Etisalat is planning to grow not only as a telecom operator, but as a digital and technology provider. "It's part of our continuous efforts in promoting inclusive digital culture, bringing the community where we operate closer together."

What Lies Ahead
"I believe that in the future, we will have a good foundation as an industry to take the lead and move on — from the tools, new way of working, people and technology," concluded Benkirane. In the next three to five years, the whole industrial automation will also play a big part. The role of connectivity across industries becomes more essential, especially when we look at the demand for private wireless and 5G. There's a plethora of use cases that need to be developed for mobile operators to drive sustainable improvements.

"For us, we will continue to support mobile network operators to improve their operations and impact the customer experience," told Mausoof.

Sefraoui believes that in the coming years, the clients will continue raising the bar of their expectations to operators. Also, in markets like Morocco, we will see "strength in the hybrid model where digital will interlock strongly with our traditional business, pushing for an omnichannel experience." Altogether, digital transformation has become more of a reality, and all parties are committed to contributing to the growth of the digital economy.

Responding to how Nokia is enabling its customers – MNOs and CSPs on their digital transformation journey, Danial Mausoof felt that every digital transformation journey is unique. He said that operational synergies of traditional CSPs or MNOs involved a lot of manual operation in their service centers but now it had moved to a more autonomous operational model with some tools and platforms that support building and enabling performance-related data outcomes. He cited examples of tools such as orchestrating, and self-organized networks to ensure the operational part of the networks running optimally.

He said that Nokia has been working with operators across the Middle East and Africa and globally to enable them to become digital service providers that are more cognitive and making sure that it is self-learning, more than autonomous and more cognitive, and building into an ecosystem area.

"Another element is that now there are many options of technology available and various challenges arise at the basic level of connectivity, especially in the enterprises' segment. There are private networks, edge computing, 5G standalone networks, and so on, and for us, the key area of focus is on building the capabilities and operational environment through the network," he said.

The moderator then asked Karim Benkirane, chief commercial officer, du, about what has usually worked better for its organization: re-imagining what the future looks like, embarking on a greenfield transformation, or looking at multiple steps of transformation to get to an end state. He stated that the greenfield was a bold decision from du, "ten years ago it was just a website upgraded from Web1 to Web3. Now it's all about metaverse and the other technologies that can support this new trend of Web3."

He mentioned also that after a full evaluation, the current IT ecosystem of the company was unable to support or drive this new phase, so it decided to build a new IT OSS and BSS, in addition to a recruitment process.

"It's a journey, you cannot start migrating all your customers into the new housing with the same people who are really busy with operations. So, we took the approach to hire additional gurus and make sure that they can support the existing team and that they can redesign the future of the company."

He also mentioned that the way of working has been upgraded to make sure that it will be a successful and smooth journey. The other dimension of the transformation is the selection of new vendors, raising the expectations, and getting better outcomes "When you bring new partners, new vendors, it's like bringing different cultures, different ways of working, different approaches, and different tools."

Karim echoed the intervention of Yehia about the vision and highlighted that "the organization needs to understand why the vision is very important, what are our KPIs and how we will measure our success." He added, "we are still in the middle of the journey and it's a long one. We are trying to build a new ecosystem and we cannot wait five years to measure the success of our greenfield program, so it has to be a short mid and long-term KPIs."

e& has gone through a massive re-branding, separation of entities. In this context, the moderator, Amitoj Arya, asked Dr. Dr. Abdulhadi Mahmoud AbouAlmal, director of technology standardization & spectrum management, etisalat by e&, how is digital transformation expected to accelerate the growth of some of the new entities "The journey of digital transformation is to grow and excel in a number of areas rather than just connectivity," he said

The importance of connectivity is increasing, and this is where telcos have the advantage. e&'s journey is going to build on the company's abilities and strengths while solidifying partnerships with other parties.

Its rebranding earlier this year is guided by the vision of going beyond connectivity. "With a customer-centric type of vision and strategy, we have to keep in mind how we can get our customers into an omnichannel form of experience and solutions — across all platforms. We need to make sure that our services are delivered for a unique digital experience," explained Dr. AbouAlmal.

He highlighted that one of the major differences between shifting the approach from digital to traditional is the types of services and solutions. It now requires automation to build the intelligence in end-to-end operations.

"That becomes a differentiator today, with AI embedded in a number of our activities, operations and technologies," said the director.

Arya's next question was addressed to Sefraoui, to discuss how inwi, being at the forefront when it comes to a digital service provider, is transforming to latch on future opportunities.

According to Sefraoui, inwi has been through a very interesting journey so far with the fully digital service offering bringing a lot of learnings to the company. Yet, what is vital is to keep on disrupting to stay at the forefront.

The main advantage of bringing such digital offering is the level of personalization proposed, which is not present in more traditional channels.

"If we are to continue being serious about this path, we will need to strengthen even further the customer research base on which we act. We have adopted so far a lot of ways of work that help us integrate the feedback from the clients within the way we develop such as agile thinking," says Sefraoui.

The opportunity inwi has with 'digital' is the ability to test new things in a fast way and adapt to them.

"Another dimension which is very important going forward with digital is having a high quality state-of-the-art client service," added Sefraoui.

According to him, going beyond the 100% digital offering, figuring out how digital truly interlocks and is intertwined with the rest of the business is also key.

Finally, Sefraoui concluded that the last thing which is going to differentiate inwi in the market is its operation model. inwi has to make sure it keeps its operation model well-structured through agility and flexibility, to be able to adapt to the challenges and changes coming their way.

Responding to what the "secret sauce" for successful digital transformation was for the panelists, Karim Benkirane felt that digital native companies, the risk appetite of the organization, and the culture of the company were the key success factors. Yahia Sefraoui opined that the total involvement of the top management in the digital transformation strategy was of utmost importance. Meanwhile, Dr. Abdulhadi Mahmoud AbouAlmal felt that the culture more than the technology was a critical aspect of digital transformation. "We need to believe what we're doing. That's really what we're going to have a difference in." He stressed that right from the technicians on the field to the top management, the vision of the transformation should be completely aligned. "When we are doing this sort of culture transformation, we need to make sure that our technologies and tools are correctly implemented, our infrastructure and KPIs are properly set to achieve the targets," he explained. TR

> Digital transformation has become more of a reality, and all parties are committed to contributing to the growth of the digital economy

Enthusiasm Is Rising for the Telecom Review Leaders' Summit

The Telecom Review Leaders' Summit is just three months away, and everyone in the industry is excited to see what this huge annual event will bring to the table.

Under its new theme "Global, Regional, Digital," Telecom Review Leaders' Summit this year heeded the call of its partners and expanded the Summit into a two-day event at the Intercontinental Hotel, Dubai Festival City, UAE, to accommodate more high-level speakers and diverse quality content.

On December 7 and 8, the 16th edition of the Telecom Review Leaders' Summit will tackle the industry's latest trends and developments, including:

- The Role of ICT Leaders in Shaping Digital Economies
- The Future of Technology: 6G, Metaverse, New Generation of Chipsets and Digital Inclusion
- The Importance of Incorporating Sustainability in Telcos' Strategies
- The Best Cybersecurity Models
- The Importance of Data Regulations and Policies
- Boosting Network Performance: The Role of Wholesale and the Capacity Industry
- The Potion for the Right Infrastructure Deployment
- Digitalization of the Content Industry
- Telcos Embracing the Importance of Network Automation
- The Influencing Role of Women in the ICT Sector
- The Role of Low Orbit Satellites in Accelerating Digital Transformation

This year also, the Summit will be hybrid, which will allow panelists and participants to join the discussion from anywhere in the world and participate virtually.

In addition to in-depth panel discussions, attendees will gather in a friendly networking environment. Exhibitors in the demonstration area will also showcase their innovative solutions and meet with participating industry leaders and experts.

On the evening of December 8th, the traditional and highly anticipated Telecom Review Excellence Awards ceremony and gala dinner will be held to recognize ICT brands and industry leaders for accomplishments made during the past year.

Through its prestigious awards, Telecom Review, together with an independent panel of judges, continues its dedication and commitment to the ICT industry in honoring the best of the best in corporate innovation and performance as well as individual capabilities and contributions as influential players globally.

Many nominations have been received to date, so make sure to keep the flow going and give your brand a chance to be recognized! All details for completing nominations in addition to the complete list of awards can be found online. This year's categories represent our industry and its direction, so please be sure and nominate your brand.

Expect the unexpected at the 16th edition of Telecom Review Leaders' Summit.

This is your chance to witness one of the best editions so far. TR

Striding Towards the Intelligent World — Data Storage White Paper

The Striding Towards the Intelligent World — Data Storage white paper presents Huawei's outlook for the storage evolution in enterprise data centers. Covering 9 topics, it provides enterprise customers with recommendations on data infrastructure development to jointly foster the data storage industry.

Unstructured data accounts for more than 80% of new enterprise data and is increasingly important to production and decision-making. It is necessary for enterprise IT teams to transform their structured data-centric capabilities to design, planning, and management of mass unstructured data.

Diverse data applications such as distributed databases, big data analytics, and AI are booming. Enterprises are encouraged to use the decoupled storage-compute architecture to serve emerging data applications for higher reliability.

All-flash storage accounts for more than 50% of the primary storage market, and the era of inclusive flash storage is coming. Huawei recommends that enterprises seize storage replacement and deployment opportunities to accelerate the adoption of all-flash storage.

Ransomware attacks are becoming the most significant threat to enterprises. Their storage teams are advised to establish a more comprehensive data protection system and build an all-round ransomware protection storage solution to strengthen the last line of defense for data protection.

As data is becoming the core asset for enterprises, digital resilience is a major metric for any enterprise resilience framework. Enterprises should strengthen data protection to ensure zero data leakage, tampering, and loss, always-on services, and always compliant access, thus enhancing digital resilience.

From management to products, AI powers autonomous-driving storage throughout the data lifecycle. It is recommended that enterprises proactively develop evaluation criteria for storage AI management software, and storage management teams upgrade tech stacks for storage AI.

As multicloud becomes the new normal, the recommended practice is to migrate innovative services that have uncertainties and emerging services like OA to public clouds, while retaining core services in their on-premises data centers. In multi-cloud construction, enterprises are advised to use the IT architecture that centrally stores and shares data and deploys applications in multiple clouds, and plan a unified data management platform across clouds to maximize data sharing.

A flexible storage business model helps handle explosive data volumes and economic uncertainties. Huawei recommends that enterprises plan how to obtain IT resources and select the most appropriate business model according to business requirements and future strategies.

Green data storage is a must for data centers to reach net-zero carbon emissions. Enterprises can deploy storage products with high-density designs, system convergence, and efficient data reduction to further reduce data center energy consumption.

Nokia Unveils SaaS-Based Charging Solution for 5G

Taking its Software As Service (SaaS) offering a notch up, Nokia has unveiled AVA Charging, which aims to support communication service providers (CSPs) and enterprises to expedite monetization of new 5G and IoT use cases, using on-demand software through a subscription-based model.

Nokia AVA Charging provides "Intelligence Everywhere" through AI, machine learning, no code configuration, open APIs, multi-cloud orchestration and digital ecosystems that are highly scalable, supporting environments in excess of 150 million subscribers. CSPs can use the service to monetize consumer services like cloud gaming, as well as enterprise services for vertical markets including utilities, logistics and healthcare.

Another major advantage of the new SaaS offering is its integration with 5G Standalone core network functions in a multivendor environment to support new commercial charging models based on a variety of factors, including low latency, high throughput, device density and location. Its ease of deployment minus the need for on-site software maintenance and updates makes it an ideal service tool for CSPs and enterprise.

It can also be incorporated with the Nokia/Qvantel Digital Monetization Solution as a Service, which combines Qvantel's Flex BSS and Nokia AVA Charging, fast-tracking a separate BSS stack to support new 5G opportunities.

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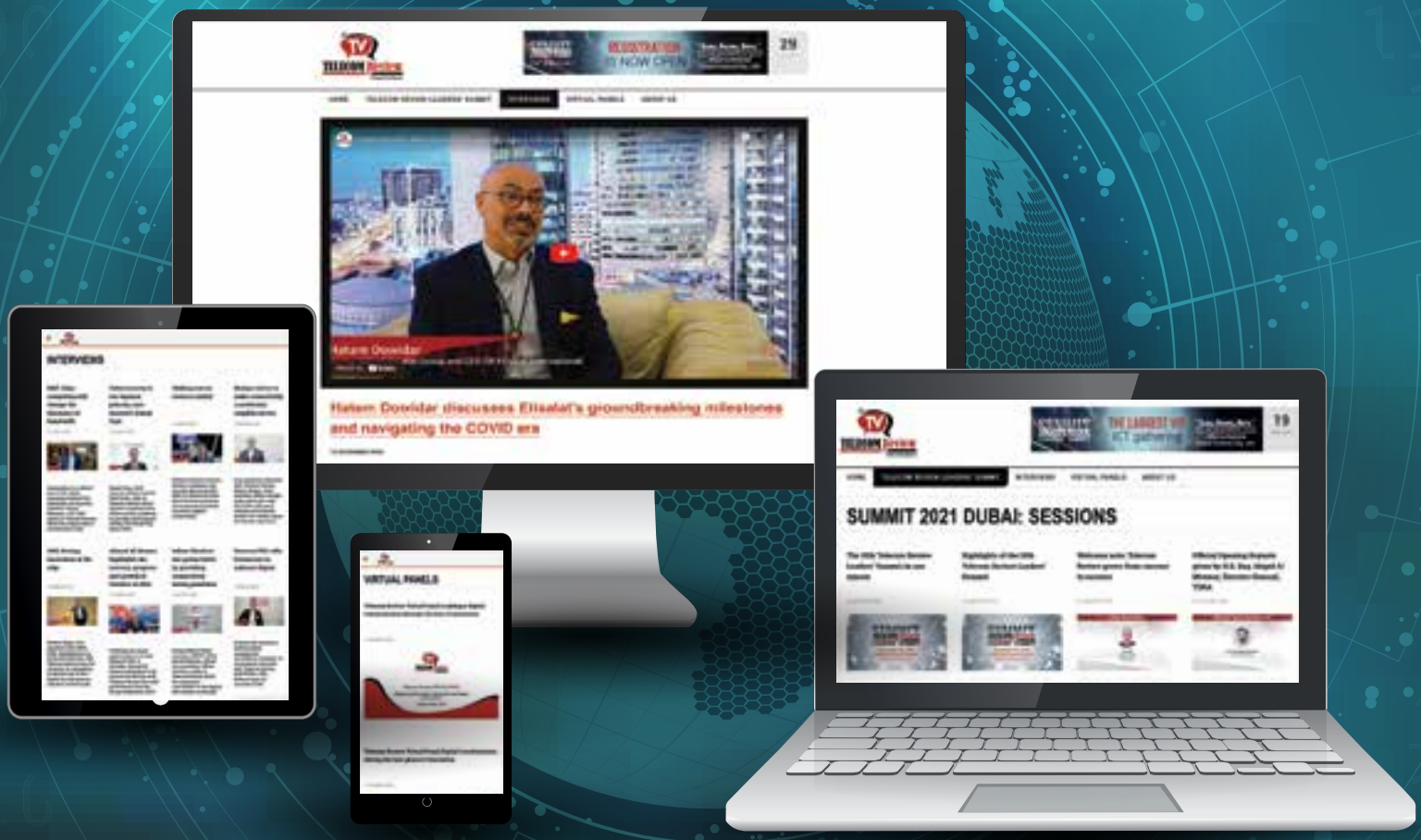

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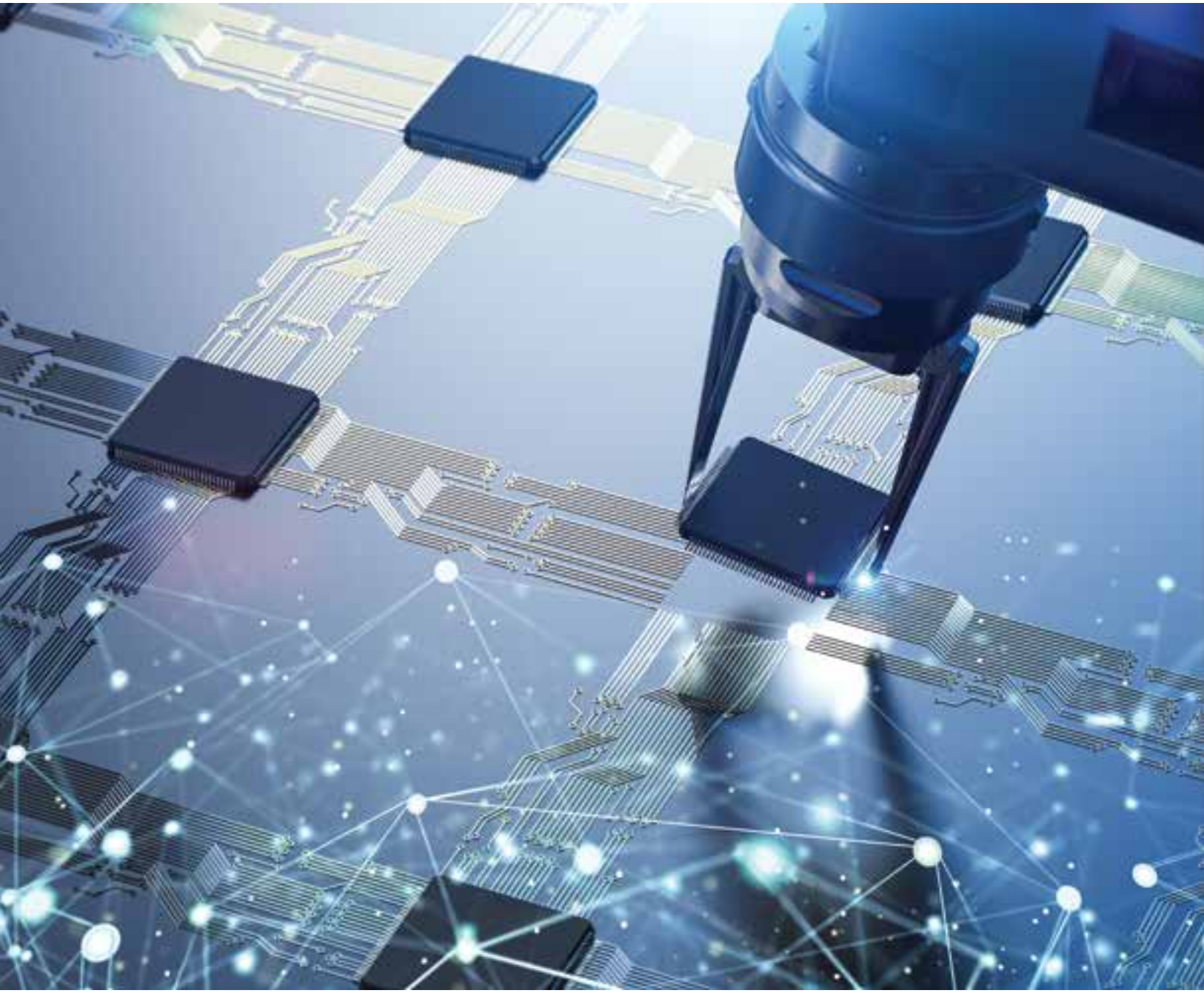

Chip Talk: Where Have the Wafers Gone?

After impacting the market with product scarcity this past year, owing to various reasons including US-China trade, COVID-19 and drought, the semiconductor industry continues its roller coaster ride with orders currently exceeding supply lines.

Almost all electronic devices and applications used for digitization are driven by semiconductors. In 2021, the drive toward digitization pushed the sales of semiconductors to $555.9 billion, up 26.2%, with sales in China reaching $192.5 billion, as per the Semiconductor Industry Association (SIA). A record 1.15 trillion semiconductor units were shipped during the period. Given the growth in technology trends propelled by AI, ML and cloud computing, the semiconductor industry is projected to reach $726.73 billion by 2027, SIA notes.

Conversely, in 2022, chip sales growth has slowed. SIA reported a drop in worldwide sales on a month-to-month basis; industry sales were $49.0 billion in July 2022, up 7.3% over the July 2021 total of $45.7 billion but a 2.3% drop compared to the June 2022 total of $50.2 billion. Including the Americas, year-to-year sales were up in Europe (15.2%) and Japan (13.1%), and the Asia Pacific/others (4.1%), but down in China (-1.8%). Meanwhile, month-to-month sales increased in Europe (2.7%) and Japan (0.6%) but decreased in the Americas (-2.3%), China (-3.5%) and Asia Pacific/All Other (-3.5%), as per SIA.

Why the Sudden Dip in Sales?

The primary reason for the demand-supply volatility can be attributed to last year's virus pandemic that dynamically disrupted demand due to factory closures and labor shortages along with natural calamities affecting production. However, after the lifting of COVID-19 restrictions, there was a sudden spike in chip demand – what economists refer to as the V-shape economic recovery globally. As such, supply chains have struggled to keep up with the demand, causing chip shortages, extended delivery times from analog suppliers and substantial price increases. The latter can be attributed to the recession environment in the US and Europe due to the Russia-Ukraine war and renewed COVID-19 restrictions in China. The risk factor is being felt across the semiconductor supply chain.

The constraints are mainly occurring in the production of wafer – a thin slice of semiconductor used for the fabrication of integrated circuits. Even the world's largest chip maker, TSMC, which controls 28% of global semiconductor manufacturing capacity, is experiencing ongoing shortages. The biggest manufacturers, including Texas Instruments, Intel and TSMC, are investing heavily in building new manufacturing facilities (popularly called fabs in the industry), though these new facilities aren't expected to be production-ready until 2023 at the earliest. In a similar vein, the US recently passed the CHIPS and Science Act of 2022, which will see investments of nearly $250 billion placed into semiconductor and scientific research and development (R&D). With such a move, the US intends to again jump back on top of the chip-making game as well as tackle the necessary supply chain issues.

China, a leading chip-producing country, has voiced unease with the US chip production bill, however, saying that it has created a "hostile" environment for the country's semiconductor export business. Moreover, the China Semiconductor Industry Association (CSIA), the state-run body with 744 members, reportedly organized a meeting where over 300 representatives from chip production companies took part, which is being seen as a tell-tale sign of an industry in distress. Chinese experts have reportedly warned chip companies to prepare for more turbulence to come.

How Will This Impact the ICT Sector?

Since the chip is at the heart of everything electronic, it is easy to presume that this disruption impact will be felt across the ICT sector in more ways than one. The price of affected devices could soar exorbitantly as there would be fewer goods being delivered. As per Gartner, semiconductor revenue from PCs is estimated to post 5.4% decline in 2022, as shipments are likely to decrease 13.1% as compared to growth in 2020 and 2021. Gartner also estimates that revenue from smartphones could also see a drop of 3.1% this year, compared to a 24.5% surge in 2021. And given the looming global recession, the ICT market will have to look for possible ways to stay afloat until the chips start to come back online again.

There is, however, a silver lining to all this. As global chip supply chains struggle to keep up with demand and as export policies tighten, an opportunity for more local suppliers to meet market demands may be in the offing. Earlier this year, for example, Tokyo-based Yokogawa Electric Corp. and oil giant Aramco signed an initial agreement to seed and localize semiconductor chip manufacturing in Saudi Arabia. Similarly, the UAE is meticulously planning its moves to become a leading global digital hub, with massive infrastructure already put in place. The UAE has already made its entry into the semiconductor space by becoming the primary investor in the US-based manufacturer GlobalFoundries (GF). By investing in the most capital-intensive industries globally, the UAE plans to make its mark as a truly global tech leader in line with its Economic Vision 2030.

Given the continued digitization and automation trend globally, optimistic market findings estimate the global semiconductor sector to increase by 13.9% in 2022 and by 4.6% in 2023. Could we see more collaboration in the chip manufacturing sector begin to crop up eventually as a result? Let's wait and see. TR

Safaricom to Build a Third Data Center in Addis Ababa

Mobile operator Safaricom Ethiopia announced the upcoming construction of a new data center in Addis Ababa. The company signed a land sub-lease agreement with Industrial Parks Development Corporation (IPDC) to build a new Tier-III quality "telco-cloud data center" in the latter's ICT Park outside the capital, and is reportedly investing around $60 million into this project.

Anwar Sousa, the CEO of Safaricom Ethiopia, said, "It will be our third data center in Ethiopia since Safaricom Ethiopia was awarded the Unified Telecommunications Service License in July 2021. "He affirmed that this new data center will allow the telecom company to improve the availability of the latest technologies, mainly in industrial parks, to support the digitalization process underway in the country, improving efficiency, transparency and productivity.

Safaricom Ethiopia's new data center will consolidate the new company's presence in the colocation segment, which has grown in maturity and interest in Ethiopia over the past five years. The company, which is already fighting against Ethio Telecom in this sector, must also compete with internationally renowned companies such as wingu.africa.

Safaricom Ethiopia's strategic spirit is based on the diversity of its offerings, coupled with innovative services. The company is already betting on voice, connectivity, cloud services and storage and is waiting to enter the finance segment with Mobile Money. Its ambition is to become the leader in a market long monopolized by Ethio Telecom.

ITU PP-22 Convenes to Shape Global Digital Transformation

The highest decision-making body of the International Telecommunication Union (ITU) has opened with delegates from around the world pursuing digital cooperation and transformation for the greater good.

ITU's 21st Plenipotentiary Conference, known as "PP-22," features elections for the organization's top management posts – Secretary-General, Deputy Secretary-General and Directors for Radiocommunication, Telecommunication Standardization and Telecommunication Development – along with the 12-seat Radio Regulations Board and 48-seat ITU Council.

Digital technologies have empowered billions of people worldwide, facilitating business, education, government services, trade and social interactions through the toughest phases of COVID-19. Yet Internet uptake has slowed over the past year, leaving 2.7 billion people – or one-third of the world's population – unconnected.

"We are in the middle of a digital revolution that enables and provides the means for the development of new industries and converged services, such as smart vehicles, healthcare, smart cities and homes," said Romania's Vice Prime Minister, Sorin Grindeanu, in his opening speech to PP-22.

"At this turning point in technological development, we must not forget our essential duty to respect the human being," he added, stressing the need "to protect the freedom and prosperity of future generations, in whose lives the technologies we see today as emerging will play a determining role."

ITU is the United Nations specialized agency for information and communications technologies (ICTs). As the conference opened in the Romanian capital, ITU Secretary-General Houlin Zhao said efforts must be expanded to make technology accessible and affordable to everyone, everywhere.

"Equitable access to ICTs is not just a moral responsibility, it is essential for global prosperity and sustainability," said Zhao, who has led the organization for the past eight years. "The decisions made here in Bucharest will determine our direction and priorities in line with the evolving needs of ITU's diverse and growing global membership, helping shape the future of the information society in both developed and developing countries."

South Sudan and Djibouti Sign Fiber Optic Agreement

South Sudan and Djibouti signed a Memorandum of Understanding (MOU) to connect fiber optic cable running from Djibouti through Ethiopia to Juba.

According to the South Sudanese Ministry of Information, Communication Technology and Postal Services, the MOU will be followed by the formation of a technical team from both countries to carry out this project. The Djibouti fiber that South Sudan will be drawing from will add to other similar infrastructure that the country already has deployed through private and public initiatives.

South Sudan has also benefited from 630 km of fiber optic interconnection with Kenya, deployed in October 2020 with funding from the World Bank and the Kenyan government. The country aims to lay the fiber optic network to link the national capital, Juba, with the rest of the world as well as cut the high cost of using the internet.

Like most African countries, South Sudan also has a digital transformation ambition. By acquiring additional data capabilities, the country will be able to realize this vision for the majority of its citizens.

Verizon Now Serves Nearly 48% of Cell Sites with Owned Fiber

Verizon now connects nearly 48% of its cell sites with its own deployed fiber optic cables and is on track to reach about 50% by the end of this year, allowing Verizon wireless customers to take full advantage of Verizon's peak speeds and robust service offerings. Verizon's fiber network is the largely invisible foundation that is a key driving force behind providing the reliability and scalability customers need and expect. It is the connective tissue that ties the disparate pieces of the network together and transfers data between a customer and the internet.

If networks are the oxygen of the digital era, fiber optic cables would be its central nervous system. Fiber networks play a largely unseen, but essential role in connectivity, enabling ultra-high capacity, speed and low latency data transfer for 4G LTE and 5G networks. Equally unheralded is fiber's role as the backbone of IP and virtualized networks that streamline operations, reduce operating costs and improve agility for network providers, businesses and consumers alike.

Verizon embarked on a multi-year journey to deploy tens of thousands of miles of fiber with the goal of providing backhaul fiber connection to about 50% of its cell sites by the end of 2022. Owning and operating the fiber that carries customer data from the cell site throughout the rest of the network allows the company to meet changing capacity needs rapidly, control upgrades and repairs to fiber cables and electronics immediately, as well as add security, control and reliability into network operations -- all critical to create the most reliable network for customers and provide the capacity and speeds needed now and into the future.

Phones, home broadband, the Internet, voice-activated virtual assistants, video streaming, smart-anything – none of it could run without millions of miles of these high-speed conduits crisscrossing the globe. The hottest new wireless technologies and applications largely depend on fiber optics, including 5G, IP, Big Data predictive analytics and Artificial Intelligence (AI), IoT, super-fast mobile Internet, Edge networks and many more. Only fiber can meet skyrocketing user demands for fast, efficient bandwidth while providing the huge capacity and ultra-quick response times needed to power 4G LTE and 5G networks.

NCC to Generate $1.1 Billion From 5G Spectrum in 2023

Umar Danbatta, executive vice president of NCC, revealed at an interactive meeting on the 2023-2025 Medium Term Expenditure Framework and Fiscal Strategy Paper (MTEF-FSP) that the Nigeria Communications Commission (NCC) is expected to earn over N500 billion for the Federal Government in 2023 through the auctioning of the 5G spectrum.

These forecasts are based on recent NCC disclosures, he added. The amount will largely be made from the auction of two 5G spectrums and the bidding process for the 2023 spectrum auction.

According to Danbatta, the NCC generated N318 billion in Q2 2022 compared to N257 billion in the previous quarter. This growth in revenue was made possible by MTN and Mafab Communications' payment of financial obligations related to the 5G spectrum they won in December. Each of the two companies disbursed the sum of US$273.6 million.

For his part, Solomon Adeola, chairman of the committee, applauded the effort of the commission. Adeola said the revenue generated from the commission will go a long way toward helping reduce the deficit proposed in the 2023 budget.

Inligo Networks Appoints APTelecom for International Submarine Sales

APTelecom will be Inligo Networks' international sales partner for the Asia Connect Submarine Cable System.

Brian Evans, CEO of Inligo Networks, said: "APTelecom's reach, and expertise spans a wide range of global markets which are well aligned to the planned footprint of our network, and we are pleased to engage their services as our international sales partner. The relationship will support the onboarding of international capacity buyers and will also assist Inligo Networks in managing the wide range of existing business opportunities we have for the Asia Connect Cable System"

The Inligo subsea cable network (ACC-1) announced earlier this year, will span just over 17,000 km with initial landing points in 8 key markets, including Australia, Indonesia, Singapore, Timor-Leste, Philippines, Guam, Hawaii, and continental USA.

The cable will have up to sixteen fiber pairs with an initial capacity of 256Tbps, and an ultimate design capacity of a minimum 16Tbps per fiber pair. It has been engineered to be highly flexible, incorporating the latest in WSS technology to support customers evolving needs. In addition to the ACC-1 subsea network, Inligo is in parallel developing an Australian terrestrial long-haul fiber network called 'Unite' between Melbourne, Adelaide and Darwin which will directly connect with the ACC-1 Cable in Darwin, providing the lowest latency path between Australia and Southeast Asia.

AWS Helps Customers Embark on Their Smart City Journey

With the newly-introduced AWS Smart City Competency, customers can quickly and confidently identify AWS Partners who can help them address smart city-focused challenges.

Aiming to achieve an inclusive and sustainable future for citizens, AWS Smart City Competency will provide best-in-class partner recommendations by differentiating highly specialized AWS Partners with a demonstrated deep technical expertise and proven track record of customer success within smart city use cases.

With cities at the front line of economic, social and global challenges, cities in the digital economy are being built increasingly to be reliant on technology solutions.

Many AWS Partners leverage the power of AWS Cloud to innovate and deploy meaningful smart city solutions for challenges like energy and water use, traffic management, sanitation and sustainability.

The Smart City Competency allows AWS Partners to differentiate themselves as AWS Smart City Partners, with unique benefits to help partners foster collaboration, innovate with AWS advanced services and increase visibility to customers.

With the help of qualified AWS Partners, AWS is committed to supporting innovations within public sector customers to quickly deliver smarter and more efficient citizen services.

NEC Introduces New Product Line for Open Optical Networks

NEC Corporation is driving expansion of "All Optical Networks" with the introduction of its SpectralWave WX Series – a lineup of open specifications-compliant, open optical transport products. Initially, four products will be released on October 1, 2022.

The push for "All Optical Networks" is a marked shift in transport networks, which have conventionally required both optical and electrical technologies. It will be simplified to only optical transmission technology from end-to-end in the future.

NEC envisions "All Optical Networks" as a next-generation, environmentally-friendly infrastructure that will lead to the realization of digital twins, social transformation and the creation of new services and industries. Through the provision of these products, NEC will help deploy transport networks with large capacity, low latency and multiple connections, as well as advanced security, robustness and power-saving.

NEC's new open optical transmission devices support multi-vendor configurations, allowing customers to procure and combine equipment from multiple vendors in accordance with their needs.

The lineup is built based on standards defined by Open ROADM and Telecom Infra Project's (TIP) Phoenix initiative. The compliance with these open specifications enables these devices to support configurations that connect to the function blocks of APN-T, APN-G and APN-I as defined by Open APN and under examination by the IOWN Global Forum.

IMDA and SUTD to Launch First 6G R&D Lab in Southeast Asia

The Infocomm Media Development Authority (IMDA) has partnered with Singapore University of Technology and Design (SUTD), one of the leading scientific research institutions in telecommunications, to advance Singapore's future comms and connectivity capabilities and talent.

In preparation for Singapore's 6G future, Minister for Communications and Information, Josephine Teo, launched SUTD's Future Communications Connectivity Lab (FCCLab), the first physical 6G lab in the region that will also look to combine 6G R&D with SUTD's AI Mega Centre.

FCCLab will accelerate cutting-edge research into future communications technologies and will look to unlock breakthroughs in 6G research and support emerging technologies such as holographic communications and intelligent sensing capabilities to support the next generation of self-driving cars and drones.

Situated at the SUTD campus, the FCCLab is part of Singapore's S$70 million Future Communications Research & Development Programme (FCP). FCP is hosted by SUTD and supported by the National Research Foundation, Singapore (NRF), under its Research, Innovation and Enterprise (RIE) efforts. Also supported by IMDA, the FCP will coordinate multidisciplinary research efforts across the RIE ecosystem, with Research Institutes (RIs), Institutes of Higher Learning (IHLs) and other RIE efforts. FCCLab Testbed will follow 3rd Generation Partnership Project (3GPP1) and Open RAN Standards to support easy evaluation of research outcomes. Network components can be individually replaced to facilitate targeted research. Lew Chuen Hong, chief executive, IMDA, said, "The innovations of today are not possible without constant investment and keeping our eyes on the next bound. We are excited to partner with SUTD to launch Southeast Asia's first 6G Lab. This is the start of our efforts to tap into the promise of future communications tech and become a global node of excellence."

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