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A 'Customer Champion' in a Hyper-Connected Digital World

Masood M. Sharif Mahmood,
CEO, etisalat by e&

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etisalat by e&: A 'Customer Champion' in a Hyper-Connected Digital World

Masood M. Sharif Mahmood, CEO, etisalat by e&

Embracing innovation and digitalization is critical to etisalat by e&'s success. In an exclusive interview with Telecom Review, CEO Masood M. Sharif Mahmood sheds light on the telecom arm's transformation in line with the major rebranding, factors that impacted its latest performance, steps taken to maintain its strong position in the market and the role of telcos in addressing modern digital needs within the Middle East.

What are the key drivers that led e& to begin its transformation journey from a Telco to a TechCo?

We recognized the need for change due to several realities. The world is driven by technology, as demonstrated by the rapid success of ChatGPT, which reached one million users in record time.

The traditional Telco model has struggled for years, with a decline in the core Telco business resulting in low returns on invested capital and challenges in monetization. This has been driven by the need for Telcos to continuously invest in the latest telecoms infrastructure to meet the exponentially growing demand for high-speed data. Regulatory demands and a lack of innovation in the industry have further compounded these issues. Of note, etisalat by e&'s Capex investment per capita is second highest compared to its global peers. Such investments have delivered world-class infrastructure, which in turn has led to a sustained competitive advantage and a positive return on invested capital.

As a result, Telcos have underperformed, experiencing a -10% TSR growth over the past eight years. In contrast, technology companies have thrived, with investors rewarding them for their strong financial performance and growth potential.

Due to such strategic factors and the evolving business landscape, we therefore set a clear objective to transform into a global technology group. This transformation serves as a testament to our innovative approach and unwavering commitment to enhancing our customers' lives, which have always been integral parts of our DNA.

As part of our transformation, we have implemented a strategic approach by establishing five distinct business verticals: etisalat by e&, e& International, e& enterprise, e& life and e& capital. This approach allows us to effectively manage each vertical, enhance agility and maximize value creation. It also enables us to attract strategic partners and investors who align with the specific objectives of each vertical, resulting in a more significant impact.

We have adopted a growth mindset and developed a future-ready business model to fulfill our promises, add value for shareholders, seize opportunities and accelerate our growth. Our transformation into e& as a global technology group represents our ambition, innovation and commitment to growth.

The Group is embarking on an exciting phase, and I am eagerly anticipating the opportunity to tackle the challenges presented by our technology-driven world.

This is the second year of your leadership role at the Telecoms division under Etisalat, and during this time a major rebranding has taken place. How has the Telecom division's operation transformed and evolved?

My experience at etisalat by e& has been incredibly dynamic and filled with unique challenges, opportunities and invaluable lessons. When I joined the company, the world was grappling with the aftermath of COVID-induced

disruptions. The significance of telecom connectivity for consumers, businesses and government entities had reached new heights. At the same time, the Group was undergoing a strategic transformation that significantly impacted etisalat. Our primary focus was to ensure seamless business continuity while deploying the latest and most efficient technologies, such as 5G.

I am fortunate to lead etisalat, as we possess all the necessary elements to meet all stakeholders' demands despite these challenging circumstances. Our strategy and operations align with e&'s overall strategy, centered around achieving growth by diversifying revenue streams, rapid scaling through a deeper understanding of customer needs and ideating new technologies. I play a role in providing essential guidance, but it is truly the remarkable team I have the privilege to work with that achieves astounding results.

We intend to drive growth and create value with the vision to be the "customer champion" in a hyper-connected digital world by leveraging our clearly defined strategy consisting of four objectives.

> Embracing innovation and digitalization is critical to our success, with a focus on cutting-edge technologies

First, we will grow our share of customers' Wallet in Core & Beyond services and simplify and innovate our product portfolio. This includes blending digital solutions for both B2C and SMB customers, migrating to new core services in the B2B sector and delivering premium digital experiences to maximize engagement in the B2C segment. Customers in the UAE enjoy the best mobile and fixed networks, as the UAE provides one of the highest network speeds in the world. In fact, the UAE is constantly maintaining Global mobile broadband speed leadership, and recently, its Fixed broadband speed ranking has also improved significantly. In April 2023, the UAE was ranked the 2nd fastest mobile network and the 3rd fastest fixed broadband network in the world. etisalat by e& is the main driver for improving UAE's speed rankings, as over the last three years, etisalat by e&'s mobile download speed has increased by 2.7x and fixed broadband speed has increased by 4.5x. We also plan to leverage our network and technology leadership to ensure we create additional value for our business.

Secondly, we will establish a digital and related services incubator in the UAE and abroad, focusing on scaling and monetizing new growth engines. We aim to build a diverse and long-lasting portfolio of digital services that provide value to our customers while driving growth and profitability. Through organic growth and strategic acquisitions, we plan to experiment, nurture and monetize digital engines.

The company also places a strong emphasis on excelling in world-class customer experience delivery. We aim to transform every aspect of the customer experience, including touchpoints, customer journeys, insight generation, governance, reporting, processes and culture. By adopting a customer-centric approach, we strive to excel in CX delivery.

Finally, we aspire to transform into an AI and data-driven organization. This involves simplifying and automating our business processes using AI, ensuring that our talent and skills align with future market needs, developing advanced analytics capabilities and promoting sustainability across our organization. These priorities position us for long-term growth and success in a rapidly evolving digital landscape. etisalat by e& has already started its transformation journey by developing key capabilities and companywide AI use-case implementation. For example, we are capturing many thousands of data attributes, have deployed well in excess of 100 Machine Learning models, applied facial recognition, voice biometrics, OCR and chatbots, delivered a significant share of consumer revenue from CVM, and a wide range of AI models has been implemented across multiple areas such as customer segmentation, fraud detection and Autonomous Networking.

Embracing innovation and digitalization is critical to our success, with a focus on cutting-edge technologies. In support of our growth, we also aim to embrace new mindsets and explore untapped potential. For example, to enhance customer experience, we have introduced a

Chief Customer Experience Officer. We have streamlined our organization by merging technology and IT functions to enhance agility, productivity and efficiency. Our capital allocation strategy will also support growth through investments and strategic partnerships.

Overall, our new brand identity has helped us reinforce our position as a leader and create market opportunities. These initiatives will drive our organization towards greater success.

Can you share a summary of etisalat by e&'s financial and operational performance for 2022? Which core factors impacted these results, and how will this positive outcome continue from Q1 2023 onwards?

We are proud to share our performance highlights for 2022, demonstrating our growth and success in the telecommunications industry. Our revenue increased by 3% compared to the previous year, driven by improved economic conditions in the UAE and our commitment to offering competitive and high-value products and services to consumers and businesses. We also experienced growth in our subscriber base for both mobile and fixed services, further solidifying our market position.

We focused on expanding our digital initiatives throughout the year, resulting in an expanded service portfolio and platform offerings. This strategic approach contributed to our higher year-on-year EBITDA, fueled by solid service revenue growth and ongoing cost efficiencies. As a result, we achieved an impressive EBITDA margin of 52%. Additionally, we maintained a strong net profit margin while actively investing in expanding our superior network and maintaining stable CAPEX/ revenue ratios.

Looking forward to 2023, we remain confident in our positive trajectory. We are well-positioned to capitalize on the positive macroeconomic environment and the continued demand for digital services. Our Q1 results have already shown continued revenue growth compared to the previous year, even when considering the favorable impact of Expo Dubai on last year's performance.

In line with our growth strategy, we recently acquired "Service Market," a prominent player in the online marketplace industry. This strategic move aligns with our goal to scale our operations and leverage our strong financial position. It also empowers us to invest in new growth opportunities and expand our reach in the market.

Notably, we maintain a low net debt-to-EBITDA ratio of around 0.6 at the group level, which is well below the industry average of 1.9x. This financial stability further reinforces our ability to navigate the industry landscape and pursue our growth objectives.

How do you see the future of connectivity evolving in the UAE and the Middle East?

The future of connectivity in the UAE and the Middle East holds tremendous potential for advancement. Several key developments are expected to shape the landscape. First, we anticipate the widespread adoption of 5G technology, which will enable faster and more reliable connections. This will pave the way for the growth of smart cities and the proliferation of IoT applications, revolutionizing various industries. Additionally, internet penetration will continue to increase, connecting more individuals and businesses to the digital world.

Furthermore, the expansion of cloud services and data centers will provide enhanced storage and processing capabilities, driving innovation and efficiency across sectors. Simultaneously, there will be a strong focus on cybersecurity measures to protect the growing digital infrastructure. Telecom operators are diversifying their offerings to meet evolving consumer demands beyond traditional services. This shift will contribute to economic growth, social development and improved quality of life throughout the region.

The UAE, in particular, is poised to experience significant digital adoption. The Digital Economy in the UAE is projected to grow nearly fourfold, reaching US$140 billion by 2031. Social media usage, especially among youth and millennials, is surging. Moreover, businesses and government sectors across the Middle East are undergoing robust digital transformation, with spending expected to more than double by 2026.

These drivers of connectivity signify a fundamental shift, with traditional connectivity being replaced by next-generation solutions powered by advanced technology. The future entails flexible and scalable connectivity for businesses, akin to purchasing cloud services, with on-demand connectivity customized through simple clicks. Contextually aware networks will deliver intelligent connectivity, while end-to-end automation will enhance the customer experience through zero-touch processes.

> etisalat by e& aims to enhance customer experiences and unlock shareholder value

On the consumer side, the convergence of 5G and AI presents exciting possibilities, particularly in augmented reality solutions that can enhance everyday lives. Telcos in the Middle East have a remarkable opportunity to shape a new future for connectivity by leveraging and enriching the available data to gain unparalleled insights into consumers.

The potential for innovation is limitless.

What are the steps etisalat by e& is taking to maintain its strong market position in the UAE?

etisalat by e& is committed to revolutionizing connectivity and becoming a customer champion in a hyper-connected digital world. By focusing on growth and leveraging the power of AI, the company aims to drive efficiency and agility in its operations. Investing in talent and utilizing data and insights, etisalat by e& aims to enhance customer experiences and unlock shareholder value.

To maintain its strong market position, etisalat by e& aligns with the UAE government's digitalization ambitions. This empowers the company to provide best-in-class innovative solutions, harness advanced technologies and maintain cutting-edge telecom infrastructure offerings. Acting as a trusted partner and advisor to businesses, etisalat by e& enables enterprise connectivity and supports the digital economy by facilitating future-forward spaces such as private networks, autonomous vehicles and AI.

Leveraging its 47 years of telecoms experience, etisalat by e& focuses on technology adoption in areas like 5G, Edge and Private Networks, which offer clear growth opportunities. This positions the company as the telecom orchestrator of choice.

An example of etisalat by e& bringing customers closer to a digital-first lifestyle is its acquisition of El Grocer, a grocery delivery platform, through its highly popular Smiles platform. This move enhances customers' experiences by providing seamless digital-first services. Similarly, the acquisition of ServiceMarket,

a leading online marketplace for household services, aligns with the vision of empowering consumers and diversifying the Smiles marketplace's online presence.

To stay ahead of the competition, etisalat by e& regularly reviews its strategy and takes essential steps to leverage its strong market position. Continuous investment in infrastructure, including the expansion and improvement of Fiber and 5G networks, enables the delivery of the fastest bandwidth and best user experience to more customers.

In addition, the company invests in new technologies and solutions, such as AI, to improve service quality, enable faster time to market and enhance the overall digital experience.

Recognizing the importance of adjacent digital services, etisalat by e& has made significant investments in digital transformation and strategic acquisitions. These efforts have positioned the company as a leading digital player in the UAE and the broader region. The expansion of the SMB marketplace for business customers offers software solutions in a SaaS model, empowering small and medium-sized businesses in the digital landscape.

Launching digital services like the GoChat SuperApp and acquiring leading platforms such as elGrocer and ServiceMarket showcase the commitment to providing an extensive portfolio of telecom and digital services.

These initiatives are part of a comprehensive strategy to become a leading digital player in the region. etisalat by e& is dedicated to delivering exceptional telecom and digital services, ensuring all customers have the best experience and access to innovative solutions.

What roles can telcos play in serving the needs of the modern digital consumer in the Middle East, and why?

Telecom companies in the Middle East play critical roles in serving the needs of the modern digital consumer. These consumers are at the forefront of embracing emerging technologies and exhibit high levels of digital engagement across various industries, including banking, entertainment, telecom and travel.

Given their unique position in the digital ecosystem, telecom companies are pivotal in driving the adoption of digital channels and meeting the needs of consumers. They possess distinctive capabilities, including mobile and fixed connectivity infrastructure, strong billing relationships, access to customer data, extensive distribution and sales networks and partnerships with global tech giants.

One of the key roles of telecom companies is to provide fast and reliable connectivity, which is essential for consumers to access the services and platforms they rely on.

Telecom companies can also expand their offerings to provide a blend of core and digital services. They can enhance consumers' digital lifestyles by becoming preferred service providers for multiple digital services such as gaming, entertainment, smart homes, devices, e-health and insurance.

In addition, telecom companies enable digitization by providing the necessary infrastructure and expertise to help industries introduce digital business models such as e-health, e-finance, e-education, e-commerce, critical IoT, cybersecurity and analytics solutions to enhance their offerings and customer experience. Telcos can also support industries in digitizing their internal operations, leading to improved efficiency, productivity and agility.

Furthermore, telecom companies can establish partnerships with governments to strengthen the provision of secure connectivity to e-government services. This collaboration can involve developing e-government applications and driving the adoption of such services through mobile and other devices.

To enhance the overall customer experience, telecom companies can leverage data analytics and AI, to deliver personalized customer service and support tailored to individual needs and preferences.

Overall, Telecom companies in the Middle East play a crucial role in meeting the needs of the modern digital consumer. They serve as infrastructure providers, ISPs, MNOs and digital content and service providers. By investing in robust networks, offering reliable connectivity, driving the adoption of emerging technologies, facilitating IoT connectivity, collaborating with governments and leveraging data analytics and AI, they contribute to the growth of the digital economy and support the digital transformation of industries in the region. TR

> To maintain its strong market position, etisalat by e& aligns with the UAE government's digitalization ambitions

Mohamed Salama, Head of Fixed Networks, Nokia MEA

Nokia MEA: Software Is a Key Enabler of New Revenue Streams

The industry's move to software, cloud and AI-based solutions has opened up a whole new world of broadband monetization opportunities. Learn more on this topic with Telecom Review's exclusive interview with Mohamed Salama, head of fixed networks, Nokia MEA.

With the fixed broadband market growing rapidly, how can telcos leverage this expansion to boost their monetization opportunities?

Let me start by sharing an observation from my engagements with customers. Their attitude towards fixed broadband, specifically fiber, has completely changed. Not so long ago, our conversations focused on the need to transition to fiber, how to deploy it and how to do so cost-effectively. Lately, these technical discussions have morphed into ones about business: customers are now asking how they can introduce new services and generate more revenue from their fiber infrastructure.

Indeed, the wide availability of fiber and the advances in its performance have triggered a new paradigm. Fiber-to-the-Home is becoming Fiber for Everything. Generating more revenue streams by adding new use cases can be achieved with minimal additional investment. On the pure physical connectivity layer, the existing FTTH network is eminently suitable for supporting additional business services such as mobile transport or smart city connectivity; there is no need to dig new trenches in the streets.

Additionally, the industry's move to software, cloud and AI-based solutions has opened up a whole new world of broadband monetization opportunities. Our advice to customers is that a software enablement strategy is essential if they want to capture new revenue streams in the shortest time-to-market, at the lowest possible incremental cost and while optimizing the overall subscriber experience.

Can you explain how new fixed broadband revenue streams are being enabled by software-defined access? What use cases are heavily impacted, and how does Nokia contribute to this?

Before the emergence of software-defined access networking (SDAN), it could take months, or many weeks at best, for a service provider to develop new services and implement them in the network. This was frustrating for both the providers and their end customers.

SDAN could not have arrived at a better time. It takes away the complexity by using an open and flexible cloud-based software platform to automate their operations and introduce new features/services faster.

Here again, while initial discussions about SDAN were around its implementation and operational savings, we are now talking about how SDAN can enable new revenue

streams. In simple terms, SDAN can segment the network into software-based network slices or virtualized portions that support consistent and high-performance connectivity. This can be used to sell premium residential services, new wholesale and neutral host models, or B2B services like virtual office working from home, Industry 4.0 enterprise connectivity or Metaverse VR sessions.

One of the best examples to illustrate this concept is cloud gaming. Gamers want quick reactions and a high-resolution gaming experience. At Nokia, we have developed an end-to-end network solution that leverages SDAN slicing capabilities to deliver the prerequisites of low latency and high throughput. Here in MEA, we have successfully demonstrated fully automated assurance based on real-time network KPIs of the gaming slice during conditions of increased network latency.

As a next step, we are also working with our customers in the region to develop new use cases around network optimization, predictive care and better assurance using powerful data-driven network insights, closed-loop automation and machine learning, to name a few. With fixed wireless access ramping up, more operators in the region started looking for an end-to-end service lifecycle management system for fixed wireless access. As part of our SDAN solution suite, we have developed a controller that could verify mobile coverage and available capacity before installation, optimize usage of radio resources and provide service assurance with high-precision real-time telemetry.

How does Nokia help improve the experience for broadband devices by enabling the easy and fast introduction of software-based value-added services via the app store?

We consider the home network as one of the areas of huge opportunity for monetization — but only if you get it right. You can deliver brilliant, low-latency, 1 Gb/s services to the home, but if the Wi-Fi doesn't extend to where your daughter is streaming video, then you have a problem.

High-performing, self-optimizing whole-home Wi-Fi has become a non-negotiable element of the broadband experience. Therefore, at Nokia, we have heavily invested in meshed Wi-Fi gateways that are fully operator-controlled by cloud-based software solutions.

Now, with the emerging concept of application containers, these Wi-Fi gateways also enable the simple and fast introduction of new value-added services. Traditionally, new services for in-home Wi-Fi required an entire device software upgrade. With the container framework, we have introduced an isolated environment within the devices where applications can run using dedicated resources. So, now you can bypass the firmware updates to install or update the application without interfering with the underlying functioning of the device or other applications.

For this, we have set up an ecosystem of third-party developers who make their applications available through our Nokia Application Container platform. So far, these include advanced capabilities like cybersecurity, multicast video delivery over Wi-Fi, Wi-Fi slicing and Wi-Fi motion sensing, with more to come very soon.

Please explain how software works on the network layer.

There are many areas where advanced software-defined network capabilities bring benefits to network operations. For example, migration to next-generation PON. While more advanced operators, mainly in the GCC region, are moving fast with XGS introduction, other service providers in the region still opt for a more cost-efficient GPON rollout without immediate plans for XGS.

These operators can benefit from Nokia's multi-PON solution, so they can start with GPON, and when XGS-PON is needed, they can activate it remotely without even visiting the central office. Next-generation PON capabilities would only be enabled through a software license, allowing pay-as-you-grow and full investment protection from the start.

Another example would be service activation. Installing an ONT at the customer's home and activating the service typically involves a lot of time, manual effort and can cause errors. All of that increases the cost and time, impacting customer satisfaction. However, with the automated software that runs in the cloud, the activation can be radically simplified and shortened.

Yet another example would be network slicing. It is a software feature that enables operators to slice a single physical network into different slices (or virtual partitions). Each slice can be assigned to a different service (one slice for consumer services, another for enterprises, etc.) or even different service providers in the case of wholesale networks.

All of these are examples of how we can use advanced software features to make the networks smarter, create more revenue and achieve more savings.

What are Nokia's ongoing initiatives that will help telcos realize fixed broadband monetization opportunities through software enablement?

The call for new fixed broadband monetization opportunities, which need to be delivered in the shortest time-to-market, at the lowest possible incremental cost, and while optimizing the overall subscriber experience, is resulting in a strong industry push towards software capabilities.

Therefore, at Nokia, we have committed significant R&D resources to the software enablement of all layers of our fixed broadband solutions - the network, the home, enterprise, and the cloud.

While the introduction pace of service providers may differ in this software enablement, multiple MEA operators have started deploying one or more of these solutions. These partnerships and collaborations across the industry will be vital to further develop relevant use cases.

The foundations are now in place; it is the time to scale. TR

Ramy Boctor, Chief Technology Officer, Vodafone Qatar

Vodafone Qatar: Using Next-Generation Technologies to Simplify Customers' Lives

Vodafone Qatar is committed to a culture of continuous improvement and network enhancements. In an exclusive interview, Chief Technology Officer, Ramy Boctor, sheds light on the company's digital transformation efforts, its technology integration and its CSR approach.

How will Vodafone Qatar, a noted steward in the tech world, maintain its Internet and telecommunications leadership to drive digital transformation?

Vodafone Qatar recognizes its role as a key contributor to developing Qatar's National Digital Vision. This realization means that we have committed ourselves to a culture of continuous improvement and network enhancements. We actively seek opportunities to boost the efficiency, reliability and effectiveness of our products and services and remain open to embracing and deploying emerging technologies to further advance the country's digital transformation.

To this end, we have made several improvements to speeds on our network in recent months, the most notable of which are: investing in a 1.2 Tbps backbone capacity and deploying high-capacity solutions such as dual beams and hexa beams in highly loaded areas to ensure adequate network capacity and full resiliency; and trialing mmWave 5G, which supports higher data speeds than other 5G spectrums, reaching up to 4.6 Gbps on the downlink and 734 Mbps on the uplink to support special use cases.

Moving forward, we are eager to continue growing our mobile and fixed networks across each of the segments we cater to (prepaid, postpaid, home and enterprises) in order to unlock digital possibilities for our people and businesses, enabling them to access brand new, first-in-the-market solutions.

What competencies does Vodafone Qatar depend on to create additional value in society and enhance communication in Qatar?

We pride ourselves in taking every bit of time and effort to identify ways in which our customers can enjoy unparalleled digital experiences powered by our world-class network

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Together we can

vodafone

connectivity. Under this resolve, we have worked above and beyond to develop and continually enhance our portfolio of products and services for consumers and businesses alike. One of our most recent campaigns, "Al Bayt Al 3oud," which translates as "The Big House," is a perfect demonstration of this focus, where we have endeavored to showcase the many ways in which our technology enables individuals to overcome everyday challenges and stay connected with friends, family and coworkers.

For example, our IoT Fleet Management solution empowers business owners to monitor their fleet in real-time whilst also allowing employees a seamless communication pathway to instantly connect with managers in case of emergencies — thereby saving time and added costs and enhancing overall operational efficiency.

Moreover, with innovation being one of our core pillars, we rely heavily on our deep sector expertise and core competencies in ICT and Science Data to actively forge partnerships with key stakeholders in Qatar, enabling smart living and digital-first lifestyles across society. Earlier this year, we collaborated with Nokia to roll out our cutting-edge fiber technology in Msheireb Downtown Doha — the world's first fully built smart and sustainable city district — making it the first Gigacity in the Middle East to deliver ultrafast network speeds on our 25Gb/s fiber network.

Across your tireless and impactful efforts in the telecommunications sector, how do you assess the industry transformations and their implications for your business?

With the compass of the industry shifting towards cloud and AI technologies, digitalization is becoming a mandate, drawing attention to key considerations and questions on how to transform the network stack toward full automation and data-driven architecture whilst harnessing the power of AI to enhance customer experience and create more value. Vodafone Qatar has been leading the digital transformation journey, making conscious decisions leveraging telecom expertise and cutting-edge AI and cloud technologies.

Qatar relies on artificial intelligence at all levels. How does Vodafone Qatar integrate this and other technologies into its business?

Employing next-generation technologies to simplify the lives of our customers is an integral part of our operations and a priority area in which we continue to make strides. As we undergo a rapid digital transformation, enhancing our digital capabilities, such as artificial intelligence (AI) and robotic process automation (RPA), has been pivotal to the success of our commercial and technological decisions.

This is echoed in the opening of our new telecoms Network Operations Center (NOC) in Qatar's Lusail city in 2021. Our NOC utilizes emerging technologies, including AI and automation, in addition to other best industry practices and tools to ensure our networks remain consistently reliable, efficient and high-performing.

As part of our wider digital transformation agenda, we also introduced Labeeb, one of the first AI-powered chatbots in Qatar, which is available to customers on our Vodafone app. Enabled via natural language processing capabilities blended with machine learning, Labeeb provides customer services around bill payments, top-ups, add-on management and special offer information to users in both English and Arabic.

How do you leverage your leadership in the technology sector to influence positive change in society? What is your approach to Corporate Social Responsibility?

Among the priority areas very close to our hearts at Vodafone Qatar is "sustainability," which also forms one of the three pillars of our operations. We are proud to serve as a beacon of environmental action in Qatar and align our efforts to ensure that the change we are seeking to influence in society begins from within our organization. This means that we always look for opportunities to emphasize sustainable living and environmentally friendly practices amongst our workforce. For instance, we involved our employees in the commemoration of World Car Free Day, where they used sustainable alternatives to arrive at work such as carpooling, electric scooters, bicycles or by walking.

Human development also features heavily under our CSR approach. We are committed to nurturing the leaders of tomorrow in the technology landscape in Qatar. In line with Qatar National Vision 2030 that seeks to build a knowledge-based economy, we routinely connect with young talents at various career fairs across the country and have also developed graduate programs to foster their growth and smooth transition into professional tech-oriented roles. TR

We have worked above and beyond to develop and continually enhance our portfolio of products and services for consumers and businesses alike

Sofrecom Collaborates With Telcos to Maximize Technologies and Facilitate Integration

In an exclusive interview with Telecom Review, Sofrecom CTIO Davy Letailleur explains how the company leverages emerging technologies to support the digital transformation within the telecom sector as well as the market trends within the MEA region, among other insights.

Davy Letailleur, CTIO, Sofrecom

Sofrecom has become a vanguard in operator development and diversification as well as a benchmark partner in building e-government solutions. How does technology play a critical role in fulfilling these responsibilities?

Telco technologies are becoming increasingly essential to meet major environmental, societal and economic challenges.

It is becoming more and more important to bring together a range of technologies to meet the needs of operators and governments, with the challenge of ensuring interoperability and end-to-end technology integration. The Telecom ecosystem is evolving towards increasing players specialized in infrastructure services (towercos, fibercos, Energy, satellites, datacenters, etc.), cloud, networks, platforms and digital services, where AI and cybersecurity technologies are becoming more and more important. Moreover, networks are becoming "softwarized" (virtualization/ cloudification), enabling a move towards autonomous or automated networks, and offering on-demand connectivity solutions that open up new opportunities for value creation.

At Sofrecom, we work with telco operators to assess technologies' maturity and interoperability and facilitate their integration. At the same time, we need to address environmental and social issues to help operators move towards a more efficient and resilient model in the face of changes in their ecosystem. These include climate change and the circular economy, which is both a lever for decarbonization and value creation.

As a specialized consulting and engineering firm, how does Sofrecom leverage emerging technologies to support digital transformation within the telecom sector?

First and foremost, Sofrecom capitalizes on the Orange Group's innovation with a wide range of solutions and tools in different regions. This gives us real leverage to develop new expertise in systems integration and to assess the relevance and maturity of the solutions considered for each customer's needs. Sofrecom is currently building up its expertise mainly in Europe and the MEA zone, with more than 2,500 multicultural consultants in France, Morocco, Tunisia and the United Arab Emirates.

Sofrecom relies on a strong network of partners to enrich its value proposition with new, differentiating innovations, particularly in software, and to strengthen its local teams for its various projects.

Nevertheless, successful technology integration makes sense only if it is

part of a larger transformation strategy and not just a technical one. For example, with DATA/IA, it is not enough to introduce its uses to achieve its promises; rather, its adoption requires a change management system to scale up. A collective adoption process must be put in place, which usually takes time and therefore requires anticipation.

We offer a "data value measurement" approach to our customers. Our aim is to enable them to assess the potential for value and accelerate the adoption of data/IA issues in a range of telcos' activities, such as: personalized customer relations, fraud prevention, improving operational efficiency (e.g., technician intervention) and improving network energy efficiency.

Can you share how Sofrecom anticipates market trends in the MEA region and adapts to clients' needs?
Connectivity issues remain paramount, with infrastructure services such as coverage enhancement, broadband upgrades, fiber backbone deployment, datacenters, etc., as prerequisites.
In this area, Sofrecom develops innovative solutions for monitoring and controlling the quality of fiber deployments. We support operators and specially towercos in improving the efficiency of mobile site infrastructure management. Sofrecom's telco engineers support 4G/5G deployments and manage datacenter studies and deployments, taking charge of customer migration. We also offer high-value-added tools for measuring and managing network quality of service.

In Africa, digital inclusion is a priority. We contribute to the development of national digital strategies and support the development of network schools, the idea being to co-build know-how with partners and the local industrial ecosystem to create sustainable jobs in the telecoms sector. Access to energy is another challenge, due to the low level of electrification in certain rural and peri-urban areas, with the development of SHS (Solar Home System) kits as a possible response. We support Orange in deploying these solutions.

In addition, we contribute to various broadband deployment projects to provide connectivity in rural areas or schools and work through different partnerships on deploying trusted digital solutions such as digital identity solutions, national data archiving and management, and mobile payment solutions for financial inclusion.

In the Middle East, networks are being transformed towards greater automation and "software-driven" or "data-/AI-driven" networks. Sofrecom provides an independent assessment of the maturity level of network operators based on a scale of 0 to 5 standardized by the TM Forum. The introduction of openRAN technologies is set to accelerate from 2024 onwards, following a process that is likely to accelerate with the rollout of telco Cloud and 5G network cores, enabling the promises of 5G to become a little more concrete through on-demand networks and greater network agility and resilience (cybersecurity threats and management of climatic hazards).

Finally, in the MEA region, circular economy development is set to take shape, led by the emergence of reconditioning factories for both customer and network devices. And, in network energy efficiency, new, more efficient solarization solutions are expected, the aim being to increase the use of green energy by considering the carbon footprint over the entire lifecycle of the solution.
We support these needs through opportunity studies aimed specifically at validating business models, defining master plans for energy efficiency improvement projects, and providing operational support for project management and deployment.

With an extensive know-how network, how do you see Sofrecom's expertise continuing to evolve in the MEA region? How does this address the sustainability aspect among customers?
Following the above points, our main new areas of expertise are:

- **Infrastructure services:** satellite solutions, IS solutions to address the infrastructure management needs of Towercos and Fibercos, multicloud and datacenter solutions that can address data protection issues and integrate local or regional regulations, and, of course, continued deployment of 4G/5G and fixed networks (fiber connections, fiber backbone, Fixed Wireless Access).
- **Digital services:** platforms, multiservice applications, and new organizations to meet the digital transformation challenges of operators and governments.
- **The gradual transformation of networks towards software,** with increased use of Data/IA.
- **Cybersecurity**
- **And the green transition,** where we address several issues such as green IT and networks; circular economy; and energy savings.

From your perspective, what are the factors that will impact the MEA region's telecom industry growth in the next five years? In what ways can Sofrecom contribute to accelerating this growth?
Telecoms growth in the MEA region will be driven by two key issues:

- **Continuing infrastructure investment:** the aim is to create funding structures for these very expensive infrastructure investments (public and private investments, public-private partnerships, international donors, etc.). To encourage investors to sign up for this strategy, Sofrecom is one of the players striving to improve efficiency in using funds, especially regarding costs, quality and deadlines, as well as integrating digital inclusion and climate issues.
- **Network monetization and digital services:** the telecom business model needs to evolve to provide all stakeholders involved with a greater operating margin. This will require a shift towards shared solutions, business digitization, network automation, circular economy and infrastructure monetization; new technologies will foster this transformation, but change management and anticipation will be key to delivering value. TR

An Jian, President of Huawei Middle East & Central Asia Carrier Network Business Group

5.5G Paves the Way for the Intelligent World

Middle Eastern countries were strategic and proactive in their quick adoption of 4G and 5G. Now the region is at the forefront of the next evolution in cutting-edge networks, 5.5G and F5.5G. These technologies will unleash unprecedented upgrades in network performance, connectivity, reliability, energy efficiency and intelligence. On the end-user side, 5.5 G's ultra-broadband capabilities and deterministic latency will empower various sectors, enhancing human-to-human, human-to-vehicle and human-to-thing interactions.

In an exclusive interview with Telecom Review, An Jian, President of Huawei Middle East & Central Asia Carrier Network Business Group, explains why 5.5G is the foundation for the region's emerging digital economy.

5G has achieved remarkable results since it was launched almost four years ago. How will the 5G network evolve in the near future?

After four years of commercial use, the development of 5G networks has progressed by leaps and bounds. According to statistics from GSMA and GSA, as of December 2022, over 240 commercial 5G networks have been deployed worldwide. In the Middle East, 5G coverage has reached 45 million people, with over 20 million 5G users, including 2.3 million 5G fixed broadband users and 57,000 5G leased line users.

Currently, 6G is still in the early research stage, and 5.5G is seen as the next step in the evolution and upgrade of 5G networks. The industry is accelerating its consensus on this matter. The 5.5G era is expected to bring a network experience that is ten times better than that of 5G and unlock 100 times more business opportunities.

The characteristics of the 5.5G era can be summarized as follows:

- **Ten times the experience:** The personal and home user experience will be enhanced from 1 Gbps to 10 Gbps, better supporting immersive, interactive and multi-user collaborative services.
- **Ten times the connectivity:** Together with all other IoT scenarios such as Nb-IoT and RedCap, the introduction of Passive-IoT technology in the 5.5G era will support an Internet of Things (IoT) scale ranging from tens of billions to hundreds of billions of devices.
- **Ten times the determinism:** The capabilities of latency, positioning and high reliability will be improved by ten times.
- **Ten times the energy efficiency:** The number of CO2 emissions per terabyte of data transmitted in mobile networks can be reduced by ten times.

- **Ten times the intelligence:** The ADN (Autonomous Driving Network) will advance from Level 3 to Level 4, resulting in a 10-fold increase in network operational efficiency.

The advent of the 5.5G era promises significant advancements in network performance, connectivity, reliability, energy efficiency and intelligence. This technological evolution is expected to revolutionize various industries and pave the way for innovative applications and services that were previously unimaginable. As the world eagerly anticipates the deployment of 5.5G networks, it is clear that the future holds immense potential for further connectivity and progress.

Could you please give us an update on 5.5G's progress?

The Middle East has achieved significant progress in 5G development over the past four years: the focus has now turned to 5.5G. This new standard is undergoing standardization and will be defined through three versions, namely 3GPP Release 18 to Release 20, which will continuously enrich the technical specifications of 5.5G. The Release 18 version is set to be frozen in the first half of 2024.

In terms of spectrum, in addition to the existing C-band, 2.6 GHz and 2.1 GHz 5G NR frequency bands, the U6G band (6425-7125 MHz) will play a crucial role in achieving 10 Gbps in the 5.5G era. Therefore, 3GPP has recommended U6G be used as a licensed spectrum, and several regional spectrum management organizations also support its identification as IMT (International Mobile Telecommunications).

This year, the industry has already introduced the first 10 Gbps chip, and commercial devices equipped with this chip are expected to hit the market in the second half of this year.

In 2023, Redcap technology is expected to enter large-scale commercialization, with over 50 commercial devices anticipated by the end of this year. Redcap technology finds applications in various scenarios, such as smart power, intelligent security and smart manufacturing.

Furthermore, the prototype of Passive-IoT terminal tags, utilizing passive IoT technology, is ready. These commercial devices will operate without batteries and have a coverage range ten times greater than traditional technologies, making them suitable for industrial manufacturing, logistics, energy, pharmaceuticals and more applications.

The development and construction of 5.5G are accelerating, with the entire industry chain actively preparing for the commercialization of 5.5G. The explosion of 5.5G is just around the corner, promising transformative advancements and new opportunities in the Middle East's telecommunications landscape.

Discuss Huawei's actions and plans in the Middle East.

Throughout the development of 4G and 5G, the Middle East has been a leading market globally. Huawei's strategic MOUs with regional operators are focused on exploring 5.5G and F5.5G. These agreements encompass new technologies, target networks and use cases and set the stage for continuous evolution.

Could you let us know the potential new capabilities and what kind of use cases can be enabled with these new capabilities?

5.5G is set to revolutionize connectivity with its ultra-broadband capabilities and deterministic latency. It empowers various sectors, enhancing human-to-human, human-to-vehicle and human-to-thing interactions.

The advent of 5.5G brings forth a new era of digital infrastructure, enabling significant advancements in personal, vehicular, and industrial connectivity. With its ultra-broadband and deterministic latency capabilities, 5.5G revolutionizes how we experience human-to-human, human-to-vehicle, and human-to-thing interactions while injecting new vitality into home broadband connections.

- **Human-to-Human Connectivity:** In the era of 5.5G, the world is transitioning from mobile internet to mobile 3D intelligent interconnection. The key foundation for the broad adoption of 3D services lies in the downlink multi-gigabit speeds and deterministic latency of 20ms @ 99% offered by 5.5G networks. This paves the way for immersive experiences and opens up new possibilities for the mobile internet. AI-Generated Content (AIGC) will emerge as the core mode of content creation in the future, driving efficient content production and diverse development. It is projected that by 2027, users' average monthly data consumption will increase by ten times, thanks to the proliferation of AIGC and the enhanced capabilities of 5.5G networks.
- **Human-to-Thing Connectivity:** 5.5G networks provide ubiquitous connectivity for high-, medium- and low-speed IoT devices. Passive IoT, a significant innovation in 5.5G cellular IoT technology, creates a trillion-dollar market for IoT applications. Passive IoT finds extensive applications in warehousing, manufacturing, logistics, consumer goods and other value-driven scenarios by offering the same cost as traditional RFID technology but with the added benefits of uplink communication capabilities and ten times the coverage.
- **Human-to-Vehicle Connectivity:** In vehicular communication, 5.5G networks redefine the concept of connected cars through vehicle-to-infrastructure (V2I) and vehicle-to-cloud (V2C) synergy. The seamless integration of communication and perception capabilities under the 5.5G 10 Gbps network enables the next generation of intelligent and networked vehicles, driving enhanced safety, efficiency and overall user experience.
- **Revitalizing Home Broadband:** 5.5 G's 10 Gbps network capacity introduces new possibilities for home broadband services, bringing transformative experiences such as ultra-high-definition multi-angle 3D immersive videos. It also enriches the Fixed Wireless Access (FWA) concept by implementing mobile technologies to achieve home broadband connectivity, offering users various applications and services. TR

TDRA Takes a Productive Part in ITU's Second TSAG Meeting

The Telecommunications and Digital Government Regulatory Authority (TDRA) participated in the second meeting of the Telecommunication Standardization Advisory Group (TSAG) held at ITU headquarters in Geneva from May 30 to June 2, 2023.

The TDRA delegation participated in the preparation and review of the operational and financial plans for the Telecommunication Standardization Sector and the work of the sector's study groups in preparation for the World Telecommunication Standardization Assembly, which will be held next year.

The TDRA delegation included Abdulla Bin Khadia, Eng. Omar Al Nemer and Shamma Lootah (remotely).

TSAG entered the 2022-2024 study period with a strong mandate to prepare the restructuring of ITU-T study groups. The leaders of ITU's standardization expert groups (ITU T study groups) are invited to play a central role in this work, highlighting the basis of the future ITU-T study group strategy.

TSAG aims to act as an advisory body to the study groups, membership and staff of ITU-T, keeping in mind the needs of all members, from developed and developing countries, and from industry and governments. It is responsible for the working procedures defined in the A-series Recommendations and the organization of the ITU-T work program. It performs an extremely important function within ITU-T by following up on the implementation of the work program and advising the Director of ITU-T's secretariat (the Telecommunication Standardization Bureau, or TSB).

TSAG is called on to resolve coordination issues among the study groups, to expand electronic working methods for the ITU-T and to provide advice and procedures on relationships with other standards bodies. Additionally, this group, which meets every nine months, is responsible for reviewing the operational and financial plans of the ITU-T and acts as the preparatory group for the quadrennial World Telecommunication Standardization Assembly.

Recently, much work has centered on the way that NGN work should be coordinated, a key issue for all ITU-T study groups and focus groups.

Huawei, ITU-ARCC to Jointly Focus on Cybersecurity in Arab World

The ITU Arab Regional Cyber Security Center (ITU-ARCC) and Huawei have signed an agreement to jointly promote public-private partnerships (PPPs) in cybersecurity. The cooperation agreement was signed by Eng. Badar Al Salehi, Director General, Oman National CERT, and Head of the ITU Arab Regional Cybersecurity Center (ITU-ARCC), representing ITU-ARCC, and Shunli Wang, VP of Huawei Middle East and Central Asia, during COMEX 2023. The signing of this agreement marks a new era of cooperation between the regional cybersecurity organization ITU-ARCC and global ICT leader Huawei to promote cybersecurity knowledge transfer, sharing of best practices and capacity building in the Arab world.

The agreement seeks to strengthen the collaboration among Arab cybersecurity experts to effectively address threats and incident response in cyberspace. It also aims to nurture an open, mutually beneficial and neutral cybersecurity ecosystem through inclusive public and private partnerships. Further, both entities seek to jointly support efforts to establish a secure, prosperous and sustainable Arab digital economic ecosystem.

Commenting on the role of the agreement in supporting cybersecurity, Eng. Badar Al Salehi said, "The cybersecurity market is witnessing steady growth, reaching more than $270 billion, and is expected to reach $600 billion by 2025. This agreement comes in line with the Regional Cybersecurity Week launched by the Sultanate last November, through which we aim to develop the cybersecurity industry in the Arab countries."

Aloysius Cheang, CSO of Huawei Middle East and Central Asia, said, "Cyber defense is truly a team sport where all stakeholders have a role in protecting our ICT infrastructure. Further, deploying one solution to fit all cybersecurity scenarios is impossible, requiring unified standards and technological measures covering the whole cybersecurity ecosystem. With that in mind, we at Huawei are honored to partner with the ITU-ARCC, to support its efforts in addressing the cybersecurity challenges by providing secure and trustworthy products, solutions, and services."

e& and Vodafone Forge Strategic Ties Across EMEA Region

e& and Vodafone Group Plc have agreed to a strategic relationship that will bring certain aspects of the two operators' businesses closer together across Europe, the Middle East and Africa.

As part of this strategic relationship, e& and Vodafone have entered into a relationship agreement that establishes e& as a cornerstone shareholder of Vodafone (the "Relationship Agreement"). This is the next phase in a strategic relationship that began in May 2022, when e& made its original investment in Vodafone.

The strategic relationship also enables collaboration across a broad range of growth areas, as e& and Vodafone may be able to benefit from each other's respective operational scale and complementary geographic footprint. The key areas of commercial collaboration that e& and Vodafone will initially pursue include:

In Enterprise, e& and Vodafone will explore jointly offering cross-border digital services and solutions to multi-national customers and public sector organizations. Services will include fixed and mobile connectivity, mobile private networks, IoT, cybersecurity and cloud-based services.

In Procurement, e& and Vodafone will seek to share best practices and may adopt joint procurement.

In Carrier, Wholesale and Roaming, the two operators will work together to become the partner of choice in providing access to high-quality digital infrastructure.

In Technology, both teams will seek to work together on a technology roadmap.

Under the terms of the Relationship Agreement, the Group Chief Executive Officer of e& will join the Vodafone Board as a non-executive Director (the "e& Nominee") for as long as e& maintains its current shareholding of 14.6%. e& will also have the ability to nominate a second non-executive Director (the "Independent Nominee"), independent of e&, if its shareholding exceeds 20% (subject to certain adjustments while regulatory approvals are outstanding). These appointments are subject to receipt by e& of the required regulatory approvals.

AWS Report: UAE Public Cloud Adoption to Unlock Billions Over Next Decade

Amazon Web Services (AWS) commissioned a new report quantifying the relationship between public cloud computing adoption, national productivity and economic growth in the Middle East and North Africa (MENA) region. The report highlights the potential for the UAE to unlock US$181 billion in additional economic value over the next decade (2023-2033), or 2.5% of the UAE's cumulative GDP, by accelerating adoption of cloud.

Unleashing the Economic Power of Cloud Computing in the UAE

In 2021, public cloud adoption made a significant impact on the UAE's economy. According to the report, it contributed 2.26% to the country's GDP — an economic value of US$9.5 billion — the largest public cloud contribution to GDP in the region. This "productivity" effect is in addition to the "construction" effect of building and operating cloud infrastructures in the UAE, which, in the case of AWS UAE Region, are projected to contribute US$11.2 billion to the UAE economy by 2036 and support nearly 6,000 full-time equivalent jobs annually.

In MENA, the UAE is where cloud adoption is driving the most economic growth in terms of spillovers. The report finds that a 1% increase in cloud adoption by UAE organizations will result in 0.21% (US$854.7 million) average GDP growth, which is three times the MENA average and the highest in the region. Over 91% of this impact can be attributed to the national productivity gains, or so-called "spillover effects," on the economy, while the remainder (9%) is driven by cloud spending from UAE public and private organizations.

As an economic stimulant, cloud computing is 17% more effective in the UAE than mobile broadband.

Yasser Hassan, managing director, commercial sector, MENAT at AWS, said: "The findings of our report highlight the tremendous opportunity for the UAE to accelerate economic growth and position the country as an attractive and influential economic hub, in line with the government's "We the UAE 2031" vision launched by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai. As cloud computing continues to gain momentum, it is imperative for the UAE to continue to support cloud adoption and develop a skilled workforce to enhance the country's competitiveness on a global scale. With the support of AWS, the UAE can accelerate its digital transformation and unlock new opportunities for economic growth and social development."

Will Middle East Overcome Latest Challenges in ICT Sector?

Huge efforts towards digital transformation are now underway in the Middle East region. Not just businesses, but governments as well, are increasing their investment in technology — some more than double from 2021-2026 — to become digital hubs and ensure a suitable transition into the advanced world of technology.

Several countries best illustrate this technological advancement and achievement.

The UAE, for one, is investing heavily in this sector. The government is placing a large amount of capital investment into a global portfolio of world-class information and communications technology assets and providing high-tech employment opportunities in IT, technology, telecoms and satellite operations, all in an effort to make the country one of the most technically innovative globally.

Saudi Arabia has also prioritized its goals on the ICT level with "Saudi Vision 2030." The kingdom is substantially focused on digital transformation, as well as on the activation of key sectors: supporting industries; developing public-private businesses; reducing the country's dependence on oil revenues; providing data analytics solutions; and working on AI-friendly ecosystems.

In addition, Oman is stepping forward as well. After being hailed as the Arab Digital Capital for 2022, Muscat has prioritized the ICT sector's long-term development through "Vision 2040," a national implementation program fostering many services and opportunities.

And on the outskirts of the region, Turkey and greater Africa are also coordinating the Middle East in digitization and making mutually assured progress in this field.

Organizations Extending Their Digital Strategies

Today, half of the medium and large companies in the Middle East put digital products, channels, platforms and services at the top of their list of priorities. These companies are focusing on enabling measurable outcomes and scaling digital spending. In other words, they are looking to acquire a good share of their revenue from digital.

Analysis suggests that by 2027, more than 30% of medium and large companies will focus on innovation scaling and digital business operations. The reason for this is that digital strategies help reduce IT operations costs, address labor shortages and increase the uptake of innovation.

The Metaverse and Its Impact on the Middle East

Any talk of such advancement in the Middle East must include the Metaverse. This digital space will allow users to communicate and move virtually via their three-dimensional avatars or digital representations. The Metaverse is seen as the future for business and human interaction and is given big importance in the region. In short, Metaverse elements and applications are developing swiftly.

And while the commercial use of the Metaverse is limited to just 2% of companies for the time being, this percentage is predicted to increase to 20% in the coming year.

Furthermore, the potential contribution of the Metaverse to the GCC economies could approach US$15 billion by 2030, spreading its potential throughout the Middle East.

This is not an easy path, and many factors must be taken into consideration, including safety. Nowadays, while developing their Metaverse applications, companies are looking to minimize the amount of data in use and build a parallel digital world that gives users control over their own data. This is in an effort to keep them safe while online as well as give them the tools to respond or seek help if they are uncomfortable.

Turning Points for Region's ICT Development

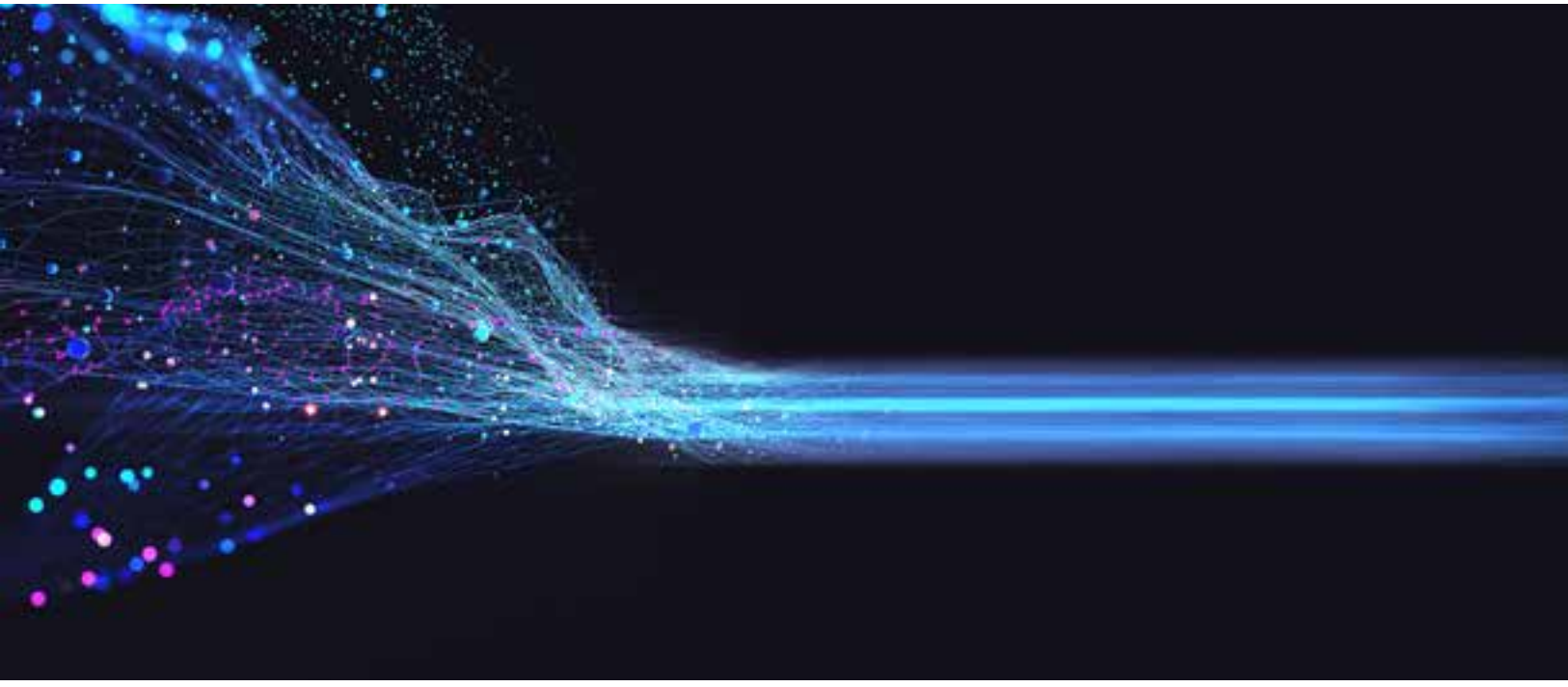
Boosting technology in the region and promoting the region to become a developed player with advanced technologies, did not happen by chance. Many factors went into this focus and achievement.

First off, because COVID-19 moved school and work into the home, ICT progress to date provided the tools and the substance for this transfer and operational continuation. This was a lifesaver on multiple levels, for sure, and the Middle East was no exception in benefiting from and thriving on these technologies.

Additionally, the economic landscape is becoming more competitive, and the region is therefore looking to further its digital aspirations and implementations in order to be an effective player. According to the latest predictions, the digital transformation spending in the META region (Middle East, Turkey and Africa) will top $48.8 billion in 2023 and accelerate at a compound annual growth rate (CAGR) of 16% over the coming years to cross the $74 billion mark by 2026.

To conclude, between being part of the technological disruption and avoiding being left behind, the Middle East has embraced its commitment to digital transformation despite the big challenges faced by this sector. The fact is that the region has realized the importance of advanced technologies and AI and is working hard towards maximizing their achievements. TR

By 2027, more than 30% of medium and large companies will focus on innovation scaling and digital business operations



Neural Networks: A Powerful Form of Deep Learning

A neural network (NN) is a set of algorithms that attempts to recognize underlying relationships in a batch of data using a technique similar to how the human brain works. In this context, neural networks are systems of neurons that might be organic or artificial in nature.

Neural networks use training data to learn and improve their accuracy over time. However, once these learning algorithms have been optimized for accuracy, they transform into powerful tools in computer science and artificial intelligence, allowing us to classify and cluster data at high speeds. Speech recognition and image recognition activities can be completed in minutes rather than hours when compared to manual identification by human experts. One of the most well-known neural networks is Google's search algorithm.

Deep Learning Algorithm

Deep learning can be thought of as a branch of machine learning. It is a field that is built on self-learning and improvement through the examination of computer algorithms. Deep learning, as opposed to machine learning, works with artificial neural networks, which are supposed to mimic how humans think and learn. Until recently, neural networks were limited in complexity due to computer power constraints. Lately, however, Big Data analytics have enabled larger, more powerful neural networks, allowing computers to monitor, understand and react to complicated situations faster than people. Image categorization, language translation and speech recognition have all benefited from deep learning. It can tackle any pattern recognition problem without the need for human intervention.

Additionally, deep learning is powered by multi-layer artificial neural networks. Deep Neural Networks (DNNs) are networks that can perform complicated operations such as representation and abstraction to make sense of images, music and text. Deep learning, the fastest-growing subject in machine learning, is a really disruptive digital technology that an increasing number of businesses are using to develop new business models.

Types of Deep Neural Networks

Deep neural networks are commonly employed nowadays in three ways: Multi-Layer Perceptrons (MLPs); Convolutional Neural Networks (CNNs); and Recurrent Neural Networks (RNNs).

An artificial neural network (ANN) is a Multi-Layer Perceptron. MLPs are the most basic deep neural network models, consisting of a series of fully connected layers. MLP machine learning algorithms can now be used to avoid the high computational resource requirements of modern deep learning systems. Each layer after that is a collection of nonlinear functions of the weighted sum of all (fully linked) outputs from the one before it.

In addition, Convolutional Neural Networks are another class of deep neural networks. CNNs are most commonly used in computer vision. Given a set of real-world images or videos, AI systems use CNNs to automatically extract features from those inputs and learn how to perform specific tasks, such as image classification, face recognition and image semantic segmentation. Unlike fully connected layers in MLP, in CNN models, one or more convolutional layers extract simple features from the input by performing convolutional operations. Each layer is a set of weighted sum nonlinear functions at different coordinates of spatially adjacent subsets of the output from the previous layer, allowing weight reuse. See below for more information.

Moreover, a Repetitive Neural Network is another type of artificial neural network that uses sequential data inputs. RNNs were developed to deal with time-series problems in sequential input data. The RNN's input consists of the current input and previous samples. The connections between nodes thus form a directed graph along the timeline. Additionally, each neuron in an RNN has an internal memory that stores computational information from previous samples.

Use Cases

Network efficiency

The idea of using artificial intelligence to optimize network efficiency and improve security dates back to the early 1980s. However, modern technology has come a long way, and innovative machine learning algorithms have made it easier to perform complex tasks like predicting failures and planning fixes.

AI has the agility to allocate network resources where they are most needed most efficiently, analyze traffic data autonomously and integrate with the many Internet of Things (IoT) devices associated with network architectures. increase. After all, no one can communicate better with one machine than another. We're already hearing people backing up the food chain.

Self-driving cars

Self-driving cars are no longer a dream. Most of these are still prototypes, but they are quite realistic today. Dozens of different companies have already invested heavily in this technological advancement. And now, in a world where the use of robot drivers and a contactless society are on the rise due to the coronavirus, self-driving cars seem even more important. If a new pandemic puts the world back into lockdown, even a simple iron bucket on wheels controlled by an algorithm could make a world of difference.

Future of NNs

Many developing technologies will no doubt lay claim to the future of NNs. The weaknesses of neural networks can be easily compensated for by integrating them with complementary technologies such as symbolic functions. The challenge is finding ways to make these systems work together to achieve common results, but engineers are already working on it. Pure complexity is also a criteria for the future of NNs. All are potentially scalable in terms of performance and complexity. As technology advances, CPUs and GPUs can become cheaper and faster, enabling the creation of larger and more efficient algorithms. One can also design neural networks that can process more data or process data faster, potentially recognizing patterns from as few as 1,000 samples instead of 10,000.

New applications are being developed. Rather than progressing vertically in terms of quicker processing power and increased complexity, neural nets could develop horizontally, allowing them to be used for a wider range of applications. Hundreds of companies might potentially benefit from neural networks in order to operate more efficiently, target new audiences, develop new goods, or increase consumer safety—yet they are grossly neglected. More acceptability, availability, and innovation from engineers and marketers have the potential to expand the uses of neural networks.

Finally, although technological optimists have been enthusiastic about neural networks' bright future, they may not be the dominant form of problem-solving AI for much longer. Neural networks' strict boundaries and significant limitations may prevent them from being optimal in a few years. TR

More acceptability, availability and innovation from engineers and marketers have the potential to expand the uses of neural networks

Elements of Impact:

Exploring Key Enablers of Cloud-Native Ecosystem

Modern innovations such as artificial intelligence, big data and Web3 are enabling seamless operations across industry verticals. And the power of cloud technology to migrate workloads from these emerging technologies to virtualized network environments is adding a new and important dimension to both the flexible scalability and reliability of modern-day business operations.

Cloud computing boasts greater computing, storage, networking, database, analytics and mobile services that increase service level protection while reducing investment in hardware upgrades, storage, servers and licenses, as well as proactive monitoring and management of the system.

Today, mobile services are becoming instrumental in designing innovative and personalized solutions through online services and applications to deliver a seamless transition, ensuring a greater degree of customer satisfaction and efficient business delivery.

From the commercial aspect, the cloud's competitive advantage comes from its on-demand pricing model, agility, ease of use and scalability in deployment. Cloud segments of infrastructure-as-a-service (IaaS),

software-as-a-service (SaaS) and platform-as-a-service (PaaS) solutions have all been steadily growing despite challenging market dynamics. In recent times, its potential role in sustainable development has also been realized across industries and sectors.

Sectors such as healthcare, for example, can adopt innovations, expand existing services to more patients, create seamless access to patient records for providers and grow partnerships. With the speed and scalability of the cloud, faster access to patient care data for thousands of clinicians and staff personnel can significantly improve outcomes and overall patient experience. Cloud-supported networks will also have the scalability to accommodate additional locations scattered around the world.

Similarly, in manufacturing, companies are using cloud services such as AWS to optimally meet surging demand for their products from sectors including construction, iron & steel, glass production, mining and agriculture in the MEA and Asia, simplifying operations and improving market performance.

However, like any other technology, the cloud ecosystem needs other elements to deliver all its goods in every hybrid, public and private cloud environment. Here are the three broad considerations:

Universal Security

Cloud-native ecosystems will require a secure environment 24/7 in order to work efficiently. With the rapid growth in 5G deployments, the ICT industry is faced with a plethora of security challenges, including the importance of customer protection and compliance as well as skill shortages.

Innovative security strategies such as breach and attack simulations (BAS) can identify vulnerabilities in security environments by representing the possible attack routes and tactics used by the perpetrators. BAS bypasses the traditional red and blue team practices by providing fully automated penetration tests. BAS can be instrumental in protecting key organizational assets by simulating likely attack techniques across all attack vectors and then providing prioritized remediation guidance. In addition, experts are increasingly suggesting a Cloud-Native Application Protection Platform (CNAPP) security model that encompasses cloud security posture management (CSPM), cloud service network security (CSNS) and cloud workload protection platform (CWPP) in a single universal platform. In addition, telecom regulators must establish classifications and frameworks for all cloud service providers (CSPs) to ensure data safety and localization.

Innovation and Collaboration

Enterprises can bring about improvements in their business operations through innovation and unlocking new sources of value. Cloud computing is increasingly making innovation possible to deliver business value to customers by easing various constraints, including multiple processes, scattered resources and inflexible rules, through an automated framework that can deliver standardized services quickly and cost-effectively. Cloud computing enables innovation by simplifying the needs of innovators to find resources to develop, test and make their innovations available to the user community.

However, innovation in a dynamic cloud ecosystem will require continuous collaboration. "We don't do it alone. Without collaboration and the right innovative partners, you cannot convince the customers. Our development team works closely with all our partners to understand the needs of the market and to ensure that our service offerings create value," says Eng. Saad A. Al-Sadhan, chief business and wholesale officer, Zain KSA, which is heading Zain Cloud in Saudi Arabia. Furthermore, as a result of the increasing cloud adoption trend in the market, Huawei recently developed its own cloud-native MetaERP system, which has been built with other Huawei systems like EulerOS and GaussDB by collaborating with other partners to incorporate such advanced technologies for future business operations.

Knowledge Sharing and Communication

The cloud ecosystem is interdependent on several components that enable the smooth functioning of cloud services. For example, the AWS Partner Network (APN) comprises a global community of 100,000 partners from more than 150 countries that leverage programs, expertise and resources to build, market and sell customer offerings. The partners utilize AWS' portfolio of services to integrate their cloud offerings and provide them to customers in the form of innovative solutions, solving technical challenges, creating new business opportunities and delivering mutual value. As such, interactive knowledge sharing is encouraged for more seamless service offerings that are in sync with the increased market demand for cloud-based solutions and services. In so doing, cloud customers can improve the way they work by accelerating their digitization journey while building resilience and catering to specific customers' needs.

Furthermore, experts predict that more powerful AI and ML solutions will function on cloud platforms in the future. To this end, Alibaba Cloud recently launched its Tongyi Qianwen Partnership Program, which aims to co-create large language models tailored for different industries with partners. The first batch of industrial models in the program will cover sectors including petrochemicals, electricity, transportation, hospitality, enterprise services, telecommunications and finance, according to the company statement. Considering that these technologies are still in their early stages, continuous updates on the know-how of the latest trends are crucial for efficient cloud market operations. Moreover, with new cloud-based services such as edge computing, virtual cloud desktops, server-less computing, automation and cloud disaster recovery slowly but surely becoming regular business operation features, cloud service providers would do well to switch into a never-ending learning mode to deliver the goods. TR

Hanan Ahmed, Chief Regulatory Affairs and Risk Officer, du

du's Hanan Ahmed: A Trailblazer for Women in Technology

The driving of regulatory and risk management efforts is integral to digital leadership. In an exclusive interview with Telecom Review, Hanan Ahmed, chief regulatory affairs and risk officer, du, talked about fulfilling regulatory obligations and customer expectations, the company's commitment to Emiratization and their efforts in empowering the next wave of women leaders, among other informative topics.

Congratulations on being du's first Emirati woman CXO. Can you share more about your background in the tech sector and your strong corporate knowledge in the public sector?

As du's first Emirati woman CXO, I am grateful for the support and opportunities provided by du in promoting and entrusting me with increasing responsibilities. My humble beginnings as a company secretary had become an integral starting point for my 14-year background in governance, audit and compliance, including roles at Dubai Group and du, has prepared me for this exciting new challenge. In my previous role, I managed the organizational governance framework, maintained government relations and ensured compliance with legal requirements and internal policies. The role required interacting with different departments and building relationships with important entities in the industry. This helped me gain knowledge, understand the market better and increase my expertise. I am eager to embrace new challenges and experiences, driving growth and success at du while inspiring others in the tech sector. As a trailblazer for women in technology, I am excited to inspire others to pursue their passions and break down barriers in this dynamic field.

In the context of your new role, what is the importance of driving regulatory and risk management efforts as a digital telco?

du is at the center of the ever-increasing role technology plays in society, and as we continuously enhance and expand our services to deliver innovative solutions that promote economic and social transformation, we must ensure we stay alive to our regulatory obligations and customer expectations with regards to these services. To do this effectively, we have honed our regulatory risk management strategies with a focus on regulations within our industry and international "good practices" in order to proactively identify and manage the associated risks.

In this way, we enhance customer confidence and foster rapid innovation in the digital ecosystem; we empower digital lifestyles, revolutionizing lives and businesses through intelligent networks and cutting-edge innovations in 5G, fixed network services and fiber deployment.

As indicated, integral to such digital leadership is driving regulatory and risk management efforts. du is a responsible and dependable service provider, and we have implemented robust regulatory compliance and risk management policies and practices to ensure that we maintain this mentality and culture as we continue our digital journey.

To ensure fair competition, network integrity and profitable operations, digital telcos must comply with regulations and manage all associated risks. This is our primary objective,

and to this end, our top priorities are consumer privacy, data protection, cybersecurity, business continuity and customer KYC.

Change is monitored and managed, but its rapid pace necessitates an equally rapid evolution of the regulatory environment. Important for shaping policies, industry standards and fostering sustainable growth and innovation is engagement with the regulator. The UAE's forward-thinking leaders and proactive regulations aid us in navigating this transition. To create the optimal operating environment, we will continue to support transformational projects such as the "We the UAE 2031 Vision" and the ICT regulatory sandbox initiative. du implements policies and practices to manage the rapid changes and to ensure that we continue our progress in our digital journey.

How essential is du's commitment to Emiratization in the ICT industry?

du's commitment to Emiratization in the ICT industry is crucial given its position as a leading UAE telecom player. Emirati talent made up 40.3% of du's workforce at the beginning of this year, with 50% consisting of women and 44% of our senior management. du's Emiratization commitment shows its support for the UAE National Agenda, which has six national priorities in different sectors, including a competitive knowledge economy, unlocking citizens' potential and letting them drive economic growth is the UAE's goal.

In line with the UAE's national agenda and Emiratization directive to increase the number of Emiratis in the private sector, du continues to strengthen its efforts to attract UAE nationals and support successful careers in telecommunications, which contribute to building a knowledge-based economy.

du's Emiratization programs train national ICT workers to fill skill gaps as well as promote innovation, local talent and technological advancement to bridge the gap between the telecom industry's skills and local candidates. Emirati professionals are more employable in ICT due to this focus on skill development. We are proud of our Graduate Trainee Program for UAE nationals last year, which allows trainees to rotate across business units and learn about new technologies and projects.

Further, with du's commitment, Emiratization in the ICT industry can improve customer experience. Emirati employees' cultural understanding, language skills and local perspective help them connect with and serve UAE customers. Localized services can boost customer loyalty and satisfaction. Local talent retention fosters industry expertise and continuity by creating a stable and experienced workforce.

Emiratization supports du's CSR goals and the local community as we empower Emiratis by providing job opportunities and professional development. Beyond business goals, this commitment helps the nation's social and economic development. It supports the UAE national agenda, builds a knowledge-based economy, improves customer experience and addresses skill gaps.

Can you tell us more about du's efforts to empower the next wave of women leaders?

du is committed to empowering the next wave of women leaders by providing them with the necessary tools and resources to succeed in their chosen fields. du has implemented a number of programs and initiatives aimed at supporting women in their professional development, including mentorship programs, leadership training and networking opportunities. These efforts have already yielded impressive results, with many women within the company rising to senior leadership positions.

du's Gender Balance Council empowers women and promotes equality and inclusion. The telco actively closes the gender gap by creating an environment that empowers women throughout their careers. The Council's initiatives and goals support our gender balance agenda and inclusive culture.

Our mentoring and learning programs are now more inclusive. Several achievements have demonstrated du's vision and commitment to gender balance. du increased the percentage of women taking courses to broaden their skillsets and accelerate the change process to transform unequal power dynamics, organizational culture and processes to advance gender equality. du mentorship program improved innovation and agility by optimizing women's talents needed for future generations.

We gave ICT presentations in UAE schools on International Day of Girls and Women in Science to promote gender equality and women's empowerment by getting more girls into tech. In accordance with the theme for this year's International Women's Day 2023, Embrace Equality, the Gender Balance Council collaborated with Aurora50 to host an event on gender equality for women in the ICT industry. The event included roundtable discussions, networking opportunities and various exercises to assist participants in understanding gender stereotypes and overcoming workplace obstacles. We are committed at du to empowering women and setting an example in the industry.

What words of advice can you give to other women who may be interested in exploring the ICT field?

To women who are interested in exploring the ICT field, I would say that it is important to have confidence in your abilities and take risks to advance yourself and your capabilities. The field is constantly evolving, so it is important to stay up-to-date with the latest technologies and trends. Seek out mentors and networking opportunities to learn from others who have experience in the industry. Don't be discouraged by any challenges or obstacles you may face, as they can often lead to valuable learning experiences. Keep an open mind and remember that diversity and inclusion are crucial for innovation and success in the ICT field, so continue to advocate for equal opportunities for all individuals regardless of gender, race or background. With dedication and hard work, you can make a significant impact in this exciting and dynamic industry. TR

Jay Srage, Head of Operations at the Michigan Ross School of Business in MEA and Managing Director at Centrigent Consulting DMCC

The Time Is Now: Shifting to a Digitalized World

In an exclusive interview, Jay Srage, head of operations at the Michigan Ross School of Business in MEA and managing director at Centrigent Consulting DMCC, discussed the benefits of integrating AI into telecommunications strategies and the top industries that are impacted by digital transformation as well as the overall future of the telecom sector.

Major companies have begun utilizing technologies like machine learning, deep learning and natural language processing to ensure that they stay competitive in their respective market sectors. Could you please tell us more about the benefits of integrating AI into telecommunications strategies?

Integrating AI technologies into telecommunications strategies started a few years back and has [now] started to reap the benefits, which are many. But to summarize into four major areas of improved efficiency, the first and foremost is improving customer experience by analyzing customer data to personalize services, recommend relevant products and provide instant responses through virtual assistants or chatbots, giving the telecom service provider a competitive advantage. Secondly, AI optimizes network performance by monitoring traffic patterns, predicting failures and

dynamically allocating resources, leading to enhanced reliability and reduced downtime. Thirdly, AI enables predictive maintenance by analyzing real-time data to detect anomalies, identify potential faults and schedule proactive repairs, minimizing service disruptions and operational costs. AI also automates operational tasks like billing, customer onboarding and network configuration, increasing efficiency and cost savings. Lastly, AI assists in network planning and expansion by analyzing usage data and population trends, helping companies make informed decisions about investments and infrastructure upgrades.

What is the current state of AI in the telecom market?

The rapid acceleration of generative AI deployment since the fall of 2022 has pushed telecom companies to race to deploy advanced technologies in one or more of the above-mentioned areas of improvement. According to AIthority, AT&T is transforming customer experiences using AI and Machine Learning applications. These applications have enabled the company to improve forecasting and capacity planning with field staff to deliver efficient customer assistance. They recorded a 7% reduction in miles traveled per dispatch and a 5% increase in productivity, which also allowed them to manage 15 million alarms per day. Another example is Deutsche Telecom, which has developed a chatbot using generative AI, Tinka, that helped the company process about 80% of the queries, significantly increasing their customer satisfaction and reducing cost. These are only examples and an indication of what's yet to come.

In the region, we have seen the major group telecom service providers evolving their strategies to become technology companies such as e&, Zain and STC. Service providers such as du have also been very active in integrating AI to improve their network planning and efficiencies. The trend has begun, and telecom service providers will gradually integrate those advanced digital technologies into their operations, organizations and business models. Consumers will stand to see the benefits in only a few months with better technical support, customized product offerings and improved network performance.

What are the top industries that are impacted by digital transformation? Which sector is affected most?

Digital transformation is a macro-event that will revolutionize every aspect and sector of the economy. Different industries react at different speeds. Besides telecom, surprisingly, the sector that was historically seen as the slowest to adopt new technologies with long design cycles that is now at the forefront of accelerated deployment of advanced technologies is the automotive sector, transforming the car from a transportation mechanism to a connected technology platform. Another sector that is currently undergoing significant transformation is finance and banking. Besides the hype of digital currencies, AI is being integrated to improve the profitability and efficiency of operations, mostly in three major functions of bank operations: risk management, fraud management and compliance. Enterprise software companies like ServiceNow are quick to integrate AI into their automation processes by partnering with Nvidia in order to deliver on the promise of automated, reliable and efficient back-office operations. Another industry that is benefiting from AI is supply chain and manufacturing (Industry 4.0). With the robotization of manufacturing, the supply chain is integrating AI to reduce the time of product introduction to market, better forecast demand and supply, and automate inventory placement and allocation, improving both delivery times and customer experience.

How do you envision the future of the telecom sector? How will AI affect its pace and trajectory?

I will simplify this answer with two messages: the first is that the vision of an all-digital network has begun and will be enabled with AI, cloud, Network Function Virtualization, SDR and other digital technologies. The other message is that the opportunity and the era for telecom companies to become technology companies that provide services to enterprise and consumers, and not just connectivity, has begun.

In your opinion, what are the different ways that artificial intelligence can aid in improving environmental sustainability?

There are many areas where AI can aid in improving environmental sustainability. The one with big impact is energy optimization, where AI can analyze energy usage patterns, predict demand, and optimize energy distribution. It enables smart grids to integrate renewable energy sources effectively. Another area is in sustainable agriculture, where AI assists in precision farming by analyzing data on weather patterns to optimize resource allocation and irrigation. Transportation also benefits from AI, where it can optimize transportation systems by analyzing traffic patterns, enabling predictive maintenance and optimizing routes. It reduces fuel consumption and improves traffic flow. TR

Digital transformation is a macro-event that will revolutionize every aspect and sector of the economy

Danial Mausoof, Head of Sales for Mobile Networks, Nokia Middle East and Africa

Nokia MEA's Rural Connect: An Innovative, Full Turn-Key Green Solution

Nokia has developed partnerships with key CSPs and TowerCos in the MEA region to deliver its Rural Connect solution. In an exclusive interview with Telecom Review, Danial Mausoof, head of sales for mobile networks, Nokia Middle East and Africa, shares information about this innovative solution, the partnerships behind it and its growth outlook, among other valuable insights.

Can you share with us details about Nokia's Rural Connect solution and the purpose behind it?

Rural Connect is an innovative, full turn-key green solution developed by the Nokia MEA Center of Expertise, specifically for MEA rural requirements and related challenges. Service providers can use it to "Connect the Unconnected" and bring mobile connectivity to low-ARPU areas with fully optimized Total Cost of Ownership (TCO). Nokia Rural Connect helps CSPs and Tower Companies reduce the digital divide by offering reliable connectivity and efficiently addressing the pressing rural key challenges:

- **Green efficient power systems:** Standalone off-grid solar solution with options to attach AC power.
- **Robust infrastructure:** Rural-design catalog for wide options of towers and supports to address maximum environments and use cases.
- **Reliable backhaul:** Flexible wired and wireless options, electrical or optical cables, Microwave, Non-Terrestrial Satellite and field-proven "UE (User Equipment) Relay" solutions. We have seen the great benefits of UE Relay backhauling solutions with one of our MEA customers. Rural sites can be connected through LTE backhaul over an 8.46 km distance from a 4G donor site and still deliver outstanding, consistent performance versus VSAT satellite transmission.
- **Future-proof scalable solution:** Nokia Rural Connect supports 2G, 3G and 4G concurrently and can scale smoothly and sustainably to 5G. Capacity upgrades can be done efficiently with Rural Connect through Nokia's unique, highly-capable and power-efficient HW (BBU and RF products) and SW features, modular power systems and efficient infrastructure solutions. Nokia Rural Connect enables CSPs to deploy and scale commercially viable rural networks at lower TCO by supporting network-sharing initiatives and technologies such as national roaming, MOCN RAN sharing, MORAN RAN sharing and Network-as-a-Service (NaaS).

Why is it important to create a future-proof rural broadband network that connects more people?
Governments and policymakers across the world are considering broadband connectivity in rural areas as a strategic priority that creates socio-economic benefits for citizens and businesses.

Rural connectivity keeps gaining momentum in MEA through many government initiatives like "Decent Life" in Egypt, Orange's "Lead the future" and MTN's "Ambition 2025," which are some examples of the commitment our customers are making to improve digital inclusion. Likewise, an increasing number of CSPs in MEA are translating the importance of rural connectivity into their strategic plans and their ESG objectives.

Case studies of rural solution deployments in Africa have shown that "future-proof" is a super important attribute that unlocks network scaling to accommodate the increased traffic growth at lower cost and optimized power consumption. The ecosystem is looking to embrace other innovative options like "RAN-sharing initiatives" between CSPs to address the economic and financial challenges in building rural networks at scale, and such infrastructure sharing features and capabilities are inherently built into Nokia's Rural Connect solution.

How will Rural Connect improve the Nokia network's reliability and effectiveness across the MEA region?
As part of Nokia CSR, Nokia is committed to contributing to economic development while improving quality of life. Furthermore, Nokia Rural Connect deployment across every corner of the MEA would allow operators to efficiently develop their coverage and be part of this growth while reducing CAPEX and OPEX through new business models such as NaaS.

- Healthcare, in which Telehealth can assist healthcare systems and providers in extending access to and raising the quality of rural healthcare.
- Education, including elementary, secondary, and higher education. This can also include special education distance learning.
- Public safety, especially first responder communications. Public Safety broadband services can rely on commercial Mobile Network Operator (MNO) infrastructure.

What more needs to be done to reach underserved communities? How will Nokia maximize its rural broadband opportunities to expand partnerships?
GSMA intelligence highlights that as of 2022, around 190 million people in Sub-Saharan Africa (17% of the population) were not covered by a mobile broadband network. Africa still has a large portion of the population that is not covered or is underserved, and the digital situation can be significantly improved through the power of partnerships.

Nokia has learned several lessons from multiple rural cases in the MEA. Some key barriers to be addressed through collaboration and partnerships to extend rural coverage and reach underserved communities are:

- **Higher CAPEX and OPEX to build mobile networks in hard-to-reach areas:** innovative green rural solutions with optimized TCO and quick Return on Investment (ROI) like Nokia Rural Connect can play a critical role in this area as a key enabler for broadband connectivity and a catalyst for digital services. Telecom operators are exploring other initiatives and new business models like RAN infrastructure sharing arrangements and Network-as-a-Service (NaaS) to lower the TCO.
- **Low smartphone penetration in rural areas:** we have seen high "2G only" or "3G only" feature phone penetration, and introducing affordable entry-level smartphones and subsidizing cost-efficient smartphones will help further the rural communities.
- **Digital literacy in rural communities:** This aspect is another stumbling block for digital inclusion as, in some cases, citizens are not quite familiar with using smartphones and mobile applications. Nokia, telecom operators and other partners can play an important role in boosting digital skills by providing relevant training.

Nokia has developed partnerships with key CSPs and TowerCos in the MEA region to deliver its Rural Connect solution. As a result of these partnerships, Nokia is deploying its Rural Connect solution in many countries across the MEA, such as Nigeria, Uganda, Kenya and Cameroon.

What are the short- and medium-term goals that Rural Connect would like to achieve in the next five years?
Nokia's Rural Connect solution is future-proof by design, which allows it to scale efficiently at optimized TCO in the next five years and address wide rural deployment options and scenarios. This will therefore help our customers bridge the digital divide at lower cost and with superior connectivity performance. While this solution was developed in the MEA market, it will soon be launched globally and available in all markets. Nokia will continue developing the solution further to ensure new potential requirements are addressed, thereby ensuring a smooth evolution towards 5G. TR

Nokia has developed partnerships with key CSPs and TowerCos in the MEA region to deliver its Rural Connect solution

Telecom Review Virtual Panel: 'E-Oman: The Success of Digital Transformation'

Telecom Review has successfully concluded its latest webinar titled "E-Oman: The Success of Digital Transformation," which gathered the telecom industry leaders within Oman. The panel featured executive panelists, namely Sheikh Talal Bin Saeed Bin Marhoon Al Mamari, CEO, Omantel Oman; Bassam Yousef Al Ibrahim, CEO, Ooredoo Oman; and Bader Al Zidi, CEO, Vodafone Oman. The panel was moderated by Abdullah S. Al-Balushi, Partner and Technology Consulting, EY.

In his welcome note, Mr. Toni Eid, Trace Media CEO and founder of Telecom Review Group, welcomed the guests and the moderator. Mr. Eid highlighted Oman's digital transformation and the achievements of Telecom Operators in the ICT sector. Before delving into the discussion, Sheikh Talal Al Mamari expressed his gratitude for being part of this panel, saying, "I think it takes Telecom Review to get all the heads in Telecom here in Oman together. I hope that this panel discussion sheds light on the most important dimensions in the sectors that provide value to the participants as much as possible."

Key Challenges in Oman's Digital Transformation Journey

For the first question, Al-Balushi asked the panelists about the key challenges faced by Oman's digital transformation in the ICT sector.

Al Mamari answered that the "foundation of ICT" is available in

Oman as they have "very heavy investment when it comes to infrastructure," specifically relating to telecom. However, when it comes to the utilization of the available opportunities in this ecosystem, Al Mamari enumerated varying challenges from stakeholders: moving from legacy systems that are not disruptive for day-to-day business and building capacity with talents that are capable and responsive to changes.

Adding his perspective, Al Zidi stated, "Vodafone Oman is a digital-native player that came into the market. We didn't need to go through the digital transformation because we were digital from day one. But that in itself has also imposed a different set of challenges."

One of them is cybersecurity, which becomes an important element in managing the data and data security of customer profiles. "As you become more digital, then that becomes even far more important."

"The challenge we have is the integration to the other sectors," Al Zidi also pointed out. Any digital transformation that a customer undergoes requires integration and synergy to complete the full ecosystem.

The affordability aspect of digital transformation is also a challenge that should be addressed in Oman when expanding its international connectivity opportunities.

In connection with the demand for digital services, Bassam shared his views on these challenges. By default, as an operator, they always want to bring the latest and greatest to the end customer. But if "he's not utilizing it to his full capacity, it's a waste of money from a telecom operator. It's also lack of utilization from the customer."

Apart from educating the customer, education is also required internally when "changing from a traditional type of telecom operator to a digital operator."

Impact of Digitalization on Oman's Economy

The ensuing discussion ventured onto the topic of the impact of digitalization, with the moderator seeking an in-depth understanding of the panelists' points of view.

In his response, Al Mamari suggested that many investors look for competitive landscapes, and those competitive landscapes are not only limited to economic incentives but also the speed of doing business.

Al Zidi said, "For us in Oman, the good news is that from an economic perspective, our potential is high. Our compound annual growth rate is above 8% year-on-year, which reflects the potential that can come from digitalization and digital transformation."

Al Ibrahim agreed with his co-panelists' opinions, stating that it would affect them as well, as they are also key telecom players in the market. "Regarding ICT development, let's go back a little bit and let's talk about technology and telecoms as a whole. For any developed or developing country in the world, one of its key pillars for growth is technology."

ICT's Role in Economic Development

Al Ibrahim highlighted the significant role of ICT in economic development and the driving force of telecoms in this process. He reflected on his experience working in both brownfield and Greenfield countries at the Ooredoo group level. He observed that the launch of basic telecom services such as voice, data, and SMS can rapidly propel economic development in a country. The technology implementation acts as a catalyst, enabling fast-tracking and leapfrogging in various areas.

Also, he expressed his admiration for the progress already achieved in Oman, acknowledging his fellow partners, the CEOs of Omantel and Vodafone, for their contributions to this journey. However, he also acknowledged that there is still more work to be done to ensure that Oman's Vision 2040 surpasses the requirements set forth, with telecom operators playing a vital role.

Cybersecurity and Its Data Protection

Furthermore, the moderator posed the following question to the panelists: "With the development of ICT, does cybersecurity play a crucial role in protecting data?"

Al Mamari was the first to respond, stating that as organizations, individuals and governments transition to a more digital ecosystem, the importance of cybersecurity in safeguarding data increases significantly. Al Mamari expressed satisfaction with the current level of cybersecurity infrastructure and government involvement but also emphasized the need to stay ahead of evolving threats and invest in people's awareness and skills.

Al Zidi added that as technology advances, cybersecurity becomes increasingly crucial in ensuring the safety and security of data, especially as a digital-native company. They have adopted artificial intelligence for analyzing cybersecurity threats and have witnessed the positive impact of leveraging advanced technology to combat evolving threats. He advised other organizations to also embrace new technologies to address the rising challenges in cybersecurity."

Al Ibrahim shared that cybersecurity has long been ingrained in Ooredoo's DNA, with the highest levels of the group emphasizing its importance. As key operators in the country, they strive to maintain top-notch security services and actively invest in cybersecurity measures. Ooredoo engages in continuous testing, operational reviews, and knowledge sharing with the group and external services to ensure robust protection of key assets."

Government Cooperation

Concerning the disaster recovery and other established services, Al Mamari said that there are several initiatives that Omantel is working on as it moves forward into the cloud. But most of the investment at this point, as they move some government entities into the cloud, is in cloud mirroring. "We are building that through several data centers across the country. There is a lot of science behind this, and most of our investment related to disaster recovery, along with the government of Oman, is based on these standards."

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To this end, Al Zidi added: "As a new global challenger that is coming into the Omani market, while we are very busy in building the foundation, we have also established foundations and reviewed the activities of the government so that we can identify where we can play roles and support the government in achieving its objectives and vision of 2040. We are particularly very excited about some of the industrial potentials like big data, AI and IoT."

Moreover, Al Ibrahim talked about many services that they are working on and that they have already implemented with the government. It goes back to the topic of heavy development or investment when it comes to their data centers. "There are a lot of services that we are looking at in all aspects. And again, this also goes back to how we can utilize the latest and the greatest that we are getting from our partners." He highlighted that the vendors play a massive role in providing them with the latest and greatest of what they see coming in the future.

Importance of Muscat as a Geographical Hub

On this level, Al Mamari declared that Oman has already been established as a regional hub. Today, in Oman, there are already 16 cable systems that are landing across the northern parts of the country as well as the south. This ecosystem of cable systems is not going to stop, and they are investing at this point in time in Salalah. Four confirmed cable systems will be landing in this city very soon. Two additional potential cables will land there. Their joint venture with Equinix has already been established in Barqa, and a similar data center will be built in Salalah. He stated also: "What is known today is that, with many other skills and specifically internet traffic, Oman is the base for the region. Google has the biggest infrastructure that serves the GCC countries and countries such as Iraq, Pakistan as well as Yemen, and some parts of the Horn of Africa."

In response, Al Zidi mentioned that he's very proud that the telecom industry is one of the few that has positively leveraged the geographical location of Oman. Vodafone Oman is evaluating a few potential opportunities. And it's a space that they would like to be in, and hopefully they will announce something shortly.

Al Ibrahim agreed with his co-panelists' opinions, saying that when it comes to international connectivity, Oman has a fantastic geographic advantage. "By pushing that, it will give the country massive opportunities; it will give also an opportunity to see how well we can grow the business in this area, not just for telecoms."

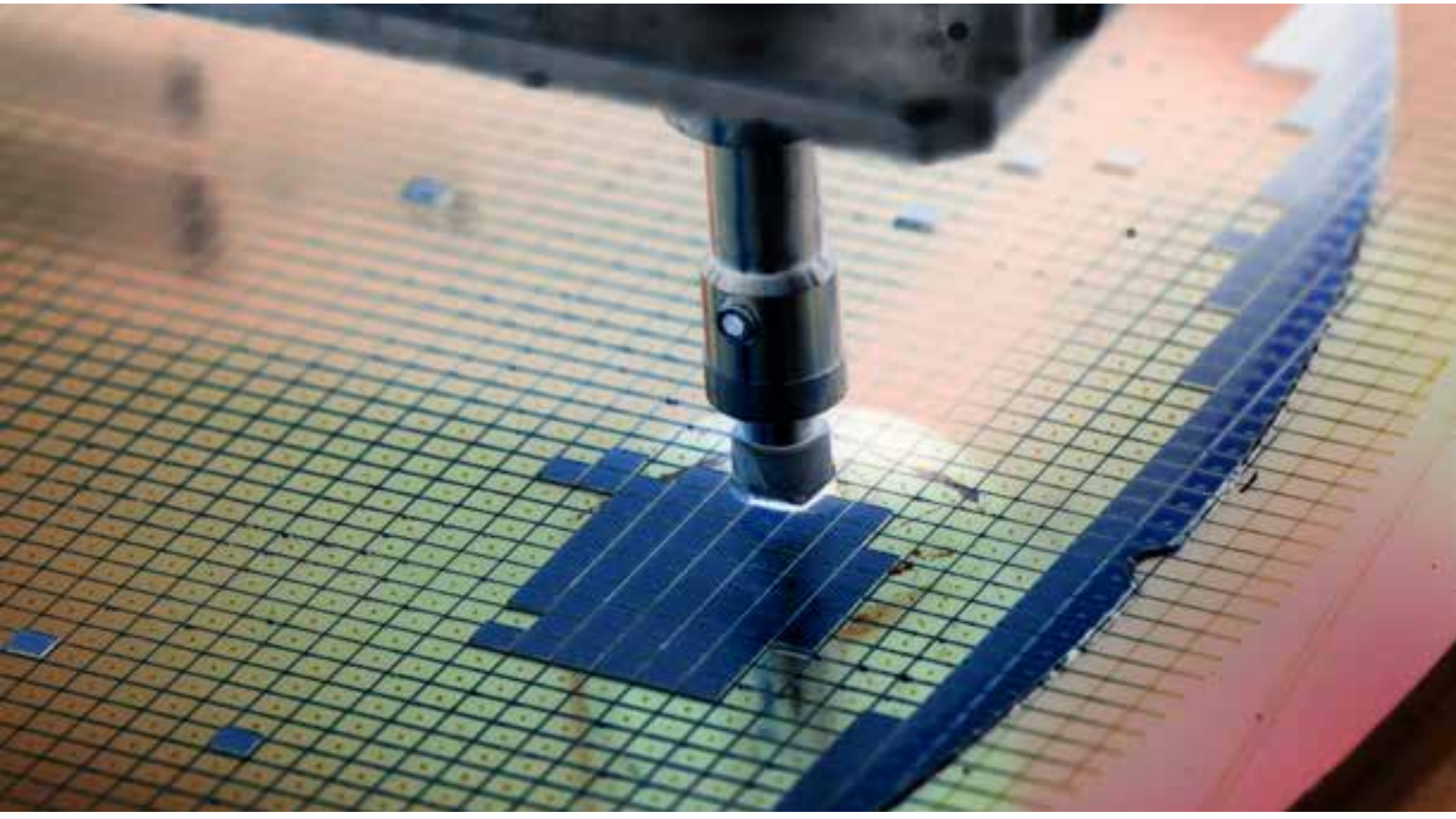
Four poll questions were then asked to the audience by the moderator, and insights on these queries were drawn from the panelists as well.

The first question posed was, "What is the most important technology to be deployed in Oman?" where 52% of the audience voted for "Artificial Intelligence," while 33% focused on "IoT" and 15% on "Emerging tracking and monitoring technologies."

The second question asked, "What is the main problem that arises when optimizing networks?" Here, the vote was distributed as follows: 16% on "Minimum-cost flow," 15% on "Max flow," 7% on "Shortest path" and 62% on "All of the above."

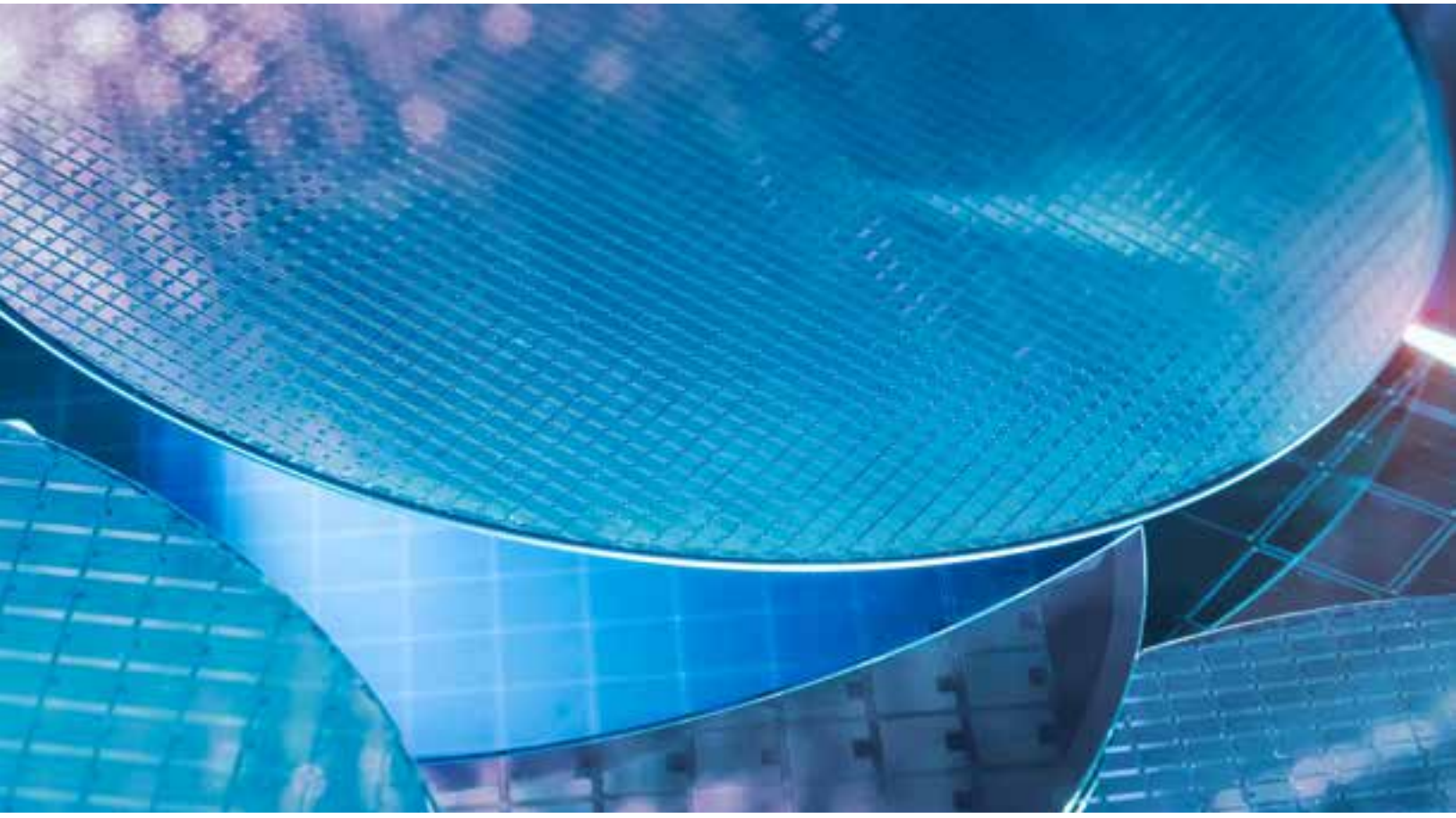
The third question pondered was, "Is cloud computing present in most sectors?" Here, 54% of the audience answered "In process," while 31% voted "Yes" and 15% "No."

The final question asked respondents to identify the main revenue stream for the ICT sector in the upcoming years. 53% of respondents agreed with "Artificial Intelligence," 29% with "Metaverse" and 18% with "Cloud Edge," while ignoring "Web 3." TR



Rolling in the Chip: A Semiconductor Quandary

The world is headed for a digital-first economy, with new industries such as the metaverse, artificial intelligence and digital currencies taking precedence in the global digital transformation. However, the integral component that will power these emerging technologies — the semiconductor or chip, which is central to all things electronic — faces a turbulent production environment. Sometimes even referred to as the "petroleum of the 21st century," the semiconductor industry is concentrated mainly in Asia (about 72% in 2022), primarily mainland China, Taiwan and South Korea. And these countries are prone to unexpected geopolitical unrest given their current political standings.



Both the US and Europe aim to boost domestic and regional semiconductor manufacturing significantly, threatening to rebalance global semiconductor manufacturing away from Asia-Pacific economies. The US and EU have planned to invest around $100 billion combined to become more self-sufficient in semiconductor production, albeit a process that could easily take years to materialize.

Leading US chip maker Intel's chief Patrick Gelsinger admitted during the last World Economic Forum in January that letting Asia take the lead in the semiconductor industry was a mistake and said that fixing it will take decades.

"We needed a global crisis (read coronavirus pandemic) to realize we had allowed ourselves to become dependent on single points of failure in the supply chain. We need resilient supply chains for the future," he told the audience at Davos.

The European Union recently raised the alarm to ramp up the production of semiconductors given the unpredictable geopolitical situation in chip-making factories in Asia. The EU is already investing heavily, intending to double the bloc's semiconductor global market share to 20% by 2030.

Lessons From the Pandemic

The global ICT industry will never forget the short supply of chips experienced during the coronavirus pandemic years between 2020 and 2022. Several reasons resulted in the scarcity of chip production: firstly, as a result of the lockdowns during the pandemic, demands from the consumer electronics industry shot up as people worked from home and engaged in online activities. Secondly, the US sanctions against Chinese technology companies added to the semiconductor shortage woes, and thirdly, Taiwan, the world's biggest supplier of computer chips — the Taiwan Semiconductor Manufacturing Company (TSMC) — experienced major drought conditions, which are highly unfavorable for the chip production process as it requires heavy use of water. The dried-up reservoirs were a major detriment to the industry.

It Needs Time

Although investing in building new chip facilities seems like a logical alternative — one that ensures self-sufficiency — in practicality, it is not as easy as it sounds. Typical semiconductor factories have limited capacity, and building new factories takes massive investment and often several years. They have to be built in factories with ultra-controlled environments, called "fabs." Dust particles, temperature fluctuations and even static electricity can damage the complex workings of semiconductors. According to analysts, currently, fabs are running at full capacity, and it will take months or

years before new ones come online to fill the extra demand.

Taming Supply and Demand

A 2022 report from the US Department of Commerce showed that "semiconductor fabs operated at over 90% utilization." Companies are racing to make the capital investments necessary to increase production. Demand will remain sustained for a long time as consumers continue to seek the requisite hardware that uses semiconductors to process the massive amounts of data needed to bring the metaverse to life. According to Statista, semiconductor revenue globally is expected to show an annual growth rate (CAGR 2023-2027) of 8.09%, resulting in a market volume of $818.6 billion by 2027. Compared globally, most revenue will be generated in China ($217.10 billion in 2023 alone).

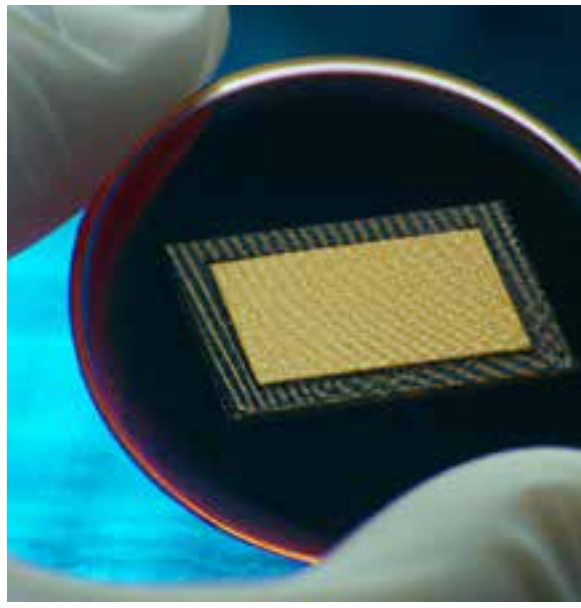
Recent semiconductor shortages have highlighted the sector's reliance on effective functionality within global supply chains, including those in the Asia-Pacific region. However, in recent developments, to further strengthen their competitive prowess over China, US senators are planning stronger legislation to tackle issues related to technology and even security concerning Taiwan.

As such, semiconductor manufacturing has been in the eye of the storm between the US and China, with Washington restricting the supplies of advanced chips or other supplies to the Asian nation, further threatening the sector. Although China is also a leading supplier and refiner of metals and rare earth materials needed for manufacturing semiconductors, the probability is that China will continue to invest in supply chains, bypassing US sanctions, and continue the production of its chips. Also, since China is a strong trading partner of key semiconductor producers in the Asia Pacific, it could threaten economic retaliation against countries that support US efforts to restrict mainland China's technological development. Taiwan's TSMC operates the world's largest silicon wafer factories and produces some of the most advanced microchips used in everything from smartphones and cars to missiles.

"If, God forbid, China all of a sudden attacked Taiwan, about three-quarters of the world's chip supply could stop," an analyst told AFP.

The chip industry is responsible for the functioning of diverse sectors, from defense to household appliances, and it is known for its supply chain volatility with the ups and downs of the world economy. For example, chip makers are currently facing losses as shipments of smartphones and personal computers are witnessing a decline given the rise in costs of these devices as a result of high inflation.

With the current high inflation-ridden global economy and strong competition growing between these world giants, it will be interesting to see if the chips coming to the market will ignite a digital revolution or choke us all with a deluge of wafers. TR



It will be interesting to see if the chips coming to the market will ignite a digital revolution or choke us all with a deluge of wafers

etisalat by e& Launches Exclusive Initiative to Support Emirati Entrepreneurs

etisalat by e& announced the launch of the "National Programme," an exclusive initiative that will support Emiratis in establishing their businesses, in line with the UAE leadership's efforts in promoting the growth of 100% locally-owned businesses and encouraging partnerships with the private sector.

The program is exclusively designed for UAE nationals looking to become etisalat by e& partners and sell etisalat by e& business services and products to customers. The aim is to onboard 50 Emirati channel partners in the next five years and support UAE entrepreneurs in realizing their potential and leading independent businesses, ultimately creating sustainable economic growth across all Emirates.

Esam Mahmoud, senior vice president, SMB, etisalat by e&, said: "We are proud to launch this exclusive programme as part of our efforts to support Emiratization and promote entrepreneurship among UAE nationals. Through this, we aim to create a partnership between the private sector and UAE nationals, ultimately contributing to the country's economic growth and development. This is also part of our commitment to the UAE leadership's vision of encouraging the growth of Emirati entrepreneurship and SMB owners."

The program's registration process is easy and straightforward, as interested Emirati business owners or new entrepreneurs have to simply upload necessary documents on a dedicated page on the etisalat by e& website. The etisalat by e& team will then review and select the right applicants and provide the necessary training needed to ensure their success as partners. The program will enable and guide Emirati start-ups and entrepreneurs with their requirements to launch and grow a successful business.

Zain KSA Achieves Record Quarterly Profit, Revenue in Q1 2023

Zain KSA recorded SAR 2.4 billion in revenue for Q1 2023, a growth of 11% compared to Q1 2022. These results reflect the success of Zain KSA's strategy, which focuses on enhancing the customer experience, expanding its footprint in next-gen technologies, investing in adjacent markets and developing its infrastructure and 5G services while continuing to enhance governance to ensure sustainable growth and profitability, which has led the company to become the preferred partner of choice for businesses and individuals.

Furthermore, Zain KSA achieved a net profit of SAR 563 million in Q1 2023, a growth of 595% compared to Q1 2022 and the highest quarterly profit in the Company's history. This record quarterly profit is a result of the Company's financial performance and the gains achieved through the sale and leaseback of Zain KSA's 3600 towers, which brought in SAR 532 million in revenue in Q1 2023. This follows the successful completion of Zain KSA's tower infrastructure sale deal and is part of the SAR 1.1 billion financial impact estimated upon the completion of the ownership transfer phase over a period of 18 months.

Commenting on the results, Zain KSA CEO, Eng. Sultan bin Abdulaziz Al-Deghaither, stated, "At Zain KSA, we continue to empower individuals, businesses and government entities with advanced digital capabilities and solutions to enable nationwide digital transformation in the Kingdom, in line with Saudi Vision 2030 objectives. The first quarter results for 2023 show a growing demand for our digital services and solutions, which has led to the expansion of our business portfolio in both the individual and business sectors. This has had a direct impact on our financial results. In addition, Zain KSA's tower infrastructure sale transaction resulted in generating substantial net profit."

Eng. Al-Deghaither added, "These results reflect the success of our commitment to our strategy of improving next-gen communication networks and scaling up 5G network infrastructure in the Kingdom. The demand-led growth in business sector services and solutions has immensely contributed to Zain KSA's first quarter revenues, alongside growing demand on our offerings in adjacent markets, especially our Fintech services provided through Tamam, the first digital microfinance provider in the Kingdom."

Commenting on Zain KSA's role in developing national talent, Eng. Al-Deghaither stated, "The Kingdom's sustainable digital transformation is only possible through skilled Saudi youth. As part of our commitment to this, we have signed a Memorandum of Understanding (MoU) with the Ministry of Human Resources and Social Development to train 50,000 Saudi men and women over the next three years. This cooperation is an integral part of the 'Wad' national campaign to encourage training within the private sector and aligns with our national commitment and strategic direction to become a key enabler of a knowledge-based society and a smart digital economy that supports Saudi Vision 2030 objectives to develop human capabilities and enhance the quality of life."

du Sets 2030 Net-Zero Ambitions to Support Key Sustainability Efforts

du, from Emirates Integrated Telecommunication Company (EITC), has committed to achieving net-zero Scope 1 and 2 emissions within its operations in the UAE by 2030 and Scope 3 by 2050. The company will be focusing on key initiatives to reduce its carbon footprint, including improving energy efficiency and sourcing renewable energy. The du climate action program will establish a clear net-zero carbon emissions roadmap for the company to advance its sustainability initiatives that have a positive human impact on future plans and operations.

Fahad Al Hassawi, CEO at du, said: "The UAE has been at the forefront of the global fight against climate change, taking proactive action to reduce the carbon impact of hydrocarbon emissions, leading the energy transition towards a more sustainable future. It is crucial for the private sector to take responsibility in environmental stewardship and play an active role in promoting sustainable development. Our net-zero ambitions are aligned to support the UAE on reaching Net-Zero emissions by 2050 and are designed to not only benefit the environment but also create economic opportunities and improve the quality of life for people in the UAE."

Advancing a Sustainable Future

du's Sustainability Report 2022 provides information on du's efforts to support three key sustainability objectives: to "make people and society happier," "operate ethically and responsibly" and "deliver the benefits of our services to all." These objectives are further split into various priority focus areas, corresponding to the United Nations' Sustainable Development Goals (SDGs).

One of the initiatives to reduce greenhouse gas emissions involves replacing diesel-powered generators with hybrid- and solar-powered alternatives. At present, there are 200 sites equipped with smart hybrid power systems that run on the latest lithium-ion battery technology, leading to a 50% reduction of diesel consumption and carbon emissions.

Vodafone Qatar Partners With Google Cloud to Support Businesses' Cloud Journeys

Vodafone Qatar has joined Google Cloud's Partner Interconnect initiative to provide Interconnect Services to support cloud adoption and accelerate the digital transformation journey of businesses of all sizes in Qatar.

This partnership will enable businesses to connect to Google Cloud through a private Vodafone network connectivity service that offers high availability, low latency and enhanced security.

The adoption of cloud services is fundamental for businesses to succeed in a digital world and drive better business outcomes. Google Cloud Partner Interconnect from Vodafone is connectivity designed to support businesses in their journeys to the cloud. The solution enables businesses and public organizations to securely connect to Google Cloud outside the public internet, making an organization's traffic less at risk of interruptions where traffic might get dropped or disrupted. It also allows businesses to dynamically scale their connection capacity to meet their requirements during high-demand periods.

During the launch event, Vodafone Qatar's Chief Technology Officer Ramy Boctor and Enterprise Business Unit Director Mahday Saad Al-Hebabi met with Google Cloud's Vice President for EMEA South Anthony Cirot and Director of Customer Engineers for EMEA South Bastien Legras to discuss the partnership and the possibilities that it will unlock for the future.

Al-Hebabi commented: "We are proud to partner with Google Cloud, and through this partnership we aim to focus on empowering organizations and enabling their workforces to connect better, thereby playing our role in accelerating digital transformation within Qatar and helping to achieve the National Vision 2030, while also helping to ensure business continuity across various industries."

Google Cloud Qatar Country Manager Ghassan Kosta said: "We are delighted that Vodafone Qatar turned to Google Cloud's scalable and secure infrastructure to provide businesses in Qatar with stronger connectivity. Together, Vodafone Qatar and Google Cloud will bring resilient services and more connectivity options to businesses in the country, which ensures that internet connectivity is not disrupted across applications or regions. This will empower businesses with a robust back-end that supports seamless operations and customer experiences."

Zain Omantel International: The Middle East's Premier Wholesale Powerhouse

Zain and Omantel have launched Zain Omantel International (ZOI), an unprecedented joint venture that will establish itself as the Middle East's premier international wholesale services provider.

This groundbreaking partnership aims to revolutionize the wholesale telecommunications sector by offering a unique proposition that combines the strengths of both parties to deliver unparalleled service and support to customers worldwide.

ZOI signifies a substantial advancement in the telecommunications industry and is poised to become a global powerhouse due to Zain's extensive regional presence and success in the retail and digital arenas, combined with Omantel's exceptional wholesale capabilities and comprehensive international subsea and terrestrial networks. The joint venture will cater to the end-to-end telecommunications needs of operators in the Middle East, as well as international carriers, data centers, hyperscalers and content and cloud providers seeking services within the region and beyond.

As a result, ZOI will manage all international wholesale requirements for Zain and Omantel operations in eight countries, serving over 55 million customers. Furthermore, ZOI will optimize the existing wholesale businesses of both companies by reducing operating costs and increasing competitiveness through access to state-of-the-art low-latency and high-capacity services over its extended footprint.

Bader Al-Kharafi, Zain Vice Chairman and Group CEO, commented, "This strategic value-enhancing partnership reflects the next stage of industry collaboration and advancement and represents another significant milestone of our '4Sight' profitable growth strategy. It also demonstrates our commitment to transforming the business and creating synergies while extending our reach and capabilities to provide the highest quality services to our customers. ZOI is ideally positioned to evolve into a significant international player on the wholesale telecommunications scene that will benefit both Zain and Omantel on financial, commercial and operational levels."

Talal Al Mamari, Omantel CEO, added, "The joint venture with Zain is a testament to our unwavering commitment to transforming the international arm of Omantel group into a leading global provider, building on our existing position as a top regional wholesale player. ZOI is poised to become the primary gateway from our region to the rest of the world, leveraging the combined strengths of Omantel and Zain. With these differentiating factors, ZOI is the preferred partner with a truly unique presence in the international telecommunications landscape."

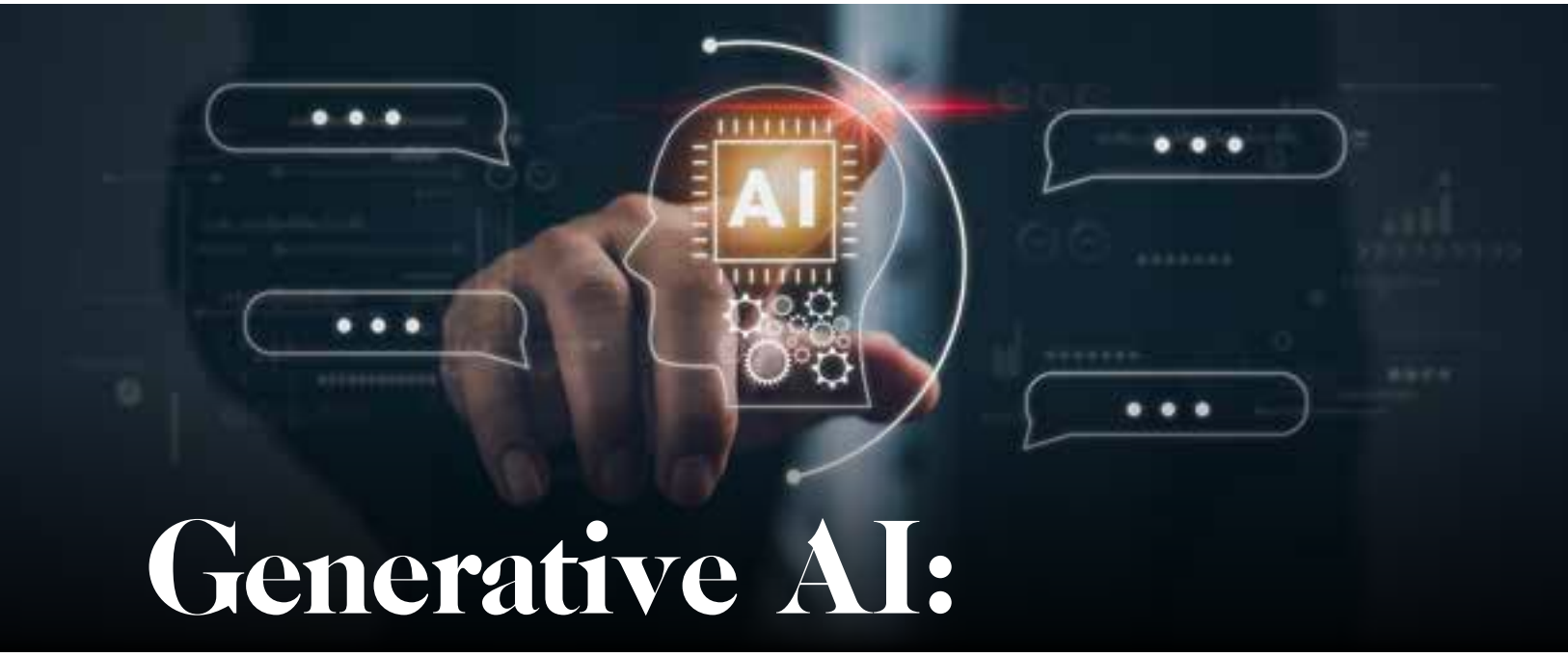
Dr. Samer Fares Appointed as Ooredoo Palestine CEO

Ooredoo has announced the appointment of Dr. Samer Fares as the new Chief Executive Officer of Ooredoo Palestine, effective May 15, 2023, succeeding Dr. Durgham Maraee.

Dr. Samer moves to Ooredoo Palestine from his most recent role as Chief Legal and Regulatory Officer at Ooredoo Algeria, bringing to his new position over 15 years of experience in the telecoms industry and in several leadership roles within the Group. Previously, he was Legal and Regulatory Director at Ooredoo Group's Legal and Regulatory Department and was General Counsel of Ooredoo Palestine before that. He holds a PhD in Law from Ghent University in Belgium.

Dr. Samer Fares succeeds former Ooredoo Palestine CEO, Dr. Durgham Maraee, who successfully drove the company's strategy and growth since 2013. Under his leadership, Ooredoo Palestine delivered strong growth in market share, subscriber base, revenue, EBITDA and net profit year after year. Dr. Maraee also oversaw the successful launch of the company's commercial services in the Gaza Strip as well as its highly successful launch of 3G services in the West Bank. With many achievements throughout the year, he has laid solid groundwork for future success.

Aziz Aluthman Fakhroo, Managing Director and Group CEO at Ooredoo Group, said, "On behalf of the entire Group, I would like to congratulate Dr. Samer Fares on his appointment as CEO of Ooredoo Palestine. Dr. Samer brings a wealth of experience and a proven track record of success to the role, and we are excited to see him lead Ooredoo Palestine to new heights. I would also like to take this opportunity to thank Dr. Durgham Maraee for his outstanding leadership and contributions to the company during his tenure. His dedication, hard work, and vision have been instrumental in shaping Ooredoo Palestine into the successful company it is today. I wish him the best of luck in his future endeavors."



Generative AI:

Can This New Tool for Enterprise Live Up to the Hype?

Just as we were getting familiar with the artificial intelligence of Google's Alexa and Amazon's Siri, our voice-controlled virtual assistants helping us navigate the digital realm, the meteoric popularity of generative AI services, particularly ChatGPT, has taken over the world's attention.

MicroSoft-backed Open AI's ChatGPT has gained such a fan following since 2022 that the startup's current value stands roughly at a staggering $29 billion, and it has not gone public yet.

Since their launches, generative-AI services such as ChatGPT, MidJourney, DALL-E, Stable Diffusion and now Google's Bard, among others, have captured the fancy of the enterprise industry, which is nothing short of a mania of sorts.

What has been the most interesting aspect of these Large Language Models, or LLMs, of artificial intelligence technology is a different set of models known as the foundation model. The term foundation model was first coined by the AI team at Stanford to differentiate the various AI models.

To put it simply, research shows that regular AI applications are built by training them with specific data (labeled data) to perform specific tasks. While the foundation model can drive all of those use cases and applications, it can also drive a number of additional applications. In a nutshell, the foundation model has the superpower to transfer to multiple different tasks and perform multiple different functions as it is trained on a huge amount of unstructured (unlabeled) data in an unsupervised manner from the internet.

In the language domain of AI, such an exercise means terabytes of data being used to train the models and the generative capability of the model — predicting and generating the next word based on previously fed words. Furthermore, by including a small amount of labeled data in the equation, it can be tuned to perform traditional natural language processing (NLP) tasks such as classification and named-entity recognition — aspects

normally not associated with a generative-based model or capability — with the process known as tuning. Even in the absence of voluminous data and only a few data points, the foundational models can still be used with low-labeled data domains through the process of prompt engineering to perform specific tasks.

"Foundation models are the driving force behind the next generation of intelligent machines, empowering them to see, hear and think in ways that were once only possible for humans," according to Demis Hassabis, CEO of DeepMind Technologies, an artificial intelligence research laboratory serving as a Google subsidiary.

The Growing Frenzy

Out of the 2,500 executive leaders surveyed by Gartner recently, 45% said that the publicity of ChatGPT prompted them to increase investments in AI. Seventy percent of them said that their organization is in investigation and exploration mode with generative AI, while 19% are in pilot or production mode. Moreover, AI has already shown its potential and can revolutionize many areas such as healthcare, finance, transportation and more through its capacity to automate tedious tasks. It can increase efficiency and provide information that was previously not possible. AI can also help us solve complex problems, make better decisions and reduce human error.

Advantages of Generative AI

Organizations experimenting with generative AI are vouching for productivity and performance with popular use cases such as media content improvement, code generation or even stock market analysis. Its services are increasingly being seen as adding value to support solutions that augment humans or machines and autonomously execute business and IT processes. For instance, the Telecommunications and Digital Government Regulatory Authority (TDRA) recently launched the "Name Ideas" initiative, which helps users choose original UAE domain names for websites through a ChatGPT-supported mechanism. This initiative allows users to find a suitable domain name for their business by simply submitting a simplified description of the commercial activity. SMEs often struggle to find a domain name to match their activity and reach the widest segment of customers, and this initiative will greatly simplify that process.

Some Downsides

Training foundational models is a costly affair. By the time the data points swell up to a huge size, they are very expensive to run inference — the process of running data points into a machine learning model to calculate an output such as a single numerical score. There may be a need for multiple GPUs to host these models and run inference concurrently, making them a more costly method than traditional approaches. Analysts and technologists estimate that the critical process of training a large language model such as ChatGPT will cost more than $4 million. More advanced language models could easily be significantly more expensive.

Most importantly, the trustworthiness of AI is currently the most hotly debated topic. Check Point Research (CPR), a leading provider of cyber security solutions globally, warns that artificial intelligence has the potential to be a transformative technology that can significantly impact our daily lives, but only with appropriate bans and regulations in place to ensure AI is used and developed ethically and responsibly. In the case of ChatGPT, experts point to concerns related to privacy in light of increasing data leaks and even the user eligibility criteria. In the general hype of things, most users do not realize that the sensitive information entered into services like ChatGPT will be very valuable if leaked and could be used for targeted marketing purposes — an unprecedented potential for social manipulation.

A Mindful Approach

In March 2023, over 1,000 technologists, including tech billionaire Elon Musk and Apple co-founder Steve Wozniak, called for a pause in the development of powerful AI systems to ensure the safety of their use. Furthermore, a prominent computer scientist often dubbed "the godfather of artificial intelligence," Geoffrey Hinton, recently quit his job at Google to speak out about the dangers of the technology.

In conclusion, we can safely say that the impact of AI on our society will depend on how we choose to develop and use this technology. It will be important to weigh the potential benefits and risks while trying to ensure that AI is developed in a responsible, ethical and beneficial way for society.

"When the decisions are built on AI, there will be false positives, and there needs to be a way to measure the efficacy of what it is doing and be able to roll back or test the waters. So there is a traffic engineering and test-and-move-forward approach that has to be built-in AI. Intuition is very important for trust to grow," reasons Gaurav Rastogi, senior director, R&D, VMware, a significant global player in the Cloud and AI space. TR

70% of surveyed organizations are in investigation and exploration mode with generative AI

Power on the Page: Why Internet Firms Must Rein In Their Content

We have reached a point in time where it's hard to imagine life without endless content streaming on our connected devices. From wacky TikTok videos to serious talking heads and even hardcore terrorist campaigns, it's all out there for our consumption.

As such, this content diet is inadvertently shaping our perspective of the world around us. Some of the effects of this content have been highly debatable. Mental health experts, for example, have warned of the potential for fear-inducing videos available on channels like YouTube to affect brain development in young children. They've cautioned against viewers being exposed to self-harm videos or even ones that show how to make Molotov cocktail bombs, etc.

But who should be responsible for the many ills taking place today as a direct (or indirect) result of such content? To that end, however, it would be wrong to view all the content on social media channels and other platforms through the same lens of eagle-eyed scrutiny; many are genuine gems of free information exchange.

So far, all of the internet giants are free of legal obligations relating to their content. In the US, under the provisions of Section 230 of the US Communication Decency Act, tech platforms are not legally liable for the content they host. Despite the various attempts of both parties in the US Congress to amend the act, content governance is hitherto dictated by the terms of the tech companies themselves.

Tech giants such as Facebook, Instagram, Twitter, TikTok and YouTube have been regularly bypassing the Section 230 arrangement while flooding the user feeds with content that they "think" is fit for their audience ad nauseam.

Raising Eyebrows

Perhaps the most challenging aspect in the deluge of content generation has been the advent of fake news. The damaging effects of fake news have shattered our belief systems in such information integrity. We no longer believe in nor can we tell wrong from right. We have been propelled into a state of perpetual confusion through the spread of rampant misinformation and disinformation. Even the established sources of information are struggling to cope with this debilitating phenomenon. And to top it all off, new technologies have made generating false content a cakewalk — think AI-generated content such as deep fakes.

To tackle such challenges, news agencies have initiated dedicated fact-checking units. However, social scientists have reached the conclusion that the direct impact of fact-checked corrections is "often very limited." The process of fact-checking and content moderation is no mean feat, and it will require continuous training and motivational support to achieve efficient and rewarding outcomes. Research shows that Facebook users engage with misinformation in the form of fake news 70 million times per month on average. This is a drop from the 2016 peak of 200 million monthly fake news engagements. On Twitter, people share false content 4 million to 6 million times per month, a figure that has not declined since the 2016 US election, which made history for the unbridled micro-targeting of users with misinformation to sway their votes.

Similarly, unsuspecting app users have been duped out of their savings and personal data by the use of click-bait content by nefarious perpetrators under the guise of hard-to-resist takeaways and gift offers. Online shoppers continue to experience disheartening surprises when finding that, for instance, their most desired recent online purchase turns out to be fake merchandise. Despite the efforts and claims by application owners about tightening the content and data privacy policies, the occurrence of online harm experienced by consumers tells a different story altogether.

Who's Got the Data?

The use of platforms like TikTok is being banned by many governments across the world due to the company's ambiguity regarding the efficient management of their users' data.

Not surprisingly, in a recent response to a 2014 lawsuit filed by a group of activists against Google Korea, South Korea's Supreme Court has demanded that Google come clean on the details of its sharing of the personal information of South Korean nationals with third parties. According to news reports, the complaint against Google is that it had passed on user information to the American government's "PRISM" intelligence program.

However, as per US laws, Google has the right to reject the demand. The Korean Supreme Court has maintained that Google's obligation to abide by US laws does not "legitimize" its practice in South Korea. Under South Korean law, online service providers must comply with individual users' requests and provide records of whether — and how — their data has been shared with a third party.

Until and unless such data governance policies are streamlined into transparent and binding regulations, the global digital economy faces a challenging environment.

> Given the Pandora's Box that online media has become today, governments around the world are trying to work out a method to sanitize digital platforms

Putting Measures in Place

Given the Pandora's Box that online media has become today, governments around the world are trying to work out a method to sanitize digital platforms. One such initiative in Europe has taken the shape of the Digital Services Act (DSA). Guided by the principle that "what is illegal offline should be illegal online," the DSA aims to provide clearer and more standardized rules for large and small digital service providers across the European market. The DSA will regulate how both big and small platforms moderate content, advertise and use algorithms for recommendation systems across online marketplaces, social networks, app stores, travel and accommodation platforms, and many others.

Moreover, initiatives such as UNESCO's Internet for Trust conference in February brought together over 3,000 representatives of governments, regulatory bodies, digital companies, academia and civil society to discuss the dilemma of misleading information on social media channels. UNESCO will finalize and publish the guidelines by mid-2023, the use of which will then be expected — by governments, regulatory and judicial bodies, civil society, the media and digital companies themselves — to help improve the reliability of information online while maintaining the promotion of freedom of expression and human rights.

The Long and Winding Path

Experts predict a more difficult battle against misinformation in the future unless efforts are made to rein it in now. Given the arms race toward AI supremacy among tech giants, including Google and Microsoft, misinformation might unintentionally be presented more convincingly, as is being witnessed in the case of chatbot services like Google Bard and ChatGPT. Such AI chatbot services have already come under the radar and scrutiny of governments around the globe.

Most importantly, while efforts such as the DSA, the Internet for Trust and many similar initiatives are under way, internet companies would do well to act proactively regarding their platform policies, including their enforcement, the coordination of automation and people for critical operations, closed-loop feedback mechanisms and the like, to be on top of challenges that may surface in the future.

"If people continue to tolerate social media algorithms that reward lies, future generations will inherit a world in which truth has been dangerously devalued," warned UNESCO director-general Audrey Azoulay during her prescient keynote address at the Internet for Trust conference. TR

ZainTech Expands Tech Services Portfolio With Adfolks Acquisition

ZainTech, the one-stop digital solutions powerhouse of Zain Group, announces the acquisition of Adfolks, a UAE-based cloud-native engineering firm that provides a comprehensive range of cloud transformation services. This acquisition aligns with ZainTech's strategic plan to expand its technology services and offer holistic solutions to its growing customer base and represents another step in Zain Group's "4Sight" strategy, transforming from a mobile operator to a multi-core digital ICT entity.

This acquisition will further expand ZainTech's technology services portfolio, including innovative, scalable and secure cloud-native applications and other technology solutions for its clients across the region.

Andrew Hanna, CEO of ZainTech, commented, "Combining Adfolks' expertise and talent with ZainTech's and Zain's B2B teams' resources and capabilities will enable us to drive even more value for our clients in the dynamic and constantly evolving technology landscape by streamlining their digital transformation journey, making it simpler and more seamless than ever before."

Arun Mohan, CEO of Adfolks, said, "I am excited about this next chapter for Adfolks with ZainTech. The combined strength will be a value not only to our respective business objectives but most importantly to our clients, who will benefit from the combined expertise and innovation of Adfolks and ZainTech."

Adfolks was founded by Mohan in 2016 with a vision to help clients leverage cloud and cloud-native technologies to solve their business challenges. The company provides exclusive services that automate technological processes, accelerating time to value and returns on investment.

Adfolks has a proven track record for creating growth through transformative technology and agile delivery methods and is recognized for its expertise in Modern Infrastructure, Application Modernization, Security, Data & ML and Automation.

As a Microsoft Azure Cloud Gold Managed Partner, AWS Select Partner and GCP Consulting Partner, Adfolks brings its team of expert engineers, customer success managers, and agile project delivery specialists to the ZainTech family.

The acquisition of AdFolks follows ZainTech's recent acquisition of BIOS Middle East, a leading provider of Managed Private Cloud Services in the region. Both entities strengthen ZainTech's portfolio of hybrid, cloud-native and multi-cloud managed services.

Nokia Adds AI Solution to Fixed Network SaaS Suite to Improve Service Offerings

Nokia has announced an expansion of its Fixed Network solutions suite available through a Software-as-a-Service (SaaS) delivery model with the launch of AVA Fixed Network Insights, which will enable operators to strengthen their customer service offering while reducing operating costs.

Using AI/ML insights powered by Bell Labs algorithms across DSL, fiber and fixed wireless access networks, AVA Fixed Network Insights provides operations and customer care teams with automated recommendations to proactively identify and remotely resolve problems within both home and access domains before they lead to network service problems and to reduce call handling times and improve first call resolution.

Through services consumed purely on demand through a subscription, Nokia's approach to telecom SaaS is about enhancing operators' ability to launch new services faster, improve time to value more quickly and cut complexity. It also avoids large upfront investments and the need to perform on-site software maintenance and updates.

AVA Fixed Network Insights is expected to eventually entail chatbot-driven support through easy-to-implement recommendations that can be utilized by the end-user without the need for onsite or remote technical support.

AVA Fixed Network Insights is expected to be commercially available by the end of this year.

Nokia's Fixed Networks applications, including Altiplano Access Controller and WiFi Cloud Controller, can already be deployed by operators through a SaaS subscription.

Julie Kunstler, Chief Analyst, Broadband Access Intelligent Service, at Omdia, said: "The SaaS delivery model is a critical piece of digital transformation for operators. Nokia's new Fixed Network Insights SaaS component provides operators with another needed pathway towards AIOps-driven, self-healing fixed broadband networks."

stc Collaborates with Huawei to Deploy Agile and Automated Network for Cloudification Drive

stc Group, the digital enabler in the region, announced the collaboration strategy today, which includes a partnership with Huawei to build the industry's best cloud infrastructure and deliver the highest service experience to its end users.

This cooperation with Huawei is part of the evolution of Intelligent Telecom Network O&M and the agile network architecture. The first CDCT (Continuous Delivery Continuous Testing) Validation under Telco cloud Partnership program in KSA was completed via stc lab capabilities, which accelerates the 5G Standalone Core vision of an optimized telecom network architecture with intelligent operation and maintenance.

stc completed the 5G Core Network Functions automatic upgrade test case with the Huawei MBB Autonomous Engine (MAE) solution and associated team. This signifies a giant step taken forward under the stc Network Cloudification and Automation Strategy that aims to support Saudi Arabia's vision of economic diversification in 2030. The stc strategy aims to deploy an agile cloud-native, next-generation platform, including 5G edge computing and convergent and digital networks, through a sustainable, shortened TTM and optimized TCO approach. As the first practice of the CDCT use case validation project in KSA, stc Group demonstrated VNF/CNF onboarding and upgrading scenarios with a cloud detector — a simulator to perform automatic function test cases, thus successfully achieving O&M transformation from the NE-centered manual mode to the service-centered adaptive mode.

The traditional network functions upgrade mode brings challenges to core network O&M mechanisms and to network security. As the digital enabler in the region, stc Group has always been focused on innovation and evolution. By exploring the concept of ADN (autonomous driving network) with Huawei, an advanced automatic workflow engine is introduced to orchestrate automation capabilities, such as agile service onboarding and tools, for quickly implementing automated process orchestration in scenarios such as NE upgrade, capacity expansion, scaling, and reconstruction.

Red Hat's Partner Day: Staking Claim as Open Hybrid Cloud Tech Leader

Telecom Review was invited to a closed-door media roundtable held during Red Hat's Partner Day event at The Ritz-Carlton, Dubai, on May 17, 2023.

Adrian Pickering, general manager, Red Hat MENA welcomed partner representatives, including Raja Agrawal, head of Microsoft Azure MEA; Ronald Powell, VP of Hybrid Cloud - CTO Office, Injazat; and Tarek El Araby, digital solutions director, GBM, as well as invited members of the press.

Red Hat Strategy Update and Ecosystem Relevance

In his presentation, Pickering tackled the new normal scenario and highlighted how Red Hat supports innovation anywhere with broad choice and flexibility.

Beginning his talk with the impact of COVID-19 in elevating the importance of technology, Pickering stated that "innovation is very high" and that he's never been more excited about "how open source-based solutions are being perceived and received in the various countries."

Red Hat continues to drive innovation around community-based open source development. Pickering quoted company CEO Matt Hicks on considering the open hybrid cloud as the North Star of Red Hat: "That's our fundamental strategic direction, and we're getting good growth rates on a global basis."

The majority of Red Hat MENA's time today is spent working with developers because "they want to have the tools, capabilities and capacity to develop either applications based on the demands of the business or they want to modernize existing applications so that they can migrate off legacy infrastructure."

In a hybrid cloud evolution, there's a significant runway remaining, as less than 25% of workloads are moved to the cloud. Today, there is a shift from public cloud to hybrid and multi-cloud, and in the future, hybrid cloud will extend to enterprise edge infrastructure.

"We do our best to actually support this transition in their business," explained Pickering, and by embracing partners and delivering differentiated cloud services from hyperscalers, Red Hat's platform relevance will be strengthened.

66% of UAE Organizations Faced Breaches in 2022, Infoblox Report Finds

Two-thirds (66%) of UAE respondents reported one or more breaches to their organization from cyberattacks — most originating from Wi-Fi access points, according to Infoblox's 2023 Global State of Cybersecurity Report.

Mohammed Al-Moneer, regional senior director, META at Infoblox, commented, "Most fear data leaks and cloud attacks and do not believe they have a firm handle on the insider threat."

In the next 12 months, UAE respondents said their organization will be most concerned about data leakage (48%), cloud attacks (40%) and attacks through networked IoT (29%). Moreover, they believe that they are least prepared to defend their organization's networks against the abovementioned threats.

"Financial damage is one of the highest in the EMEA region, and system outages or downtime are among the chief fallouts," mentioned Al-Moneer.

Collectively, the estimated average value of UAE organizational losses resulting from breaches in the past year was roughly AED 8 million (US$2.2 million).

Organizations that were victims of breaches mostly experienced system outages or downtime (49%), data lockouts due to ransomware (41%), other malware infections (39%) or data manipulation (38%).

"Networking and security work better together when they share real-time visibility into application, user and device context," added Mohammed. "Real-time threat protection and more resilient network performance can only happen when networking and security work side by side."

On average, most organizations (69%) take up to 24 hours to investigate a threat, with many relying on third-party threat intelligence platforms or services. To aid their investigations or threat hunts, security teams mostly rely on vulnerability information (44%), DNS queries and responses (43%), open-source intelligence (39%) and network flow data (38%).

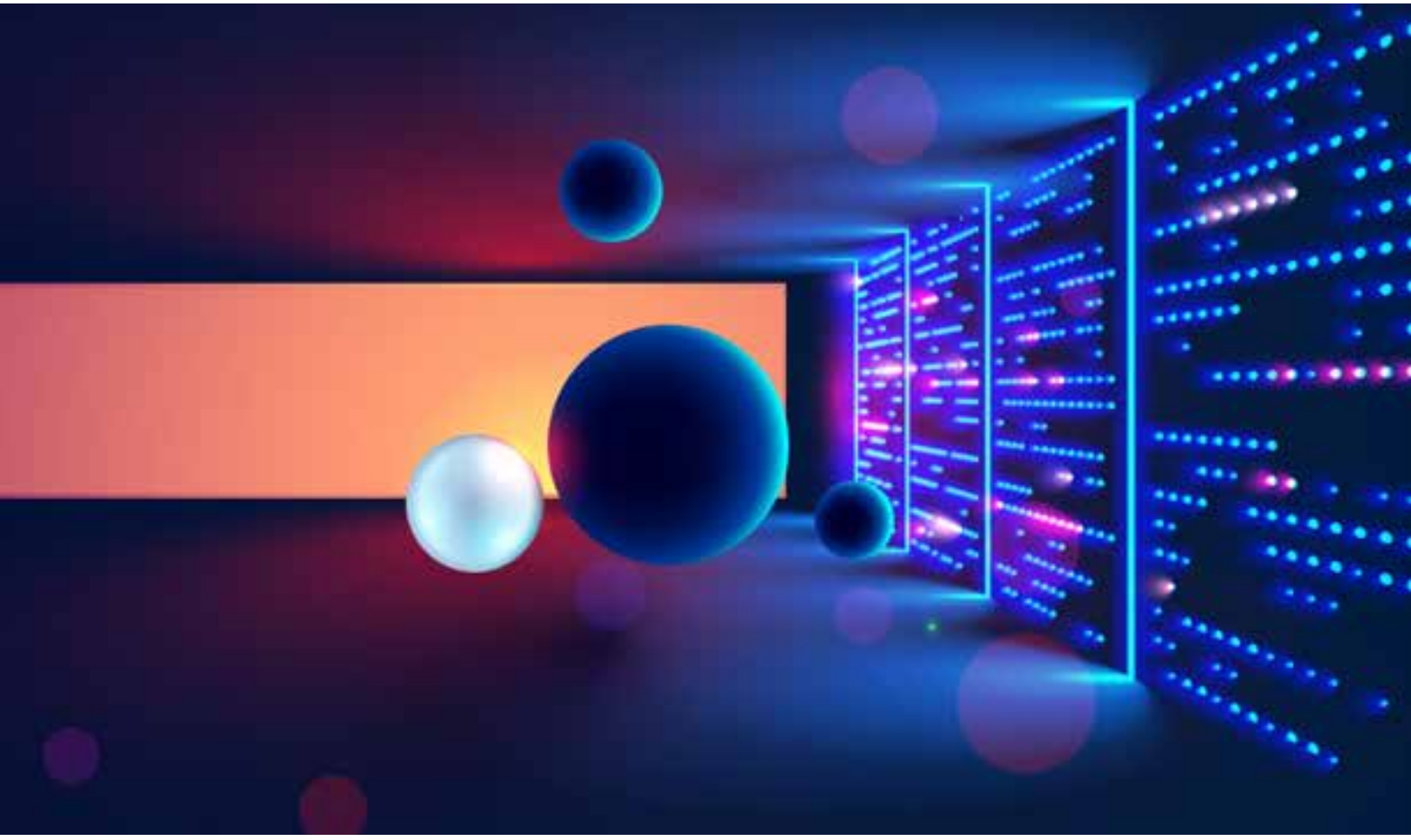
Khazna Data Centers, Benya Group to Build Egypt's First Hyperscale Data Center

Khazna Data Centers (Khazna), the largest network of hyperscale data centers in the Middle East and North Africa region, announced its plan to enter the Egypt market with Benya Group, the leading integrated solution, digital transformation, and ICT infrastructure provider in Egypt and the MEA region.

The new US$250 million state-of-the-art data center will be Egypt's first hyperscale data center and will be built at the Maadi Technology Park, Egypt's first specialized investment zone.

With an expected capacity of 25 MW of IT load, the data center will unlock opportunities for businesses in Egypt aiming to expand internationally and targeting multinational corporations that are pursuing growth and innovation in the Middle East and North African markets. Egypt has recently undertaken a series of investments, digital government service reforms, and infrastructure upgrades to enhance the contribution of the Information and Communications Technology (ICT) sector to the country's economic growth. The inauguration of this data center will further address the need for a future-ready digital infrastructure in Egypt, where data demands have risen significantly in recent years. This will also support Khazna's growth strategy in international markets, reinforcing its commitment to expand operations beyond the UAE.

"We are thrilled to announce our partnership with Khazna, which will enable us to enter the hyperscale data center construction sector with full force. This MoU we signed represents a significant step towards strengthening our role in establishing this type of data centers in Egypt, with the support of our partner, Khazna Data Centers, which has an excellent reputation and outstanding expertise in this sector," said Ahmed Mekky, chairman and CEO of Benya Group. "The new hyperscale data center will not only meet the needs of the Egyptian market but also, through its extensive capabilities, serve African and Middle Eastern countries. It will contribute to attracting more investments for business sectors involving intensive operations, supporting cloud computing and content system operators. In addition, it will encourage major commercial companies to join these giant digital clusters that rely on the latest cloud computing applications, digital technology, and big data. This MoU is also in line with the group's policy to enhance Egypt's digital infrastructure and support the government's plans to increase foreign investments, as well as support the Ministry of Communications and Information Technology's policy for digital transformation."



Space: The Ideal Data Center Frontier

According to the most current information, data centers consume more than 90 terawatt hours and produce emissions equivalent to 27 million tons of CO2 annually within the Europe, Middle East and Africa (EMEA) region alone.

With such a high negative impact in terms of both power consumption and carbon emissions, finding a solution is paramount to the sustainability goals of the region. To this end, over the next five years or so, data centers may become an addition to the current infrastructure of outer space. Alongside commercial space stations and low Earth orbit (LEO) satellites, space data centers may soon join this celestial neighborhood, a move that could prove an ideal boost for the thriving digital economy.

What Do Data Centers Require?

In order for a data center to operate, it requires large amounts of land (area), energy and cooling. Each of these is available in abundance in space,

particularly our most plentiful natural source of renewable energy: the sun.

Moving data centers into orbit would eliminate most of the energy costs associated with their operations as well as the detrimental impact such terrestrial usage has on the environment. Instead, their energy would come directly from the sun, with their cooling being, in part, a simple physiological benefit of their location in space (with low Earth orbit temperatures falling to -100°C).

Over the next decade, we anticipate exploration of and intensive work on such projects in space from service providers, infrastructure vendors, satellite companies and hyperscalers alike. These tech enablers are keen to take advantage of the vastness of the space and utilize it for data storage, processing and security, all while maintaining their sustainability goals.

In conceptualizing and constructing these space data centers of the future, a successful data center power and cooling design is a must. This will help apply the relevant cooling techniques and power distribution principles efficiently, with less energy and more productivity, and with a reduced carbon footprint as well.

Preparations Beyond the Sky

The concept of moving data centers to space is currently being fruitfully explored for its core objective of addressing data centers' copious and growing demands on the planet's limited resources.

In light of this exponential increase in data volumes and computing, the European Commission initiated a feasibility study, the Advanced Space Cloud for the European Net-Zero Emissions and Data Sovereignty (ASCEND) program. The investigation seeks to ultimately reduce the energy expenditure and pollution produced by data centers.

The main goal is to deploy data centers in the Earth's orbit while considering several key factors that impact the viability of such a build on the infinite horizon. Experts hold that this facility construction will be fully automated with specially developed robotic assembly technology. Indeed, one of the principles envisioned is to design these modular facilities with electronic components that can be easily transported on reusable space shuttles.

To further reduce structural requirements, optical technology will be the foundation of data center connectivity in space. Optical networks function in such a way that storage is not required to be located in close proximity to the processing or function. This is an ideal scenario for both powering space data centers and allowing them to be more modular, flexible and distributed.

The Japanese telecom and technology firm NTT has already unveiled plans to launch a data center into space as early as 2025. The micro data center, housed in a satellite, will collect valuable data, including images and video. Rather than the more costly procedure of beaming all that information down to Earth, the space-based premise will process the information above the atmosphere.

Moreover, a Florida-based cloud computing startup is raising funds to build a series of data centers on the moon. In fact, Lonestar successfully tested its data center on board the International Space Station in 2021. NASA's Commercial Lunar Payload Services program, created to help deliver research projects to the moon, funds the company's Intuitive Machines lunar mission.

With data centers being composed of connected servers that store and transfer digital data, space data centers will initially be geared towards remote data storage and disaster recovery, allowing companies to back up their data and store it in space.

Computing in a Space Environment

Currently, satellite-based data centers leverage data from the countless sensors orbiting our planet, aggregating it in a more cost-effective and focused approach. According to experts, the memory aspect needed to transfer data from space down to earth with minimal loss is measured in the 10s of terabytes (TB).

Recently, the first Australian space-based edge computer, Space Edge One (SE-1), was commissioned and put into orbit. Such efforts showcase the growing interest in space-edge computing. Engineers and researchers from NASA's Jet Propulsion Laboratory (JPL) and the companies Qualcomm and Ubotica are also developing a set of AI algorithms that could help future space missions process raw data more efficiently.

The space data center evolution has a long way to go before being actualized. A thorough preparation in both investment and structural design must take place to ensure that these specialized processing and storage utilities work seamlessly in the sky and in harmony with facilities back on earth.

Given all these factors and the ongoing determination, it's a safe bet that space-based computing will continue to enable gains in artificial intelligence, data analytics, cloud networking and advanced satellite communications within a software-defined satellite architecture. And space data centers will likely soon join their ranks. TR

“The concept of moving data centers to space is currently being fruitfully explored for its core objective of addressing data centers' copious and growing demands”

ITU Aims to Raise $100 Billion to Drive Global Digitalization

The International Telecommunication Union (ITU) issued a worldwide appeal calling for an increase in the value of pledges for digitalizing the world from the current US$30 billion to US$100 billion by 2026.

The appeal by the United Nations specialized agency for information and communication technologies includes a focus on raising the level of resources for universal and meaningful connectivity and digital transformation in the world's least developed countries (LDCs).

The announcement of the target was made on World Telecommunication and Information Society Day, observed annually to mark the signing of the first International Telegraph Convention and the ITU's founding in 1865.

"Tech is at the top of the global agenda, but the benefits of digital technology are still out of reach for too many people," said ITU Secretary-General Doreen Bogdan-Martin. "If we are serious about digitalizing the world in a way that is meaningful and sustainable, we must take action to accelerate digital transformation for everyone."

In 2023, ITU's anniversary is focused on empowering the least developed countries through information and communication technologies using the Partner2Connect Digital Coalition and its online pledging platform.

The ITU appeal to the public and private sectors encompasses a campaign launched in February 2022 by Partner2Connect to mobilize direct funding or other contributions for connectivity projects in countries registering the lowest on development. Of the US$30 billion already pledged overall, Partner2Connect has identified commitments worth US$12 billion to bring the LDCs online as quickly as possible.

G7 Nations to Launch Discussions on Responsible Use of Generative AI

G7 leaders, including the United States, Japan, Germany, Britain, France, Italy, Canada and the European Union, announced that they will launch discussions this year on "responsible" use of generative AI technology.

A working group will be set up to tackle issues from copyright to disinformation, the seven leading economies said in a final communique released during a summit in Hiroshima, Japan.

Text generation tools such as ChatGPT, image creators and music composed using AI have sparked delight, alarm and legal battles and governments worldwide are under pressure to move quickly to mitigate the risks.

The chief executive of ChatGPT's OpenAI told US lawmakers that regulating AI was essential. OpenAI CEO Sam Altman testified before a US Senate panel and urged Congress to impose new rules on big tech.

"We recognize the need to immediately take stock of the opportunities and challenges of generative AI, which is increasingly prominent across countries and sectors," the G7 statement said. "We task relevant ministers to establish the Hiroshima AI process, through a G7 working group, in an inclusive manner... for discussions on generative AI by the end of this year," it said.

Discussions could include topics such as governance, safeguard of intellectual property rights, promotion of transparency and response to foreign information manipulation.

The new Hiroshima AI working group will be organized in cooperation with the OECD group of developed countries and the Global Partnership on Artificial Intelligence (GPAI), the statement added.

Apple Announces Multi-Billion-Dollar 5G Investment

Apple announced a multi-billion-dollar collaboration with US tech firm Broadcom to make "cutting edge wireless connectivity" components to high-speed 5G telecom networks.

The iPhone maker did not disclose the exact investment it would put into the Broadcom alliance, but said it is part of a commitment to invest in the US economy.

"We're thrilled to make commitments that harness the ingenuity, creativity, and innovative spirit of American manufacturing," Apple chief executive Tim Cook said in a statement.

"All of Apple's products depend on technology engineered and built here in the United States, and we'll continue to deepen our investments in the US economy because we have an unshakable belief in America's future."

The alliance will include designing and manufacturing sophisticated 5G radio frequency components.

"5G technology is shaping the future of next-generation consumer electronics – and Apple is spending tens of billions of dollars to develop this field in the United States," the company said.

Apple is on pace to meet a commitment it made in 2021 to invest $430 billion in the US economy over the course of five years, according to the Silicon Valley technology titan.

It said those investments include money put into data centers, capital projects and suppliers.

China Bars U.S. Chipmaker Micron From Key Infrastructure Projects

China has prohibited U.S. chipmaker Micron from taking part in important infrastructure projects, claiming that the company poses a threat to the country's security.

The Chinese Cyberspace Administration of China (CAC) stated in a translated statement that the review found that Micron's products have serious network security risks. As per the statement, these pose significant security risks to China's critical information infrastructure supply chain, affecting China's national security.

The CAC did not disclose any additional information regarding Micron's violations, but it did say that Chinese owners of vital infrastructure had been told to stop purchasing Micron items, including chipsets, hard drives, and RAM modules.

China accounted for US$3.3 billion of Micron's full-year 2022 sales, which came to US$30.7 billion, making it the largest chip manufacturer in the country.

Further, the company also explained that they are evaluating the conclusion and assessing their next steps.

"We look forward to continuing to engage in discussions with Chinese authorities," they added.

At a time when tensions between China and the U.S. are rising, this is China's first significant action against a U.S. technology business. It is similar to the U.S. government's ban on the same grounds against the equipment vendor Huawei.

TELUS International Goes Continental: Expands to South Africa and Morocco

TELUS International, a leading digital customer experience innovator that designs, builds and delivers next-generation solutions, including artificial intelligence (AI) and content moderation, for global and disruptive brands, today announced it has established operations in South Africa and Morocco. TELUS International now operates in 32 countries located across five continents around the world.

"TELUS International's expansion into Africa is a continued advancement of our company's growth strategy, further augmenting our robust and agile global delivery model to provide even more diversified, client-tailored and high-quality support from key outsourcing destinations. By establishing our footprint on the continent in both Morocco and South Africa, our team is able to effectively meet near-term client demand while establishing a strong foundation from which to grow," said Jeff Puritt, president and CEO of TELUS International.

"Our caring culture and differentiated, end-to-end digital capabilities will help ensure TELUS International stands out as an attractive employer in the region and a high-value partner for global brands. Our long-term goal is to ramp our operations more meaningfully in the years ahead, progressing thoughtfully in building our presence over time. We are confident that our 18-year track record of successful global expansion will serve us well in this regard, unlocking for our stakeholders' meaningful opportunities related to digital CX, trust & safety and AI services," added Puritt.

Highly Skilled, Multilingual Talent Pools and World-Class Infrastructure

South Africa and Morocco are fast-growing business services hubs known for their talent pools of young, educated and highly skilled digital natives ready to access the employment market every year. The availability of individuals who are fluent in several languages, including English, French, German, Dutch and Italian, as well as the broad spectrum of cultures and ethnicities present in these countries, will enable TELUS International to further augment its highly engaged and diverse global team. Additionally, South Africa and Morocco are strategically located in favorable time zones to accommodate the company's clients across Europe and North America, and both countries possess world-class infrastructures with strong broadband networks and economies to support future growth.

Canada Approves Non-Competitive Local Licensing for 3900 MHz Band

The Honorable François-Philippe Champagne, Minister of Innovation, Science and Industry, announced a new licensing policy that will give easy local access to 5G spectrum for Internet service providers and innovative industries, as well as rural, remote and Indigenous communities.

This new non-competitive local (NCL) licensing process will help smaller users access 5G spectrum in very localized areas. With this policy, Canadians will benefit from improved connectivity in rural and remote areas and access to innovative new products and services.

"Whether it's on farms, in factories, on university campuses or in hospitals, new wireless technologies are enabling exciting innovations across our economy. That's why our government is making access to 5G spectrum easier to ensure that Canadians, especially those in rural and remote parts of our country, can benefit from these emerging technologies," explained Champagne.

Based on the published May 2023 decision, Bell, Qualcomm, Rogers and Sogetel, among others, generally supported ISED's proposal to apply the NCL licensing framework to the 3900 MHz band in all areas.

Global Cyber Insurance Market to Reach $33 Billion by 2027

The global cyber insurance market registered significant growth in 2020 and 2021, primarily due to substantially increased premiums. The increased frequency and severity of cyberattacks, coupled with the global shift to remote working in the wake of the pandemic, prompted insurers to raise prices.

Against this backdrop, the global cyber insurance market is forecast to grow from $16.7 billion in direct written premiums (DWP) in 2022 to $33.4 billion in 2027, according to GlobalData.

In its latest report, Thematic Intelligence: Cyber Insurance 2023," GlobalData reveals that even with waning demand (largely due to rapid premium price increases), global DWP in the market grew healthily in 2021 (66.5%) and 2022 (42.7%).

Benjamin Hatton, insurance analyst at GlobalData, comments: "As premiums gradually soften going into the second half of 2023 and beyond, and as economic conditions become less burdensome on businesses, demand for cyber insurance should grow going forward. Greater levels of cybersecurity, lower tendencies to pay ransom demands, war exclusions, and a more competitive insurance landscape will all coalesce to keep a lid on prices going forward. This is expected to gradually encourage greater uptake of policies in both personal and commercial spaces, leading to a persistently strong market growth rate over the period."

Global cyber risks continue to pose a threat to businesses after the pandemic, with many UK SMEs acknowledging that their cyber risks have increased. According to GlobalData's 2022 UK SME Insurance Survey, nearly 50% of medium-sized enterprises have experienced increased cyber risk since the start of COVID-19.

Hatton concludes: "The tough economic climate may be holding some businesses back from buying cyber cover right now, but as economies return to growth, the cyber line looks set to receive strong demand going forward."

Global Smartphone Shipments Continue to Slump

Shipments totaled 268.5 million units in Q1 2023, which, when compared to the previous year, marks a decrease of 12.7%. Two of the largest OEMs, Samsung and Xiaomi, reported 18.3% and 22.0% falls in shipments year-on-year, respectively. Realme has taken one of the largest YoY falls, from 15 million shipments in Q1 2022 to 8 million in Q1 2023, a 43.8% slump.

According to the latest Omdia smartphone preliminary shipment report, despite the large year-on-year fall Samsung has seen, it still had the most shipments in the first quarter of the year, recording 60 million shipments.

Its lead on Apple has dwindled compared to Q1 2022, from 18 million more than Apple in 2022 to just 3 million more in Q1 2023.

Despite the flat shipment levels, Apple's market share has increased year-on-year as a result of all other OEMs seeing falls in shipments, increasing marginally from 18% in Q1 2022 to 21% in Q1 2023. It seems Apple is weathering the economic storm better than other OEMs and is recovering from the blow to its two-year streak of YoY continued growth.

"Due to production disruptions at Foxconn's Zhengzhou plant in December of last year, Apple was unable to supply the necessary quantities for the most important sales season, Christmas, and the end of the year. As a result, some of Apple's production was carried over to the first quarter of this year," explained Jusy Hong, senior research manager at Omdia.

Q1 2023: US Provides Fastest Airport Wi-Fi

Based on Ookla's Speedtest Intelligence Q1 2023 findings, two US airports were at the top of the list for free airport Wi-Fi.

Fort Lauderdale's Hollywood International Airport (FLL) Terminal 3 and San Francisco International Airport (SFO) have shown median download speeds of 157.60 Mbps and 156.66 Mbps, respectively, during Q1 2023. SFO also had the fastest median upload speed of 222.24 Mbps.

Also included among the top five of mobile internet performance over free airport Wi-Fi are Dallas/Fort Worth International Airport (DFW) with 143.42 Mbps median download speed, John F. Kennedy International Airport (JFK) with 136.06 Mbps median download speed and Seattle–Tacoma International Airport (SEA) with 136.02 Mbps median download speed.

"As we've seen in most recent analyses, the airports with the fastest Wi-Fi are international hubs that passengers from around the world pass through on their way to all kinds of destinations. If you are connecting through any of these airports, you should have no trouble with internet speeds this fast," explained Isla McKetta, Senior Director of Consumer Marketing at Ookla.

Moreover, Hartsfield–Jackson Atlanta International Airport (ATL) and SEA had the lowest median multi-server latency (6ms) on Wi-Fi of any of the airports during Q1 2023. This means that there's little delay when relaying information online in these airports.

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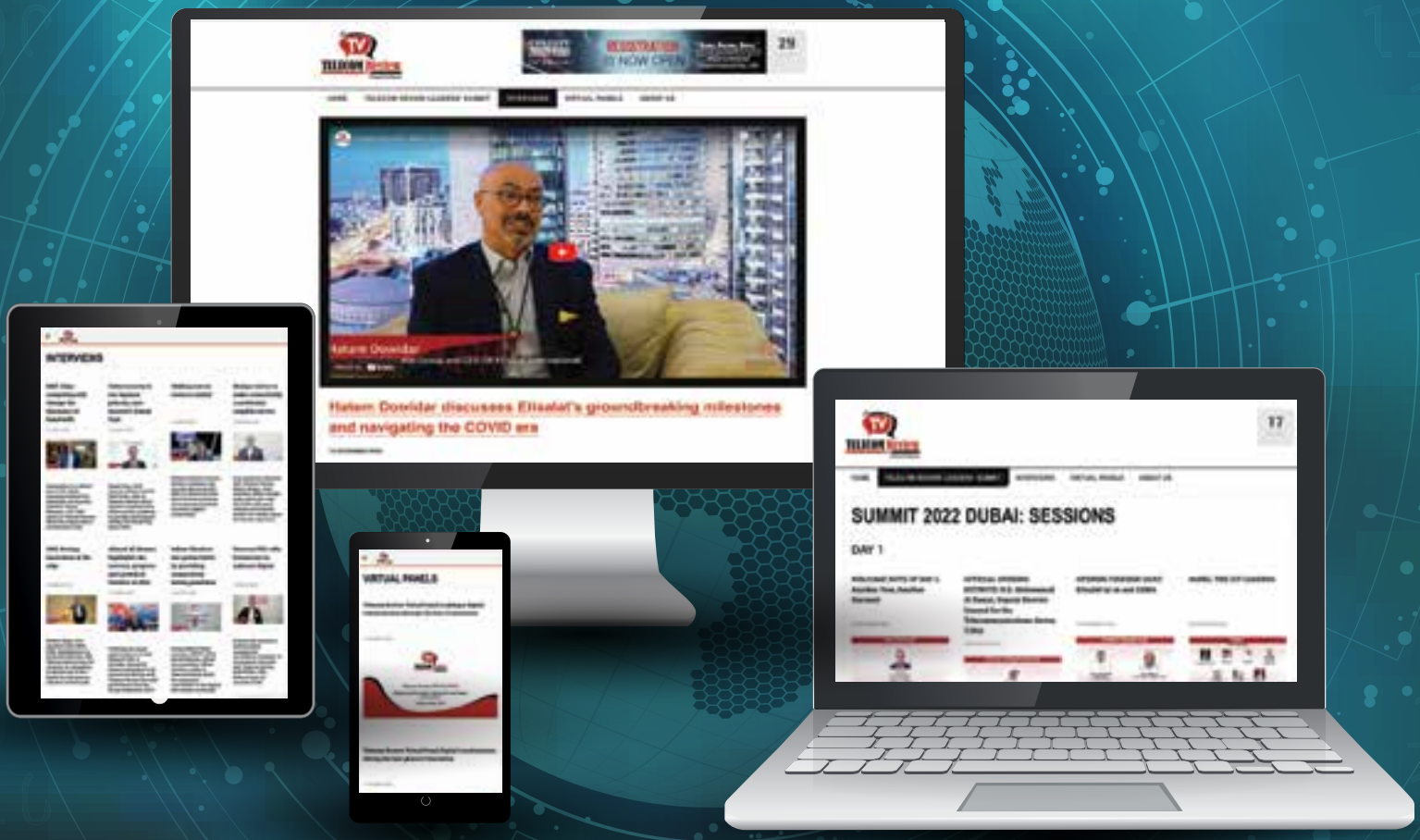

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