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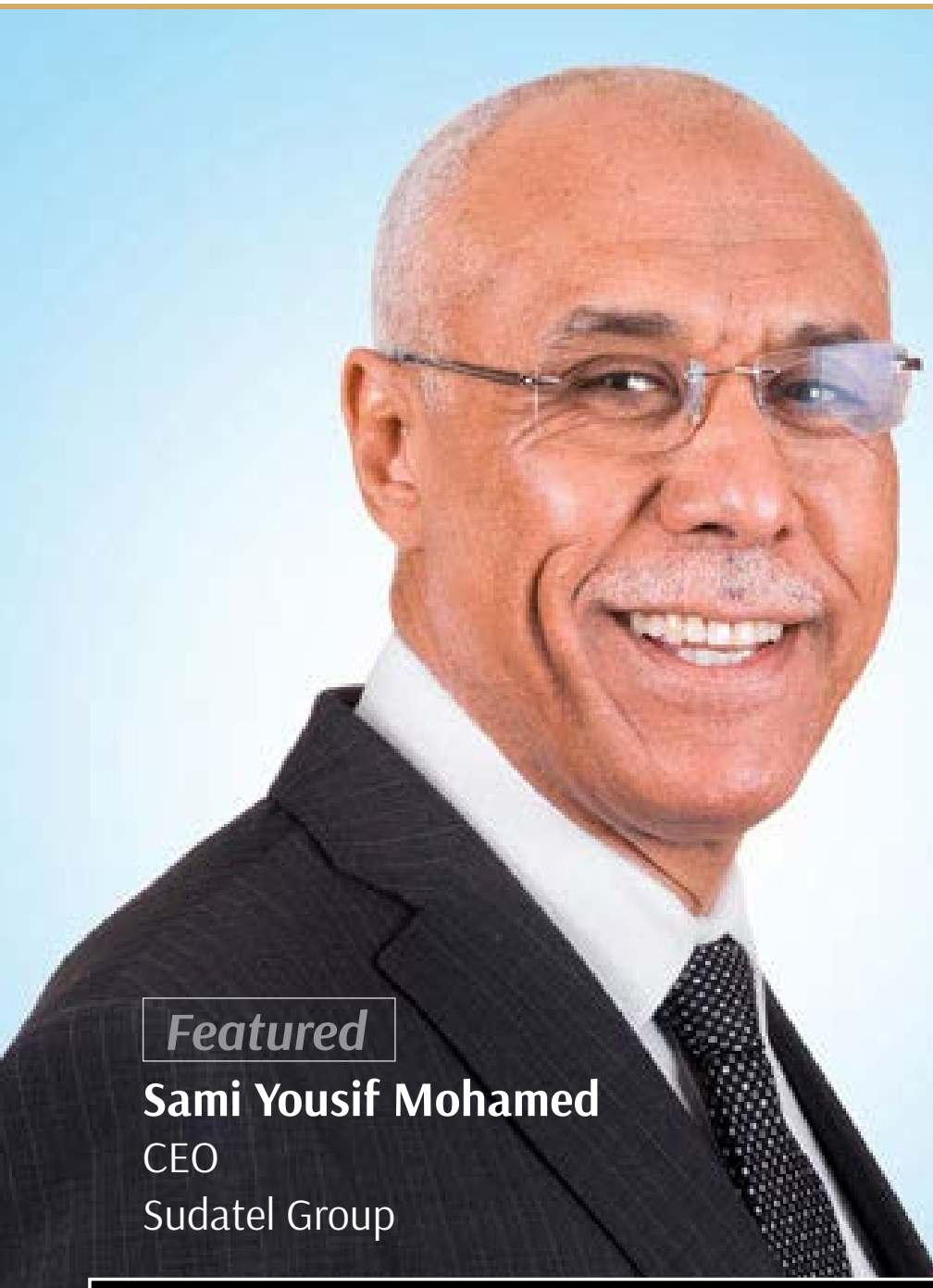
SAMENA TRENDS

FOR SAMENA TELECOMMUNICATIONS COUNCIL'S MEMBERS

BUILDING DIGITAL ECONOMIES



Featured

Sami Yousif Mohamed
CEO
Sudatel Group

THIS MONTH

AR AND VR IN SMART CITIES

SAMENA TELECOMMUNICATIONS COUNCIL
BUILDING DIGITAL ECONOMIES

هيئة تنظيم الاتصالات
TELECOMMUNICATIONS REGULATORY AUTHORITY
Kingdom of Bahrain - مملكة البحرين

CONVERGENCE TO BAHRAIN 2020

FEBRUARY 6, 2020

FOUR SEASONS HOTEL, MANAMA, BAHRAIN

5G & IoT AND THE REGIONAL DIGITAL VISION

CONFIRM YOUR PARTICIPATION

An important start-of-year, market-specific networking and thought-leadership event being organized for SAMENA Council's members and industry professionals from both the Digital Communications Industry and adjacent sectors, Convergence to Bahrain 2020, to be held with the patronage of Telecom Regulatory Authority of Bahrain (TRA-Bahrain), will bring together top decision-makers from the private-sector across the Terrestrial, Satellite, and Technology domains. The agenda of Convergence to Bahrain will be centered on Bahrain's 5G implementation strategy, technology use-cases for the terrestrial and satellite industry in the 5G space, including IoT, financing models to aid 5G investments, and a decision-makers roundtable to deliberate on the future of 5G connectivity, collaboration, and regulation.

Participation in Convergence to Bahrain is open to the Industry and top professionals from adjacent sectors, sharing interest and expertise in 5G and IoT. Convergence to Bahrain will be followed by SAMENA Council's exclusive "Members-only" activities.

stc Batelco AT&T عرب سات ARABSAT

T: +971.4.364.2700 F: +971.4.369.7513 E: convergence2020@samenacouncil.org
www.samenacouncil.org

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SAMENA
TRENDS

Editor-in-Chief
Bocar A. BA

Contributing Editors
Izhar Ahmad
Javaid Akhtar Malik

Knowledge Contributions
Analysys Mason
Arthur D. Little
Eutelsat
Huawei
Syniverse
World Childhood Foundation

Publisher
SAMENA Telecommunications Council

Subscriptions
subscriptions@samenacouncil.org

Advertising
ads@samenacouncil.org

SAMENA TRENDS
trends@samenacouncil.org
Tel: +971.4.364.2700

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AR and VR in Smart Cities

Smart cities, while still lacking a standard definition within the Industry, are among the most exciting of ideas driving innovation and investment in digital infrastructure, as well as synergies among the telecom and non-telecom sectors. Objectives of smart cities are efficiency in resource utilization, improved citizen services, and an overall betterment in lifestyle of citizens.

In view of the complexities of materializing a smart city and given the potential of ease, efficiency, and accuracy that new technologies banking on the modern fourth and fifth-generation network may offer, both public and private-sector stakeholders are finding it necessary to strategize and collaborate on leveraging the new immersive technologies, including Augmented Reality and Virtual Reality. Both of these related technologies, among many, when combined with other technologies such as IoT, AI, and cloud can catalyze a myriad of new opportunities. AR and VR, while being the front end technologies, utilizing sensor technologies, IoT, big data, cloud computing, etc, to create the promise of a people-centric environment, hold a lot of opportunities. Augmented reality can be the interface that can facilitate access to benefits of a smart city, as with AR, it is possible to interact with the normal environment.

While immersive technologies, that is AR, VR, or MR (mixed reality) still require several more years to achieve maturity, experimentation and use-specific implementations are well underway. There exists a wide range of possibilities that have been linked to immersive technologies. For example, AR offers convenience in use, scalability, new types of content, new user experiences, and these benefits are important across large industries that account for most of the world's job market.

The ability to enter an "alternative reality" offers various advantages in a digitally driven environment. For example, AR can be used to bypass the cumbersome process of filling static digital forms, the same objective of data collection and application processing can be conducted through a more interactive and pleasant process. Another example of AR/VR/MR use could be in tourism, whereby tourists can be given glimpses into the history or on what to expect during their travel experiences. Or, still another example could be the use of VR/AR in schools, to allow students to be more engaged in learning by experiencing concepts that are traditionally taught only in theory, and thus enabling schools to be much more engaging. The latter need is of particular importance to the public schools, in their ability to revamp education and instill quality education among students. And all of these handful of scenarios of the use of reality technologies mentioned here are integral to running a successful, sustainable, and citizen-centered smart city.

Thus aspirations toward building an entirely new realm of digital experiences, close to those in real-life, awaits the world and numerous sectors, adjacent to Telecom, such as financial services, healthcare services, educational facilities, multimedia content, e-government, among others, can directly benefit from immersive technologies. The question, however, now has emerged: Who owns augmented spaces that government and businesses need to work together to regulate?

Additionally, as the AR environment practically requires a lot of data to be collected and recorded about individuals and surroundings, we are faced with mounting challenges with respect to ensuring privacy and ownership, use, and access of collected data. There are numerous other issues to consider, of course.

Bocar A. BA
Chief Executive Officer &
Board Member
SAMENA Telecommunications
Council

In the age of smart cities, immersive digital experiences will open up a set of conveniences and issues, and thus it is important to consider immediately implementable use-cases for immersive technologies across all industries and sectors, while also re-thinking cyber-security in new light. Just as various organizations from both private-sector and public sectors have proposed frameworks for the responsible use of Artificial Intelligence, similar approach needs to be exercised for the use of reality technologies.

25 YEARS OF SUDANESE EXCELLENCE

- 4G LTE Advanced Mobile Services. One of the most advanced in Africa and the first in Sudan.
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- 4000 KM Terrestrial Fiber Optic Network: Keeping Sudan interconnected with networks in Egypt, Ethiopia and Chad
- Six Submarine Landing Stations
- An Award Winning Tier IV Data Center
- 50 Million USD commitment to social and economic development in Africa.

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A TELECOM GROUP

25 YEARS ANNIVERSARY

Sudatel Speaks to SAMENA Council

Sami Yousif Mohamed
CEO
Sudatel Group

sudatel سودانتل

> *I can see that 5G is gaining a momentum in the advanced markets within the region with a lot of promises to enable the telecom operators to offer far more reliable and fast internet connectivity which will increase the chances for us - as telecom operators - to grow our digital ambition and become a genuine enabler to the digital economy.*

Q. At the start of your new leadership role, how do you view Sudatel' s strategy to maximally capture the value of digital and to enrich the digital customer's overall communication experience across your market operations?

A. We are operating in three different markets with wide diversity of cultural, social and economic aspects however the evolving lifestyle toward digital life remains one of the rare commonalities between all of them so we must address this trend at the heart of our corporate strategy. Capturing the value of the digital revolution starts from what we supposed to do as a telecom provider which is delivering reliable and speedy connectivity in all markets to enable the digital revolution and provide a platform to roll out innovative digital partnerships aiming to deliver rich infotainment and smart services to our consumers and corporate customers. This will go hand in hand with focusing on delivering digital and personalized customer experience in which the customers will always find themselves in a relevant context for them with minimal physical interaction with us.

Q. In view of digital transformation trends in Africa, how do you view the correlation between Sudan's overall national economic policy and the national ICT vision?

A. Sudan is undergoing a historical political change that affects all the nation's sectors including ICT. We remain very positive about this change and what it can bring to the country in general and the ICT sector in particular. The beauty of the moment is that we will

have the opportunity to support the new government in shaping the national ICT strategy and influence it in the favor of sector and its contribution to the overall economy and society. We are expecting and demanding a trendy ICT national strategy focusing by large on the digital inclusion similar to most of the African countries.

> *Operators and regulators are key components of the ICT sector obviously with different missions but a common objective of taking this sector forward and ensure its role in developing and protecting the whole nation so the co-operation should be a natural attitude in the relationship.*

Q. What are Sudatel's investment and infrastructure development goals for Africa?

A. The potential for telecom investment and growth across Africa is exceptionally positive, compared to other regions, which are almost saturated.

No doubt, ICT, Information & Communication Technology has a major contribution in supporting the achievement of the 17 SDG goals (Sustainable Development Goals). The telecom industry, through its diversity of services, Fixed, Wireless, and Broadband is playing a fundamental role in reducing poverty, improving healthcare and education, moreover driving sustainable economic growth…, which are all crucial need for many African countries.

As a result, Sudatel group grounded on its long-term strategy had invested heavily in many Africans countries, Chinguitel in Mauritania, Expresso in Senegal and Sudani in Sudan. The investment was diversified covering the Fixed, Mobile in addition to submarine cables. Sudatel is a major investor in EASSy (The Eastern Africa Submarine Cable System) and ACE (Africa Coast to Europe submarine cable). Finally, following our group strategy, we are looking forward to expand our presence in other African countries leveraging on our extended expertise and financial capabilities.

Q. What are Sudan's ICT development plans for the next decade?

A. In today's world, information and communication technologies (ICT) have a profound effect on most socio economic, political and cultural aspects of society; they have become indispensable tools in the implementation of national development plans in many countries, supporting their efforts to secure the welfare and prosperity of their citizens. Yet, the prevalence of digital divisions worldwide hinders the application of ICT capabilities in areas vital for development, such as e-government , smart cites , agriculture, health and education, impeding progress towards the achievement of an inclusive digital society so Sudani as a big player in Telco sector with a huge infrastructures will participate in three main streams towards ICT development:

- Through its state of Art Data Center Sudani will lead the development in areas of Cloud Computing, IoT, AI, Big Data , Blockchain Machine Learning etc. also Sudani will be a main facilitator and incubator for the E-government applications in Sudan as it have End2End solutions to support in achieving this strategic goal for the government.
- Sudani is pioneer in Mobile Financial Services and launched mobile money services since 2013 under brand name Gorooshi where its a Sudanese well-known word in local language mean my money so this will play a vital role in transformation and to achieve economic inclusion in Sudan as there almost more the 90% are unbanked and out of banking system. Therefore, through its services Gorooshi and a big base of mobile subscribers Sudani will switch all of those to benefit from financial services and then achieve financial inclusion.
- As the leadership and vision towards the community, Sudani ahead compared to its competitors. Owned the main gateways of telecommunications and vast of internet bandwidth where allow it to provides Applications solutions in many areas such as Apps government solutions, entertainments, health, education and financial services.

In this area of Apps and contents solutions also Sudani vision is to build more partnerships with entrepreneurships and startups to speed up the creation, development and ideas of new solutions that enrich societies life with amazing and easy use applications benefiting from it's infrastructure and experience in telecommunications.

Sudani improves customers experience with the values that added from solutions provided over the experiences of knowledge and expertise working in these field years ago.

Therefore, Sudani with a very strong infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication

Q. In your view, what new future-minded possibilities could be created through improved operator-regulator co-operation?

A. Operators and regulators are key components of the ICT sector obviously with different missions but a common objective of taking this sector forward and ensure its role in developing and protecting the whole nation so the co-operation should be a natural attitude in the relationship. The constant changes and upgrade on the technology is bringing wide range of possibilities of products and services to the customers but it will always be difficult to deliver those products and services without highly cooperative and constantly improving relationship with the regulators that will help both of us achieving our missions but also maintaining the sector's global objectives to contribute to the economy and improve the social well-being.

Q. How do you view the link between the creation and adoption of digital services and the availability of resources such as spectrum, new incentives, and reduced industry fees and taxation?

A. The digital economy is becoming a reality in people's lives and it's a complex ecosystem with different and numerous players involved which drives the supply and the demand from different perspectives so it's really hard to articulate this link clearly. However, this not the most important fact at the moment. The important thing is to be aware of this digital revolution and its existence and exponential growth on both sides -demand and supply- so we need to be part of it. But we are not alone and having the support from different stakeholders on the enabling resources such as the spectrum and subsidies will put us and the whole sector in a much better position to bring the digital economy effectively to our people's life.

Q. What enablement process do telecom operators require to be able to capitalize on the opportunities offered by 5G?

A. I can see that the 5G is gaining a momentum in the advanced markets within the region with a lot of promises to enable the telecom operators to offer far more reliable and fast internet connectivity which will increase the chances for us – as telecom operators- to grow our digital ambition and become a genuine enabler to the digital economy. Still, we haven't engaged very actively in the 5G since our markets are slightly behind the others but I guess the time will come very soon in our markets to engage with all relevant stakeholders to ensure having the right enablement process to develop our markets and catch up with the 5G technology considering the leanings from the advanced markets.

We believe that different digital trends will pick up across multiple segments in Sudan. If we start by consumers then we believe that Fintech services and digital entertainment contents such as gaming, video, music, and educational contents are key digital trends for this segment and Sudatel is actively engaging in those trends to evolve our product portfolio to meet the growing demand for it.

Q. In which segments, in particular, is Sudan's digital transformation market likely to grow fast, and what direct role are you playing in this regard?

A. We believe that different digital trends will pick up across multiple segments in Sudan. If we start by consumers then we believe that Fintech services and digital entertainment contents such as gaming, video, music, and educational contents are key digital trends for this segment and Sudatel is actively engaging in those trends to evolve our product portfolio to meet the growing demand for it. On the government segment, e-government and smart city services will be an interest for everyone due to its direct impact on the performance of the government and the ease in interaction with the citizens and subsequently improving their lives. Sudatel -as the largest infrastructure provider in Sudan- is expected to play a pivotal role in supporting the government in this vertical. SME's and large businesses are also expected to have a growing demand around cloud services and some of the

> *Smartphones changed the lives of people and technologies starting from the 3G to 4G going to 5G are constantly changing the operator's lives. They are simply driving our investments and they are a very critical key success factor to our digital ambition so we remain focused on mastering those technologies.*

IoT verticals. Sudatel owns one of the largest data centers in the region which makes it in a very advanced position to be a leading cloud service provider in the market. For the IoT, we are in a process to establish an IoT center of excellence on the group level which will centralize the product development activities to meet this demand.

Finally; digital startups are a very interesting segment in Sudan which we feel a great responsibility toward enabling them to grow and materialize their promising ideas. We are actively engaged with some of the key incubation and startup hubs in the country and looking forward to adding value to this community.

Q. How is the presence of 3G, 4G, and regional trends on 5G affecting your business and customer-experience strategy?

A. Smartphones changed the lives of people and technologies starting from the 3G to 4G going to 5G are constantly changing the operator's lives. They are simply driving our investments and they are a very critical key success factor to our digital ambition so we remain focused on mastering those technologies. Then, does it sound ridiculously simple to say without connectivity, there is no possibility to talk about any customer experience ambition? But it's that simple for us and our customer experience will start from enjoying fast and reliable connectivity to the internet wherever they go. So this is what we want to promise our customers and indeed those technologies are the key enablers to deliver on our promise

Q. As a member of the Board of Directors of SAMENA Council, Sudatel has been very active in showcasing the Sudatel brand. Under your leadership, how would you like to leverage Sudatel's association with SAMENA Council to realize new advantages?

A. Our corporate brand is the source of our pride. SAMENA Council has been a key and strategic platform to grow our corporate brand identity and position Sudatel as a regional and global player, so we will continue leveraging our relationship in that direction. Also, I am aware of many interesting initiatives led and supported by SAMENA which can bring numerous value to our corporate hence we are looking forward to engaging more actively on those initiatives and realize the associated advantages.

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Q. How do you view the year 2020 for the Sudanese market?

A. We are looking forward to 2020, especially after the historical change that has taken place in Sudan. Everyone is looking for a progress' year in all life's aspects. ICT will not be different to that and we are expecting us -as Sudatel- along with our competitors to be able to rise to the occasion and continue to enrich the Sudanese people's lives with connectivity, entertainment, and smart services.

SAMENA COUNCIL ACTIVITY

At the Saudi-Hosted Council of Arab Ministers' Meeting, SAMENA Council Elevates 5G beyond Another "G" and Terms It as an Opportunity for Reframing Investment-Friendly ICT Policies

At the Saudi-hosted Council of Arab Ministers' Meeting, SAMENA Council Elevates 5G beyond another "G" and Terms it as an Opportunity for Reframing Investment-Friendly ICT Policies. The private-sector representative body calls on policy-makers and regulatory authorities to rethink policies, regulation, competition, investment sustainability, and collaboration. SAMENA Telecommunications Council was present at the 23rd session of the Council of Arab Ministers of Communications and Information, hosted by Saudi Arabia on the 17th and 18th December 2019. Among a handful of private-sector entities present during the on-hour discussion session held on December 18th, planned earlier by SAMENA Council in collaboration with the Communication & Information Technology Commission of Saudi Arabia to bring Private sector and Public sector thought-leaders together, focusing on productivity, competition and sustainability challenges in the age of digital economy, SAMENA Council delivered a cohesive stance on treating 5G not as another "G" but rather as an altogether different technology genre; one that offers a completely new set of opportunities for inclusive human connectedness, socio-economic development and human progress, but which must be harnessed through timely policy-regulatory-investment considerations and approaches. Arab Council of Communication & IT Ministers Meeting in KSA provided a rare opportunity for the private sector to communicate with policy-makers, directly, which in SAMENA Council's views is essential to catalyzing and maintaining a change in mindsets and pace in digital transformation. It is through open communication that sensitive industry matters such as technology use-case based investments, digital trust building and cybersecurity, and adjacent sector development may be effectively addressed. The panel discussion during the Arab Ministers meeting contributed insights on digital economy from four angles: taking stock of key new challenges, understanding the 5G revolution, maintaining international co-operation, and building trust in the digital era. Global digital communication service providers and global institutions, such Facebook and the World Economic Forum, accompanying SAMENA Council during the discussion, provided perspectives to help support work underway to fulfill the Arab region's ICT development needs in the long term and facilitate new investment and co-operation building in the regional ICT sector as well as among adjacent sectors in the near term. It was recognized that digitalization triggered a new wave of innovation, which carries multiple implications for the region, for humanity, changing relationships among citizens, the role of governments, sustainability of businesses, and collaboration between Telecom non-Telecom sectors and industries, thus altering the structure of societies and economies. In the 5G era, growth, productivity and human development will increasingly be determined by the level of integration into the digital economy. Therefore, Governments and the Private Sector need to be aligned on setting conjointly defined priorities and be prepared to respond to and benefit from advancements taking place in the digital sphere. Securing the benefits from and minimizing the risks of digitalization, requires new approaches, policies and strategies to drive equitable and evenly spread benefits of digitalization across all populations and across all economic sectors. Resultantly, issues related to competition, productivity, sustainability, consumer protection, data ownership and protection, privacy, taxation and trade in the digital economy must be approached with a new mindset and out-of-box thinking with regard to policy-making, regulating, and fostering partnership between the Public and Private sectors. Bocar BA, CEO and Board Member of SAMENA Council, stated that "It was a privilege to be present at the Council of Arab Communication & IT Ministers in Riyadh. The Arab Ministers approved the joint Arab Digital Declaration, which charts out a roadmap for building a prosperous and sustainable digital economy in the region. SAMENA

Council considers this Declaration to be an important milestone and the five principles it sets forth truly require very close collaboration among Governments and Telecom Operators. Moreover, there is a need to harmonize and accelerate timely development of 5G, which is not just another mobile network technology, but refers to a large digital ecosystem, considering 5G will facilitate multiple digital segments, such as IoT, Industrial IoT, AI, VR, MR, blockchain, among others, to thrive and contribute to the regional vision of smart-city development." He continued, "Challenges in the digital economy are multiple and range from extending basic connectivity to the still-unconnected and addressing privacy and user-protection online, and from investment sustainability to engaging other economic sectors in a synergistic manner. The 17 Sustainable Development Goals agreed by all the UN Member States for the next decade, several of which were represented here in this Arab Ministers meeting, serve as a motivation and guiding force for us, the private sector, and our leaders in the realm of policy-making and regulation to closely work together. Out of respect for national ICT visions and necessity, SAMENA Council calls on all stakeholders – from Telecom regulators and network operators to non-Telecom regulators and industries - to come together for collaboration and consider 5G as an area of opportunity unlike any other we have ever witnessed. I congratulate Saudi Arab's CITC and Ministry of Communication & IT for successfully organizing the Arab Ministers meeting and for the opportunity to share the Private sector's views with the regional Policy-makers."

SAMENA Council WRC-19 Monitor: Pioneer Spectrum Bands Identified and Key Terrestrial and Satellite Parameters Agreed to Support 5G Mobile Broadband Connectivity

The World Radiocommunication Conference 2019 (WRC-19) has concluded and it has brought forth a set of impactful agreements from Member States concerning the use of radio-frequency spectrum and satellite orbital positions. The agreements arrived at the Conference will enable new communication technologies while ensuring protection of existing services.

For SAMENA Council, which represents Telecom Operators and exercises its role in serving regional Regulatory Authorities as a sector-development partner, the core issue of the identification of spectrum to provide commercially viable options for the next-generation of mobile technologies, commonly referred to as 5G, going into WRC-19, was of immense relevance to the SA-ME-NA region's digital development efforts and national economic transformation goals, defined in various national ICT visions that the Council fully supports.

As was expected, new spectrum allocations have been agreed for 5G (IMT-2020). The global Conference not only identified additional globally harmonized (millimeter wave) frequency bands for International Mobile Telecommunications, but has opened doors to facilitate diverse usage scenarios for enhanced mobile broadband, massive machine-

type communications and ultra-reliable and low-latency communications, such as those that will become the hallmark of smart-city implementation; sustainable communities; improved attention and approach toward climate change; healthcare management; renewable energy; and more efficient agricultural practices and food production.

Special considerations for protection from harmful radio-frequency interference were awarded to satellite services supporting meteorology and climatology that aim to safeguard human life and natural resources, and systems used by radio astronomers for deep space exploration. Steps were also taken to ensure that radio astronomy stations would be protected from any harmful radio interference from other space stations or satellite systems in orbit.

Some of the most notable outcomes of WRC-19 include:

- Additional bands for IMT identified in the 24.25-27.5 GHz, 37-43.5 GHz, 45.5-47 GHz, 47.2-48.2 and 66-71 GHz bands, facilitating development of 5G mobile networks.
- Additional frequency bands for High-altitude platform stations (HAPS) identified to facilitate telecommunications within a wide coverage area below for affordable broadband access in rural and remote areas.
- Regulatory provisions for WiFi networks revised to accommodate both indoor and outdoor usage and the growth in demand for wireless access systems, including RLANs for end-user radio connections to public or private core networks, such as WiFi, while limiting their interference into existing satellite services.
- Regulatory changes introduced to facilitate rational, efficient and economical use of radio frequencies and associated orbits, including the geostationary-satellite orbit.
- Standard approved to integrate ICTs in evolving Intelligent Transport Systems (ITS) to connect vehicles, improve traffic management and assist in safer driving.
- Non-Geostationary Satellites Regulatory

Key Outcomes of WRC-19 Conference in Brief

The World Radiocommunication Conference 2019 (WRC-19) concluded on 22 November with agreements reached by some 3400 delegates from 163 Member States. These agreements were enshrined in the provisional Final Acts of the Radio Regulations, the international treaty governing the global use of radio-frequency spectrum and satellite orbits.

Notable Outcomes:

- Additional globally harmonized frequency bands were identified for International Mobile Telecommunications (IMT), including IMT-2020 (otherwise known as 5G mobile), facilitating diverse usage scenarios for enhanced mobile broadband, massive machine-type communications and ultrareliable and low-latency communications.
- Protections were accorded to the Earthexploration satellite service (EESS) as well as meteorological and other passive services in adjacent bands, such as the space research service (SRS) to ensure that space-based monitoring of the Earth and its atmosphere remain unhindered.
- Satellite services supporting meteorology and climatology that aim to safeguard human life and natural resources will be protected from harmful radio-frequency interference, as will systems used by radio astronomers for deep space exploration.
- Radio astronomy stations will be protected from any harmful radio interference from other space stations or satellite systems in orbit.
- New orbital slots were opened up for broadcasting satellites, providing developing countries with the opportunity to regain access to spectrum orbit resources thanks to a priority mechanism especially set for them.
- A stable regulatory framework was defined for non-geostationary satellite orbit (non GSO) systems based on a milestone process enabling mega constellations to rapidly come to fruition. This will ensure that more affordable means of connectivity can be offered to citizens of all countries.
- Earth stations in motion will enable connectivity in planes, ships, and trains.
- The provision of a truly global maritime distress and safety system was ensured and expanded.
- A new Recommendation was approved on Intelligent Transport Systems towards connecting vehicles, improving traffic
- management and assisting safe driving.
- Measures were taken to ensure themcontinuous assistance and support for the timely implementation of new technologies, including 4G and 5G networks and services, in Palestine.
- The conference declared the commitment of the Sector to gender equality, andmgender balance.
- WRC-19 agreed to recommend to the ITU Council that a World Radiocommunication Conference be held in 2023 (WRC-23) for a maximum period of four weeks. WRC-19 agreed on over twenty agenda items for WRC-23, and decided to invite the ITU Council to finalize the agenda.
- WRC-19 also agreed to invite the Council to arrange for the convening of a World Radiocommunication Conference in 2027 (WRC-27), and for the Council to finalize the agenda for that conference.

procedures established for non-geostationary satellite constellations in the fixed-satellite service, opening the skies to next-generation communication capabilities, considering mega-constellations of satellites consisting of hundreds to thousands of spacecraft in low-Earth orbit are becoming a popular solution for global telecommunications, as well as remote sensing, space and upper atmosphere research, meteorology, astronomy, technology demonstration and education.

- Protection of frequency assignments for Broadcasting-satellite service (BSS) ensured, providing a priority mechanism for developing countries to regain access to spectrum orbit resources.

The fulfillment of grand sustainable development goals and our collective readiness to tackle the world's prevailing issues, which can be addressed effectively through the ICTs, will now be a function of the post WRC-19 spectrum situation around the globe. SAMENA Council anticipates that agreements achieved during WRC-19 will help bridge the rising digital divides across the three ITU spectrum Regions and will help steer accelerated IMT-2020 development across the SA-ME-NA region and beyond.

Enabling 5G deployment

While identifying the frequency bands 24.25–27.5 GHz, 37–43.5 GHz, 45.5–47 GHz, 47.2–48.2 and 66–71 GHz for the deployment of 5G networks, WRC 19 also took measures to ensure appropriate protection of the Earth exploration satellite services, including meteorological and other passive services in adjacent bands.In total, delegates at WRC 19 identified more than 8 times more spectrum for IMT than was identified for IMT before the Conference. 17.25 GHz of spectrum was identified for IMT after the Conference, in comparison with the 1.9 GHz of spectrum identified before WRC 19. Out of this number, 14.75 GHz of spectrum has been harmonized worldwide, reaching 85% of global harmonization.

Child Safety Online Takes Center Stage in Sweden

Catalyzing Child Online Safety through Artificial Intelligence

Sweden's King and Queen host cross-sectorial experts to identify innovative solutions

Britta Holmberg
Deputy Secretary General &
Program Director
World Childhood Foundation

The Internet has transformed the lives of many of us at an unprecedented pace and scale. For a growing number of children around the world, the digital world is integrated into their lives in almost every possible way. Broadband connectivity brings many benefits to children, including access to education and entertainment, but it also has a dark side as it exposes children to risks and threats online, including different forms of violence and exploitation.

With the rapid expansion of broadband and connectivity, it is even more urgent to address the risks of online violence against children as it is scaling up to even more horrifying levels. For example, in 2018, the US National Center for Missing & Exploited Children (NCMEC) received 18.4 million reports of suspected child sexual abuse material online. Twenty years ago, the number was 3,000. In all likelihood, the situation will further deteriorate with the expansion of broadband connectivity in the world's poorest countries where children often constitute 50% of the population.

Even though more material is being flagged as suspected child sexual abuse than before, it may simply be a reflection of increased efforts from the tech-companies to detect and report child sexual abuse material. However, it may also be a warning sign that the technical development to protect children have not managed to keep up with the harmful use of technology. Increasingly more sophisticated technology and faster internet have not only resulted in an alarming increase in the spread of child abuse materials but also in new forms

> *"The risks for children online are changing rapidly, both in scale and in form. In order to prevent those risks from turning into harm, we need the sharpest minds to be on our side. On the side of children."*
>
> *Queen Silvia of Sweden at the AI and child safety online roundtables.*

Photo credit: World Childhood Foundation USA

Photo credit: World Childhood Foundation USA

of abuse such as Online grooming for sexual purposes, Sexting/ self-produced sexualized youth content, Sexual extortion and Live-streaming of child sexual abuse shows.

Finding effective innovative solutions addressing the problem requires intensifying cross-sectorial dialogue, accelerating collective actions and ensuring that people at the forefront of technological developments understand the risks and opportunities that technology can bring to children. With this in mind, the King and Queen of Sweden invited a select group of global thought-leaders and experts from the private sector, academia, law enforcement agencies, regulatory bodies and child protection organisations to a global roundtable at the Royal Palace in Stockholm. The objective of the meeting was to harness the power of artificial intelligence (AI) to safeguard children online. The event took place on November 20 and was organized by the World Childhood Foundation and Global Child Forum, both organizations founded by members of the Royal Family.

> *Experts in Artificial Intelligence are not always aware of the risks for children online, and law enforcement and child protection agencies seldom have the right technical expertise to understand the potential of Artificial Intelligence. The meeting helped to bridge those gaps by bringing together the experts in AI with the experts in child sexual abuse and exploitation...*

Artificial Intelligence as part of the solution

While focusing on more effective ways of detection and elimination of child sexual abuse material from the Internet there is the need to also invest in solutions for prevention of upload and spread of child sexual abuse material in the first place, of making devices and social media and gaming platforms used by hundreds of millions of children the first line of defense by preventing unlawful grooming. Since technology easily can be misused to harm and exploit children, new ways to deploy it for prevention of abuse and protection of children online, and to detect and apprehend the perpetrators are urgently needed. Artificial Intelligence is by many seen as a potential solution. However, experts in Artificial Intelligence are not always aware of the risks for children online, and law enforcement and child protection agencies seldom have the right technical expertise to understand the potential of Artificial Intelligence. The meeting helped to bridge those gaps by bringing together the experts in AI with the experts in child sexual abuse and exploitation.

"AI is already widely used to prevent and investigate child abuse online, but perpetrators are constantly finding new ways to misuse technology for their own purposes. Therefore, new, innovative approaches are necessary to work faster and more collaboratively in order to fight this crime. We must take advantage of the fantastic potential of AI to protect and strengthen children. Our roundtable is a step in that direction," said Paula Guillet de Monthoux, Secretary General of world Childhood Foundation.

Some of the potential areas where Artificial Intelligence could revolutionize the fight against child sexual abuse online are:

- Software that can find, and stop grooming of children, in real-time
- A program that can analyze and categorize millions of photos, including child sexual abuse material, within minutes.
- A tool that can take what seems to be incomprehensible background noise and extract conversations and transcribe them into text in order to identify and rescue the children in the video.

All of the above is theoretically possible with the help of artificial intelligence, but much work remains before AI can be used to its full potential.

Several concrete tools using AI to protect children online were presented – some of them already in use, some in the making. Examples of tools presented were the following;

The Arachnid Crawler – developed by the Canadian Centre for Child Protection. The webcrawler has the specific task of finding and removing online child sexual abuse material. It operates by using Microsoft's Photo DNA technology along with hashes (digital fingerprints) from lists generated by several organisations. The Arachnid web crawler scans thousands of URLs per second. It scans the images on the URL and pushes what it recognises as child sexual abuse material into Project Arachnid's classification system. The content is then triple-verified by three different analysts to ensure that the image can be classified as child sexual abuse material. Once this classification has been made, a notice is sent to the hosting provider, requisitioning that the material is removed. As the final step, the hosting provider makes sure that the material is removed. For material that has gone through the triple verification, and that is publicly available on the Internet, take-down notices have so far seen a 98% success rate. Project Arachnid's aim is to remove content as quickly as possible to prevent revictimisation.

A new method to detect potential instances of child online grooming for sexual purposes is currently being developed by Microsoft. The method is the result of a cross-industry hackathon hosted by Microsoft, which will become available in 2020.

One of the sessions was therefore devoted to the challenges and opportunities of the broadband expansion reaching new markets. The session was introduced by Doreen Bogdan-Martin, ITU and Joanna Rubinstein, Childhood USA and co-chair of the Broadband Commission Working Group on Child Online Safety. They highlighted the need to prioritize child online safety, especially in anticipation of the expansion of the broadband in the developing world where most children live today.

Griffeye Brain, developed by Safer Society Group, a program that aims to innovate how AI is applied to law enforcement work processes. The beta version was released in 2018. The first outcome of Griffeye Brain is a child sexual abuse material classifier that scans through previously unseen footage and suggests images that it believes depicts child sexual abuse content. The AI algorithm automatically groups and filters material and helps investigators prioritize. Considering that one hard drive can contain tens of millions of photos, the use of the AI algorithm can be immensely time-saving.

Technical solutions available - but not for all

The presentations during the Round-table discussion made it clear that the main barrier is not the technical development. Several concrete AI tools already exist that could help keeping children safe online and make investigations of suspected online child sexual abuse more efficient. However, these solutions are too fragmented and sometimes overlapping and, most importantly, do not reach those who need them the most.

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The panel discussion with Priscila Costa Schreiner Röder from the São Paulo Cybercrime Working Group, Maria Sheila Portento, Philippine National Police, Bocar Ba, SAMENA Telecommunications Council, and Neil Walsh from UNODC illustrated the

Photo credit: World Childhood Foundation USA

fact that there are several strong initiatives, both on the national and intergovernmental level to combat child sexual abuse online, but investments are far from meeting the needs. Even in high-income countries with two decades of internet growth behind them, there are gaps in the online child-protection eco-system and the knowledge about potential technical solutions is limited. Law enforcement agencies in low-income countries where the risks for children online are increasing in an alarming pace fight an uneven struggle with limited resources and lack of access to technical tools to investigate online related crimes against children. There is a huge need to educate children, families and professionals about the risks online. In order to prevent a potential tsunami of online related child sexual abuse as broadband expansion reaches the poorest, governments and the tech industry need to work together to ensure that protection mechanisms are in place.

Finding the right balance between the privacy of the adult user and the privacy and protection of children

Besides resources and knowledge, a key to protect children online is the heated discussion around privacy- and the increasing use of end-to-end encryption which makes it more difficult for law enforcement to receive reports about suspected abuse online. The tech companies and regulators are still searching for the balance between the right of individual users to privacy – and at the same time ensure that people that misuse technology to abuse children can be identified and brought to justice.

Digital abuse. Real children.

The Round-table meeting marked the end of the 20th anniversary of World Childhood Foundation, founded by her Majesty Queen Silvia of Sweden who decided to lend her voice to spotlight the global problem of child sexual abuse and exploitation. At that time, few people talked about this issue on a global level. Since then, more and more people are starting to understand the need to tackle this pandemic. This Autumn, several key events have taken place to accelerate action to protect children online – at the Royal Palace in Sweden, at the Vatican and at the Global Summit at the African Union. *Our ambition with this round-table meeting was to forge new collaborations, learn from each other and increase the number of actors and resources focused on fighting online child sexual abuse. We are very happy to say that we already see this happening as a result of the meeting-* says Paula Guillet the Monthoux, World Childhood Foundation.

Another example of how World Childhood Foundation has been advocating for increased global commitment to fight child sexual abuse is the initiative and support to launch the first of its kind benchmarking Index on Child Sexual Abuse "Out of the Shadows: Shining light on the response to child sexual abuse and exploitation. With support from Childhood USA, Oak Foundation and Carlson Family Foundation the Index developed by The Economist Intelligence Unit covers 60 countries representing more than 70% of the world´s children. The ambition is that the Index will help to assess the progress toward reaching the Sustainable Development Goal 16.2 – ending abuse, exploitation, trafficking and all forms of violence against and torture of children by 2030. The importance of the private sector to reach the goal is highlighted in the Index.

From the start twenty years ago, Childhood has worked to develop and support innovative solutions and methods to empower children and families and reduce the risks for sexual abuse and exploitation. Through the years, those risks and the potential solutions have changed forms and internet is now a part of ordinary lives for most children. However, says Paula Guillet de Monthoux, we should not forget that in most cases, sexual abuse is still in most cases committed or facilitated by someone close to the child. We therefore need to continue working directly to empower children and families and protect them through tech solutions. Even though the abuse takes place online, neither the child nor the perpetrator are digital and research shows that online abuse can be as traumatic and harmful for a child as contact abuse. This knowledge led to a unique sentence in Sweden last year the first conviction in a child rape case, where a man was convicted for child rape, even though he had never actually physically met the victim.

With Artificial Intelligence mankind now have unprecedented possibilities to accelerate the fight against child sexual abuse online, but the same technique, in wrong hands or without adequate regulation and safeguarding routines may also lead to disastrous consequences.

> *"We need advanced technology to be developed with a child safeguarding perspective in mind. By people and companies that not only look at profit, but who are willing to take responsibility for how their technology is used – or misused. This is especially important when it comes to AI. With such a powerful tool – we cannot afford to fail. We need to make sure that it is right from the start."*
>
> *Queen Silvia of Sweden in her closing remarks at the AI Roundtable*

MEMBERS NEWS

STC Launches Its Unified Brand in KSA, Kuwait and Bahrain

STC has launched its new unified brand identity in Saudi Arabia, Kuwait, and Bahrain to enhance its performance and role as a leading digital enabler in the region, and set forth on a new journey. Since its establishment in 1998, which marked a milestone in the communications and technology sector, STC set the record over the past 21 years for success in privatization and expansion projects in Saudi Arabia and the region. On this occasion, STC announced new offers for its customers, including free international roaming in Saudi Arabia, Kuwait and Bahrain, 10GB of data free and 100 free international call minutes in all three countries. "STC's new brand identity marks a new journey in digital services we are embarking on to enrich the lives of our customers and employees. The group is proud of its beginnings in Saudi Arabia and success in Kuwait and Bahrain, thanks to the Saudis, Kuwaitis, and Bahrainis who represent the majority of STC's employees," said Eng. Nasser Sulaiman Al Nasser, STC CEO. He also stressed that the new brand is in line with the company's progress in the digital transformation of digital payments, media, and entertainment, in order to keep up with the digital revolution and rapid changes in the communication and information technology sector. Eng. Al Nasser also explained that the new STC brand translates its role and innovative services that enable businesses in different sectors to work more efficiently and economically. The new identity also enhances STC's brand value as the most valuable in the Middle East in 2019 according to Brand Finance, in addition to its ranking among the world's top 50 digital companies according to Forbes ranking. Eng. Al Nasser stressed that STC will continue to be a leader in the field, providing the best services and products and the newest technical solutions, in order to meet present and future needs in entertainment, communication, and information technologies. "STC's infrastructure makes it a leader in digital empowerment for the public and private sectors in Saudi Arabia, thus strengthening the Kingdom's reputation in the Middle East and around the world," he added. On the role of digital empowerment in promoting local content, Eng. Abdullah Al-Kanhl noted that the company launched its strategy for local content through the "Rawafed" program in 2017, which contributed about 4 billion riyals in supporting local content and localization of the technology industry, pointing out that the company has worked nearly a decade to support resettlement opportunities in different sectors such as optical fiber networks. He noted that the business incubator "InspirU" supports youth innovation projects through providing them with financial and qualitative support in partnership with experts from Silicon Valley, as well as providing all capabilities for these promising projects. He said: "Today, InspirU embraces 28 projects with investments amounting to 60 million SAR, while the market value of these investments is 300 million SAR. We are proud that InspirU's supported projects have achieved 16 million users and contribute to creating 160,000 jobs, including part-time jobs." Eng. Mohammed Al-Abbadi, Vice President of Strategy Execution and Corporate Performance, explained the journey of changing STC's brand, saying: "Launching our "DARE" strategy was part of STC's journey in digital transformation and growth with new paths. As part of this journey, we decided to launch the new brand for STC group to enable digitization and open new paths beyond telecommunications, which is an extension of the development and transformation process that STC has been working on for years. The development of the Group's new brand will be accompanied by a new start

in the framework of STC towards playing a major role in enhancing the digital future locally and regionally." General Manager of Corporate Communications Eng. Mohamed Aba AlKheil confirmed that unifying the STC brand came as a result of a study which indicates that 92% of STC clients recognize the company with this name. Eng. Aba AlKheil said the new brand is not just a logo, but a set of visual, audio and verbal communication tools and sensory expressions which translate an integrated experience about the company. He explained that the launch of the new brand reflects part of the group's vitality as a leading digital enabler locally, regionally and globally, that creates new jobs and business opportunities. The company was established in Saudi Arabia in 1998 as a result of a privatization project by the Ministry of Post, Telegraph, and Telephone called "the Saudi Telecom Company". In 2003, the company went public and set a record turnout.

STC Launches Micro Trench Technology for the First Time in Saudi Arabia

STC has launched the first network expansion project by using Micro Trench technology, which does not require pavement shaving and re-asphalting, making STC the first company in the telecommunications sector to get involved in this first-of-its-kind initiative across the Kingdom. The launching was attended by the Vice Minister of Communications and Information Technology, Eng. Haytham Al-Ohali, Governor of the Communications and Information Technology Commission, Dr. Mohammed Al-Tamimi, Deputy Minister of Municipal and Rural Affairs, Dr. Khalid Al-Jammaz, and STC Group CEO, Eng. Nasser Al Nasser. Micro Trench technology, is one of the initiatives launched by the Ministry of Communications and Information Technology in partnership with the Ministry of Municipal and Rural Affairs. This technology depend on extending small-diameter ducts and cables to low depths below the surface of the ground. Micro Trenching has been tested at a depth of 30 cm and width of 3 cm. This new technology will help protect roads and road users while maintaining smooth flow of traffic during the execution of works. It will also boost STC's network expansion projects, ensuring faster service delivery to customers. In addition to raising the efficiency of the final product in line with the objectives of the quality of life program of vision 2030.

du Named UAE's 'Preferred Telecommunication Company' at Filipino Times Awards 2019

As a proud homegrown company and an integral part of the United Arab Emirates' (UAE) social fabric, du, from Emirates Integrated Telecommunications Company (EITC), has been recognized as the country's 'Preferred Telecommunication Company of The Year' at the fifth edition of the annual The Filipino Times Awards. Abdulwahed Juma, Executive Vice President – Brand and Communications, du received the award on behalf of the company As a prestigious annual awards occasion that recognizes exemplary industry leaders and top brands in the UAE, The Filipino Times Awards honored du for its customer-centric approach to business and for the strong rapport it has built among members of the Filipino expat community across the UAE. The awards recognition also reaffirms du's mission towards driving

values of inclusivity, diversity, and tolerance across customer segments during the nation's Year of Tolerance. Abdulwahed Juma, Executive Vice President – Brand and Communications, du, said: "The evolution of du has seen the company establish and embrace a longstanding commitment to diversity and inclusion. The prestige of this commitment ensures UAE residents across all nationalities are able to benefit from our world-class services, solutions, and connected value. The Filipino community is a vibrant part of the UAE's communities, which is why we are proud to be considered a leading brand that is impacting positive change and enabling enriched connected ecosystems to flourish within the country's vital population segments." Earlier in 2019, du launched its Friends & Family prepaid calling package to unite citizens and residents with their loved ones overseas. This attractive package enables Filipino customers to stay in touch with family and friends in the Philippines by subscribing to a Weekly Pack that provides 250 minutes at AED 25 or a Monthly Pack that delivers 1000 minutes at AED 79. Now in its 5th year, The Filipino Times Awards is the most prestigious award-giving body for Filipinos in the Middle East, and recognizes Filipino change makers and leading brands who have introduced innovative solutions and improved the daily lives of OFWs (Overseas Filipino Workers) in the UAE. The awards gathered 76,000 online votes during the voting period from September 1 to October 25 of 2019.

du Hits 1.8Gbps in Standalone 5G Trial

UAE-based telco du says it has achieved download speeds of 1.8Gbps on its trial Standalone 5G network, with uploads reaching 213Mbps. The test was carried out using a single 100MHz carrier in the 3.5GHz band. Saleem Alblooshi, Chief Technology Officer at Du, commented: 'We are committed to supporting the next evolution of 5G with Standalone deployment and seamless software evolution to our core and access networks … This is a milestone for telecommunications in the UAE and sets the bar high for future 5G network possibilities in line with the nation's smart city visions and national agenda.'

'Building a 5G World': EITC Hosts 2nd Annual Global Certification Forum 5G MENA Workshop

In cooperation with the Global Certification Forum (GCF), Emirates Integrated Telecommunications Company (EITC) has hosted the second annual GCF 5G MENA workshop under the theme: 'Building a 5G world'. The exclusive one-day forum was officially opened by Jasim AlAwadi, Senior Vice President - Service Operations, EITC, and explored how regulators, network operators, manufacturers, and industries in the Middle East and North Africa (MENA) region are using and developing 5G in innovative ways. The event was attended by operators, vendors, companies from the testing industry, the Standardization bodies at GCF GSMA, and regulators from the region to discuss and understand how 5G can enable new business opportunities beyond traditional services. Participants also engaged in discourse surrounding the importance of standards and interoperability towards supporting 5G developments.

'Building a 5G world'

Saleem AlBlooshi, Chief Technology Officer, EITC said: "5G technology is opening doors to a new era of connected use cases and applications. As a catalyst for 5G development akin to leadership agendas in the UAE and the wider region, EITC is proud to be collaborating with GCF to highlight how the 5G landscape is evolving business opportunities and reinventing conventional operator models for a more connected future. Cooperating with a formative organization like GCF is hugely beneficial to the industry's journey towards 5G development, and we are thrilled to have sparked conversation that will ignite the next wave of industry innovation." Mr. Lars Nielsen CEO GCF, said: "Uncovering the full potential of 5G will unlock a gateway to future opportunities as the technology proliferates in the years ahead. As a widely recognized hub for technology innovation and 5G leadership, Dubai and the UAE presents the ideal backdrop for the GCF 5G MENA workshop to chart a path for the next chapter of connectivity. We look forward to further strengthening our relationship with EITC to present the 5G future in the region." The GCF is the organizational backbone to GCF Certification and brings together technical experts from the world's leading manufacturers, operators, and the test industry. Together the GCF's members define certification requirements in line with future projections of the industry.

Etisalat Highlights Role of 5G in Empowering the Digital Economy at MoE Workshop

Etisalat highlighted the role of 5G in empowering the digital economy during a workshop held by Ministry of Economy in Abu Dhabi. Dr. Ahmed Bin Ali, Group Senior Vice President, Corporate Communications, Etisalat, was speaking at a workshop focused on 'Utilizing future studies in development plans' organized by the Ministry of Economy in coordination with GCC General Secretariat in Abu Dhabi. The workshop attended by senior government officials focused on how key industry verticals will play a significant role in contributing to the growth and boost the economy of UAE. Etisalat embarked on its 5G journey in 2014 when it began construction of its network with a dedicated team of engineers and specialists dedicated to build advanced infrastructure supporting future technology requirements in the region. 5G plays an important role in the global economy. The major milestone for Etisalat and the telecom industry was the launch of the first commercial 5G wireless network on 14th May 2018 in the UAE, becoming the first telecom operator in the MENA region to achieve this technological breakthrough and set an industry benchmark. Expo 2020 was also the first major commercial customer in MEASA to partner with Etisalat on 5G in July 2018 delivering a unique and memorable experience for the millions of visitors. Through its network rollout and the pioneering launch of the first 5G handset in the MENA, Etisalat managed to provide UAE customers with an opportunity to experience the power of 5G technology. It is expected that the telecom sector contribution will grow to $4.8 trillion (4.8 per cent of GDP) by 2023 as countries around the globe increasingly benefit from the improvements in productivity and efficiency brought about by increased take-up of mobile services. Looking further ahead, it is forecast that 5G will contribute $2.2 trillion to the global economy over the next few years, with key sectors such as manufacturing, utilities, and professional and financial services benefiting the most from the new technology.

Etisalat and Huawei Complete Industry's First Trial of Compact Optical Cross-Connect

Etisalat, the UAE-based telecommunications services provider, has worked with Huawei to complete the first trial of compact all-optical cross-connect (OXC) for the transport industry, enhancing connectivity and speed and delivering cutting-edge technology that promises to simplify optical architecture to build future networks. The 'OptiXtrans series OSN 9800 P32C' trial cements Etisalat's leading position in innovative technology for transport networks and promotes application of the OXC solution. An OXC is a device used by telecom carriers to switch high-speed optical signals in a fiber optic network, such as an optical mesh network. The cutting-edge technology will help reconstruct and simplify optical layer architecture to build a future-oriented network infrastructure. This solution will significantly improve network scalability, shorten time to market (TTM) for new services, and reduce operations and maintenance (O&M) costs. The OptiXtrans OSN 9800 P32C is a large-capacity OXC device that can be used in the backbone or aggregation layer. It meets the requirements for fast grooming of large-granularity services and separated east-west deployment in a transport network. Esmaeel Al Hammadi, Senior Vice President, Network Development at Etisalat, said: "This joint innovation project with Huawei is a result of Etisalat's focus on its vision and strategy of 'Driving the digital future to empower societies'. This has motivated us to continuously invest to provide superior network services for our customers. This new solution with Huawei will enhance development of the infrastructure and simplify the network, reducing service provisioning time, and improving efficiency in operations and maintenance to provide an optimal network experience for customers." "We

enjoyed working with Etisalat to complete the joint trial of compact OXC," said Simon Lu, President of Huawei Transmission Network. "This is an innovative solution that will redefine and simplify the methodology to develop the optical layer in the transport industry. Huawei will continue to carry out technological innovation and research to provide Etisalat with intelligent, simplified, and ultra-broadband all-optical transmission ON2.0 solutions, helping Etisalat to achieve business success." With the emergence of new technologies and services such as cloud computing, big data, Internet of Things (IoT), and streaming media, Etisalat expects to continuously collaborate with partners in product and technology innovation, including emerging services, high-performance, large-capacity trans-mission, and efficient operations and maintenance (O&M). To address these requirements, Etisalat and Huawei launched a joint innovation pilot solution. The tested product achieved three major innovation breakthroughs:

First, the industry's largest capacity. Liquid crystal on silicon (LCoS) technology is used to enable the optical switching capacity to Pbps level (Peta Bits Per second) and achieve the industry's highest compact 16-degree grooming capability. The device integration is nine times that of the traditional reconfigurable optical add-drop multiplexer (ROADM) solution, which can save 80% of the room space. Second, the zero fiber-optic connection. Based on the industry's unique optical backplane technology, the OXC product can print more than 1,000 optical fibers on an A4 size backplane, shortening the service provisioning time from 30 minutes to three minutes and supporting fully automating fiber scheduling. Third, optical layer visualization and minute-level troubleshooting. The digital optical layer adopts the Huawei-developed optical label technology to support end-to-end visibility of wavelength-level network status. The optical network troubleshooting time is shortened from hours to minutes to achieve efficient optical-layer operation and maintenance. Huawei remains committed to open collaboration and proactively promotes ICT development. As OXC technology matures, Huawei will further expand network bandwidth, create greater value for customers and build a better-connected world to stimulate unlimited business opportunities.

عمانتل
Omantel

5G Network Officially Launched in Oman

The 5G network has been officially launched in the country by Oman Telecommunications Company (Omantel). TRA said that the launch of the 5G technology will be an addition and a new experience within the company's services. The launch is in line with the 5G technology roadmap, announced by TRA on October 15 this year. "Omantel has launched the commercial 5G network; starting with 5G Home services Omantel customers can get high-speed internet services at their homes with speeds up to 1Gbps. Customers can enjoy various lifestyle offers including basic home and gaming. The launch of 5G Home is another important milestone in our strategy to lead the digital innovation in Oman," the statement said. The 250GB (20mbps) will cost RO25, while 500GB (40 mbps) will cost RO50 and 1TB (80 mbps) will cost RO45. TRA in a statement has confirmed the continuation of work in cooperation with the relevant authorities to overcome all challenges and ensure a wider spread of the 5G network in the Sultanate within the plans drawn up without delay. The decks have been cleared for the phased launch of the 5G mobile internet as per Oman Vision 2040 strategy. It may be noted that Qatar, UAE and Saudi Arabia have already launched the 5G network. In October, TRA granted two telecom operators – Omantel and Ooredoo – the right to use a 100MHz 5G spectrum, which will offer endless opportunities for upgrading their services. Both the telecom companies will construct and install 4,400 stations to operate 5G technology in the next five years, including 1,000 stations in the year 2019-2020. To enable the effective roll-out of 5G services and encourage investment in the sector, the telecom companies will be exempted from the annual frequency usage fees for one year. With that announcement, TRA displayed its readiness for 5G services in the Sultanate, which will enable companies to employ artificial intelligence in data analysis and decision making, providing pivotal impetus to the overall economic development. TRA also announced details of Oman's 5G roadmap, which will contribute to the research and

development in crucial sectors, including education, health, and logistics. The announcement was made at the special '5G Roadmap' event organized by TRA, which discussed the planned rollout, legislative developments as well as the readiness of operators to launch the super-speed network commercially. Meanwhile, Ooredoo too has been preparing for the transition to 5G wireless technology since 2017, rolling out operational trials, demonstrations, and experience zones at stores in Muscat and Salalah. 5G promises to dramatically increase the speed at which data is transferred across the network to 100 times faster than a cellular connection and 10 times faster than the speediest home broadband service. It will also pave the way for other new technologies such as autonomous vehicles, virtual reality and the Internet of Things.

Omantel Taps into Growing Wholesale Market to Become a Global Provider

Omantel – the first and leading provider of integrated telecommunication services in the Sultanate of Oman – is gaining recognition for its fast-paced transformation from a regional wholesale hub to a global provider. Last week, the company received the 'Best Middle Eastern Project' award at the Global Carrier Awards 2019 in London, UK. Organized by Capacity Media, the Global Carrier Awards celebrates vision and excellence in the global wholesale telecoms arena. Omantel received this prestigious award for its 'Global Wholesale Transformation Project' which commenced in 2018 and is set to reshape the wholesale market in the Middle East & North Africa (MENA) region and beyond, enabling global telecom carriers and content players to reach further beyond traditional wholesale telecom models. In recent years, Omantel has significantly invested in technology, networks, and subsea cable deployments to transform its ecosystem. In addition, Omantel has created new collaborations to, directly and indirectly, serve millions of customers as well as some of the largest enterprises, content providers and carriers in the world. Sohail Qadir, VP Wholesale at Omantel, commented on the achievement by stating, "The Global Wholesale Transformation Project is a strategic and ambitious initiative building upon Oman's unique geographical location and Omantel's integrated ecosystem to simplify access to the fastest-growing markets in the world. It enables our global partners to have economically efficient and technically robust connectivity with low-latency networking and state-of-the-art facilities. This is achieved by openly offering flexible and customizable solutions to meet current and future demands our customers". The award-winning project is based on various strategic pillars; Gulf to Africa (G2A) Subsea Cable System, Asia Africa Europe-1 (AAE-1) Subsea Cable System, establishment of Omantel France and Omantel International (OTI), introduction of International Network Operation Centre (INOC) and deployment of Equinix Data Center. All of this is leading to a high standard integrated operation, which offers enhanced business solutions and greater customer experience. "AAE-1 is a game changer; it is one of the first and largest subsea cable systems in the world that uniquely connects Asia, Africa and Europe via Oman," Mr. Qadir asserted. Spanning approximately 25,000 km, the AAE-1 subsea cable reaches areas that cover almost half of the world's population, with a design capacity of at least 40 Tbps built on the latest 100Gbps technology. "The subsea cable has eased access for world telecoms to emerging, yet challenging markets. In addition, it has provided different regions with the much needed internet capacity and access to global cloud services and applications. Furthermore, Omantel is proud to be the first GCC telecom operator to establish a subsea cable landing station in Europe. This was achieved by landing the AAE-1

subsea cable in Marseille through Omantel France, a subsidiary of Omantel," added Mr. Qadir. Similarly, the G2A subsea cable system represented the first phase of Omantel's expansion eastwards into the African continent, revolutionizing connectivity from Oman to East Africa. The cable comprises of a 1,500 km subsea segment and a 1,500 km terrestrial segment with a capacity of at least 20 Tbps with latest 100G technology. With the growth of its international operations, Omantel launched an international wholesale company - Omantel International (OTI). As the first phase, OTI manages the company's international voice business and supports partners and customers with simple and efficient access to new and existing solutions. The coming phases would see an increase in the scope and role of OTI as the capacity business is going to be gradually migrated to OTI as well as other value added services. Moreover, Omantel has launched an advanced International Network Operation Centre (INOC) to ensure reliable connectivity for its expanding global network footprint. The center operates 24/7/365 and troubleshoots network issues before they can affect service quality. The operation center acts as a central point of contact for customers and partners and provides them with real-time information on end-to-end network availability and performance. It has full visibility into the 20 subsea cable systems in which Omantel has invested covering 120 locations around the world. It aims to ensure the highest possible uptime of the network and deliver operational and customer experience excellence. Additionally, Omantel and Equinix have entered into a joint venture to bring the first world-class carrier-neutral data center to Oman, where carriers, content providers and cloud

providers co-locate critical telecom and IT infrastructure. Once completed, the data center in Oman will be a part of Platform Equinix™ which is comprised of over 200 data centers globally and provides access to business ecosystems made up of +2,900 cloud providers, +1,700 network providers, and +800 content and digital media providers worldwide. Through its wholesale arm, Omantel is committed to continue bolstering the wholesale telecom landscape in the region and beyond. The company is keen on implementing strategic and innovative projects to further enhance the outlook of the sector.

Omantel Collaborates with Siemens to Bring Smart Digital Solutions in Healthcare

In yet another path-breaking step towards harnessing ICT to improve people's lives, Omantel, the frontrunner in telecommunications and ICT in the Sultanate, has joined hands with Siemens to bring smart solutions (smart hospitals) to the country's healthcare sector. Omantel aims to use its expansive state-of-the-art ICT infrastructure to bring advanced solutions to healthcare practitioners and provide better outcomes for the patients. Siemens, a robust name in infrastructure digitalization among many other specialties, showcased the advanced capabilities of eHealth & Smart City Solutions at Omantel's 3rd Annual ICT Summit which took place in November. Commenting on the partnership, Eng. Baha Allawati, VP of Omantel's Enterprise Unit said, "At Omantel, we always keep the people at the heart of our plans toward achieving a digitally enriched society. Healthcare is a growing critical sector with a host of advanced technologies being introduced to benefit patients and healthcare institutions alike. we continue to boast various state-of-the-art technologies in telecommunications, digital transformation, IT, innovative services and smart solutions, and it was only natural that these assets be optimally utilized to further strengthen the health sector with such solutions. As such, we are pleased to partner with Siemens, a global leader in providing tailored ICT solutions for the healthcare sector". On her part, Claudia Vergueiro Massei, CEO of Siemens Oman said, "The demand for healthcare services is growing. Patients have ever-increasing expectations about the quality of healthcare treatments and services. Not only that, researches show that the building environment can impact the healing process – comfortable spaces help patients recover faster and allows the staff to work more efficiently. Our digital solutions allow us to revolutionize hospitals on the human, financial and operational levels. We are therefore pleased with the opportunity provided to us with this important partnership with the leading telecom operator in the Sultanate to support its citizens and residents to have access today to the patient care of tomorrow" Furthermore, continuing Omantel's strategic direction towards the Sultanate's digital transformation, the tie-up stands to hugely benefit the public and private healthcare sectors as it opens the doors to host of revolutionizing solutions aimed at enhancing productivity, boosting efficiently and flexibility, transparency, compliance, safety and security. To achieve these goals under the defined scope, the partnership will work together using four broad cases: improved patient outcomes through circadian lighting, improved staff productivity through patient tracking and asset tracking and quicker information on emergencies. Circadian lighting regulates activity patterns of the brain in humans as per natural light available in the 24-hour pattern. Simulating circadian lighting in healthcare has shown proven results with improved patient performance to treatment, health and safety. A tracking system will help monitor the patient in and out of the healthcare facility, and will be able to inform/warn health institutions about emergencies, if any. Asset tracking systems, meanwhile, is a digital way to track inventory across departments in hospitals and clinics and reduce costs due to loss, damage, and theft. These systems improve the inventory management processes, thus saving precious time and enhancing staff productivity. With these introductions, Omantel will be successfully integrating ICT with public service through healthcare in Oman.

Orange Jordan Launches Campaign on Safe Use of Technology

Orange Jordan launched The Gift, a new awareness campaign, simultaneously with the group's launch. The campaign was announced in a press conference, held by the CEO of Orange Jordan, Thierry Marigny, and a number of executives. With the slogan "we all have great power, we all have great responsibility", The Gift aims to highlight the safe, secure and responsible use of the internet on all devices to protect users of all ages and interests. Marigny said that modern technologies provide immense opportunities for users, but at the same time, many responsibilities for better use, noting that the company offers a wide range of concrete products and services to provide customers with information or tools designed to help them use technology safely and responsibly. He added, "We realize that along with our commitment to offering the latest internet services and technologies that meet international standard, is a sense of responsibility to raise awareness on best internet uses, especially among users under 18 years old, who need technology to help them innovate and develop without any negative side

effects or impacts". Within Orange Group's direction, stressed Marigny, Orange Jordan is dedicated both to services and to CSR initiatives that contribute to digital inclusion in the Kingdom, to spread digital culture and enable everyone to use the internet in developing their communities, both in the virtual world and the real one. The safe and efficient use of the internet is even more important since many of our human communications and transactions are made possible by technology. Chief Consumer Market Officer, Naila Al Dawoud, said that the campaign complements the company's integrated services, pointing out that Orange's safe internet service, kid's safety line, and diverse digital data protection services reflect its responsibility towards users and human communities at large. The "Gift" campaign focuses on protecting users from cyberbullying, considering the impacts of online activities on other users and the society, utilizing technologies to strengthen social connections and effective communication, preventing screen addiction, as well as promoting public road safety. This campaign is an extension of the company's diverse programs for safe and efficient internet use. Orange Jordan previously launched the "Anti-bullying" campaign, in collaboration with the Ministry of Education and Madrasati initiative, to provide students with an understanding of bullying, particularly cyberbullying and participated in the "Stop the Bleed" initiative to promote road safety. The company invests in energy-saving services and applications and continues to raise awareness on the best ways to use technological tools responsibly.

VIVA Wins Four Prizes at the Kuwait Creativity Award 2019

VIVA, a world-class digital leader providing innovative services and platforms to customers and enabling the digital transformation in Kuwait, and a subsidiary of STC Group, has won four prizes at the Kuwait Creativity Award 2019. VIVA sponsored the seventh version of the event organized by the Arab Media Forum at Sheikh Jaber Al-Ahmed Cultural Centre, where different companies and entities participated in presence of many valued figures in the Kuwaiti society. Ms. Danah Faisal AlJasem, General Manager of Corporate Communications at VIVA, received the awards from Mr. Madi Al-Khamis, the Secretary-General of the Arab Media Forum, in the categories of: Fast Growth - Marketing operations, Television Creativity - Excellence in national campaigns, Television Commercial - Excellence in creativity, and Television Commercial - Excellence in the idea. These

accolades came in recognition of VIVA's uniqueness in its advertising methodology which contributed to the National Day campaign and Ramadan campaign during 2019, and activities that fall under the products and services umbrella highlighting the VIVA app, significant customer service and experience as well as the advanced network that covers all areas nationwide. On this occasion, AlJasem commented: "I am so proud to have received these awards on behalf of VIVA as this happy occasion

endorses VIVA's leadership stance in the local and regional telecommunication/ICT market in line with the fast-moving digital transformation process, and the high level of creativity that VIVA has reached through its participations in various campaigns and national activities, with an aim to strengthen ties between VIVA and its customers and the community as a whole." She added: "This also reflects the big efforts exerted by different divisions at VIVA to push clear communication with our customers and the public through different advertising methods, business channels and social media platforms. Thus, we came up with innovative and unique ideas, not only limited to commercial marketing, but also those that embed awareness, national and social informative messages."

VIVA Wins Award of "Telecommunication Services Deal of the Year"

VIVA, a world-class digital leader providing innovative services and platforms to customers and enabling the digital transformation in Kuwait, and a subsidiary of STC Group, has been announced as a winner of "Telecommunication Service Deal of the year" at the 18th Annual M&A Advisor Awards in New York on Tuesday, November 19th. The award was presented to VIVA representative Mr. Wassim El-Hayek General Manager of Investor Relations and M&A. This year, over 200 nominees, representing over 500 companies, became finalists for the awards. An independent judging committee of 28 top M&A industry experts determined the ultimate recipients of the awards. On this occasion, Mr. Mohammed Bin Abdulmohsen Al-Assaf, CFO at VIVA said, "This prestigious award reinforces VIVA's stance in the market since it was chosen from over 500 participating companies to receive this honorable award which represents the best of the M&A industry in 2019. VIVA's positioning in this major event, where it was the only company from the Middle East, was the result of the company's first success in the field of acquisitions, which translated into the acquisition of Qualitynet the leading internet service provider in Kuwait." He added: "VIVA has adopted the highest professional standards for the completion of this transaction through its M&A Department within the Finance Sector. In addition, this transaction went through several stages and challenges in order to reach the best results and achieve the desired objectives through the process of the evaluation and due diligence covering all aspects including financial, technical and legal in cooperation with the best local and international consultancy firms. I would like to thank our advisors who contributed to this success, especially NBK Capital (Financial Advisor) and Meysan lawyers and legal consultants (Legal Advisor) for their professionalism in completing this transaction." He continued: "VIVA is always eager through its robust strategy to play a leading role in applying best practices and professional standards across all VIVA sectors and departments that support its plans and activities. The acquisition of Qualitynet allows VIVA to capture the growth potential in the business market and enable the great talented people of VIVA and Qualitynet for the journey towards fully integrated products and services and innovative solutions in line with the digital transformation."

Sudatel Appoints New CEO as the Company Prepares for Further Expansion and Growth

Sudatel Telecom Group Board of Directors has appointed Mr. Sami Yousif Mohamed as CEO and Group President effective immediately. The appointment comes as Sudatel prepares to invest heavily in its operations in side Sudan and across countries West Africa. Mr. Yousif has worked for Sudatel since 2013 and was most recently the Executive Vice President for Financial and Administrative Affairs of the Group. Previously he was Director of Finance in The Arab Investment Company, which is owned by the Governments of 14 Arab states. Mr. Yousif said "Of course, I am delighted and honored to be leading a company that I greatly admire. I am working on a five year plan for Sudatel which will enable us to grow steadily and meet the demands of businesses and consumers across our footprint".

Telecom Egypt Records 10% Y-o-Y Increase in Revenue in 3Q19

Telecom Egypt (TE) has reported a 10% increase in consolidated revenue for the quarter ended 30 September 2019, with total turnover reaching EGP6.316 billion (USD391 million), with the largest contribution arising from its 'International Customers & Networks' and 'Home & Consumer' operations, which generated EGP2.099 billion and EGP2.085 billion, respectively. EBITDA for the quarter totaled EGP1.063 billion, which represented a 48% year-on-year decline from the EGP2.036 billion recorded in 3Q18, with a margin of 17%. TE attributed the drop in EBITDA to the impact of its deal struck with Bharti Airtel in 3Q18 for global submarine systems, and its early retirement program (ERP), saying that excluding the Bharti deal from Q3 2018 and the ERP from Q3 2019 'leads to a normalized flat EBITDA and a margin of 24%'. Net profit after tax totaled EGP1.089 billion, down from EGP1.448 billion, with TE again stating that the figure would have been flat y-o-y when excluding the Bharti deal, noting also that foreign exchange gains and higher investment income from Vodafone had offset the ERP and higher depreciation expenses related to an accelerated CAPEX program. In operational terms, TE's mobile base continued to increase, rising to 4.575 million at the end of the reporting period, up from 3.589 million at end-September 2018. Fixed broadband accesses also maintained an upward trend, reaching 5.700 million at 30 September 2019, up from 4.968 million a year earlier, with fixed voice lines standing at 8.387 million (Sep-18: 7.589 million). Commenting on the company's performance, Adel Hamed, TE's group chief executive, said: 'The results we announce today are a signal that we are moving in the right direction with revenue continuing to grow at a double digit and filtering through to EBITDA, especially in light of the absence of any one-off or project based revenue in the quarter. That said, such investment led to a jump in depreciation and financing expenses that has pressured the bottom-line in spite of strong operational performance, yet we have created a large opportunity and exceptional positioning for us to monetize such investment for years to come.'

Zain Launches First 5G Roaming Service in MENA between Kuwait and Saudi Arabia

Zain Group, the leading mobile telecom innovator in eight markets across the Middle East and Africa announces a regional first as its operations in Kuwait and Saudi Arabia successfully launch first 5G roaming service in across the MENA region, with download speeds reaching as high as 500 Mbps for both outbound and inbound roaming. Zain has been one of the most ambitious 5G operators in the region, with its operation in Kuwait announcing the commercialization of the service in May, and Zain Saudi Arabia following in October with the launch of what was and remains the largest 5G network deployment in the region, and third largest in the world. Zain Kuwait and Zain Saudi Arabia between them count over 550 4G and 3G roaming agreements in over 215 countries, with this latest milestone 5G roaming agreement opening countless opportunities to further enhance the mobile experience for Zain customers as they travel the world, and as 5G becomes more widespread with the advent of more 5G devices. Bader Al-Kharafi, Zain Vice-Chairman and Group CEO, and Vice-Chairman of Zain Saudi Arabia commented, "This momentous stride taken on our 5G journey reinforces our global position at the forefront of the implementation of this exciting technology. It is through the vision and support of the country's leadership in markets such as Kuwait and Saudi Arabia that we can make such rapid progress in this nascent area, and in turn expedite our 5G roll out in support of both the New Kuwait 2035 Vision and Saudi Arabia's Vision 2030." Al-Kharafi continued, "Empowering nations and improving the customer experience is something that Zain is passionate about, and with the advent of 5G we see a whole new world of opportunities to achieve this. We are transforming into a digital lifestyle provider and are confident that our early investment in 5G will help us consolidate this position and drive us to even greater heights." The roaming agreement between Zain Kuwait and Saudi Arabia sets the ground for further 5G roaming agreements within the Zain Group and beyond. Zain's pioneering approach to 5G means as soon as compatible devices begin to ship in commercial numbers the mobile operator's networks will be ready and capable to provide 5G services to customers immediately. Al Kharafi concluded, "The launch of 5G roaming reconfirms our success in achieving greater integration, extracting synergies and expertise between our key regional operations." Zain joins a very select few operators globally to have tested and introduced international 5G roaming and remains the only one to establish 5G roaming between two countries in the MENA region.

Accenture Launches myNav, Cloud Platform to Help Enterprises Navigate the Cloud Landscape

Accenture has launched myNav, a cloud platform that helps organizations design and simulate different cloud solutions to identify the ones that best fit their specific business requirements. Identifying the right cloud solution can be complicated, as there are multiple cloud providers and cloud models, including public, private, multi and hybrid. Further, many companies spend significant time and money migrating applications and data centers to the cloud only to find that the applications don't always operate optimally. Accenture research shows that nearly two-thirds of companies are not seeing the expected benefits from their cloud migration initiatives. myNav evaluates multiple variables — including an organization's technology infrastructure, applications, data, operational model and business outcomes — to identify the right solution for enterprises, then simulates it at scale to confirm its viability and refine the business case. By providing a customized roadmap, myNav enables organizations to maximize the return on their current and future cloud technology investments. For example, myNav recommends the application transformation approach for clients to accelerate their innovation in the cloud. "We built myNav based on our knowledge repository of more than 30,000 cloud projects and over 80 industry solutions deployed worldwide in nearly every industry," said Bhaskar Ghosh, group chief executive of Accenture Technology Services. "myNav uses this repository to simulate optimal and scalable cloud architectures and solutions. By providing a

more informed view and a calibrated cloud strategy for business transformation, myNav helps clients compete more effectively in today's data-driven, cloud-enabled economy."

myNav provides a recommended cloud target through a three-step process:

- Scanning and assessing the client's existing infrastructure, application and data landscape and recommending the most appropriate cloud architecture and solution;
- Using an automated artificial intelligence (AI) engine to interact with Accenture's library of collective cloud expertise and recommend an enterprise architecture and solution; and
- Simulating and testing the scaled-up model of the client's recommended cloud solution to identify the value and help build the business case for an optimal solution for their business requirements.

"Enterprises need solutions to not only ease their initiatives of 'migrate to and transform in the cloud but also bring certainty in their cloud journey," said Yugal Joshi, vice president at Everest Group. "They are struggling in deriving value from cloud as they are not able to deeply assess what will work for them. As multi-cloud strategies become increasingly important, enterprises will need to have better migration approaches to ensure ROI from cloud initiatives. The key is to bring conviction in cloud adoption by learning from other adopters, leveraging advanced data insights, and creating contextualized cloud adoption strategies that can predict and guide what will work, what will not, and what are the changes needed for a transformative cloud journey." Unique in the market, myNav is the only platform that enables organizations to discover, assess, design and simulate end-to-end cloud solutions at scale. Accenture has supported cloud computing projects for 80% of the Fortune Global 100 across 68 countries and has trained more than 84,000 professionals on cloud technologies and architectures. The company has been innovating in cloud technology for a decade and holds more than 300 granted patents and pending applications across its global cloud portfolio.

Accenture Completes Acquisition of Consulting Firm Silveo

Accenture has completed its acquisition of Silveo, which was first announced on November 14. Silveo is a French consulting company providing services and solutions for digital manufacturing and intelligent supply chains based on software from, for example, SAP and Dassault Systèmes. Headquartered in Neuilly-sur-Seine, France, Silveo brings a team of 50 professionals, who are joining Accenture Industry X.0. Financial terms of the transaction were not disclosed. In its 2019 fiscal year, Accenture invested nearly US$1.2 billion globally on 33 acquisitions to acquire critical skills and capabilities in strategic, high-growth areas of the market.

Accenture Expands Cybersecurity Capabilities with Network of "Cyber Ranges" to Help Industrial Companies Simulate and Respond to Cyberattacks

Accenture has expanded its cybersecurity capabilities with the opening of three "cyber ranges" to help industrial companies — including those in the oil and gas, chemicals, utilities and manufacturing industries — practice their response to cyberattacks across their most critical assets. The cyber ranges are controlled, interactive and hyper-realistic environments for cybersecurity training and software development used to assess network and other technical vulnerabilities of industrial control systems (ICS). These systems are commonly used to automate processes in critical infrastructure industries such as utilities, petrochemicals, oil and gas, and industrial manufacturing. Featuring live-fire, multi-vendor capabilities, the three cyber ranges are located in:

Houston, Texas: Housed within one of the company's innovation hubs, this cyber range focuses on the oil and gas industry, from upstream exploration, midstream into downstream refining and retail.

Washington, D.C: Focused on the utilities industry from electric transmission to distribution, this cyber range is in Accenture's Cyber Fusion Center in Washington, D.C.

Essen, Germany: This cyber range, in one of the company's Industry X.0 Innovation Centers, is dedicated to the utilities and chemicals industries focused on electric distribution networks and chemical plants. "We tailor security solutions to our clients' industries and help them build resilience across their entire value chains," said Jim Guinn II, who leads Accenture's cybersecurity business for the energy, utilities, chemicals and mining industries. "Our ICS cyber ranges are designed to help pressure-test and improve the security posture of organizations so they can innovate safely and grow their businesses with confidence." Accenture is also in the construction stage of its first ICS Cyber Fusion Center opening early next year to help clients better protect their industrial networks, including field level and plant assets. Located in Accenture's Innovation Hub in the heart of Houston's business district, the new ICS Cyber Fusion Center will bring together world-class threat intelligence and vulnerability assessment services leveraging a dedicated team of ICS and industry security analysts. The center will be part of Accenture's global network of Cyber Fusion Centers, joining others in Washington, D.C.; Bangalore, India; Prague; Tel Aviv, Israel; and Tokyo. "The energy industry has the largest installed base of industrial control systems around the world, and the cyber risk has never been greater," said Luis Luque, ICS cybersecurity global lead at Accenture Security. "Securing and defending these large and complex industrial systems requires not only improving processes and tools, but also adopting cybersecurity practices for operational maintenance and resilience programs. With the expansion of our ICS cybersecurity capabilities, we can deliver the most comprehensive security solutions tailored across the ICS environment, delivered by people who understand the zero-loss time imperative our industry expects."

Accenture and UCB Collaborate to Accelerate Data Processing and Help Improve Patient Safety

Accenture and UCB, a global biopharmaceutical company, have collaborated to build a safety solution based on Accenture's INTIENT™ Pharmacovigilance to accelerate processing of individual patient safety case reports. This will help UCB uncover patient safety impacts from existing treatments and better manage the risks of new drugs and services. Accenture's INTIENT Pharmacovigilance leverages artificial intelligence to collect, manage and learn from UCB's structured and unstructured source data within pharmacovigilance, which monitors the effects of drugs during clinical trials and after they have been cleared by regulators for use. INTIENT Pharmacovigilance improves the flow of data, making pharmacovigilance case processing faster, less costly and more consistent. An Accenture Life Sciences operations team is managing case processing augmented by the platform for UCB, allowing UCB's case processing team to focus on value-add activities such as medical assessment and targeted follow up, helping them uncover insights into emerging trends, potential compliance issues and adverse events. This solution embeds real-time artificial intelligence, machine learning and robotic process automation into the data management process — from gathering initial patient information and subsequent inputs to regulatory reporting. This platform further improves accuracy and consistency in reporting, supports a more timely discovery of potential adverse events, while also supporting compliance with data privacy Good Pharmacovigilance Practice (GPvP) productive system requirements and policies. "The patients who benefit from our products are UCB's number one priority," said Kristof Huysentruyt, senior director and head of safety data management and systems at UCB Pharma. "Accenture INTIENT Pharmacovigilance will help us rapidly process data to identify potential events or issues, while reducing the time and cost needed to deliver a higher level of patient safety. This solution helps us walk the talk of being patient-driven." One of the realities that is driving the need for INTIENT is the many variable forms of data being managed within the life sciences industry, including both structured and unstructured data, as well as the vast number of data sources. Structured data is highly organized and formatted in a way that is easily searchable in related databases; however, unstructured data has no pre-defined format or organization, making it much more difficult to collect, process and analyze — and to derive scientific insights. "UCB is demonstrating its industry leadership and commitment to patient safety through the implementation of INTIENT Pharmacovigilance. With variable case types and sources and complex regulatory changes varying by geographic region, pharmaceutical and biotechnology executives can use INTIENT to support their data security, efficiency and analysis objectives," said Kevin Julian, a senior managing director in the Accenture Life Sciences practice. "Most importantly, the platform and the services provided around it can help advance the discovery and development of new patient treatments by unlocking information that otherwise might be trapped in silos, enabling unfettered access to actionable insights and improved collaboration across the life sciences enterprise."

Prince Sultan bin Salman Visits Arabsat and Values Its Role in Operating Satellites

His Royal Highness Prince Sultan bin Salman bin Abdulaziz, Chairman of the Saudi Space Commission, valued the role played by the Arab Satellite Communications Organization (Arabsat), specializes in operating satellites in the Arab world, and whose services are provided through more than 500 TV channels and 200 radio stations and paid TV networks and wide range of HD channels. This came during his visit to the company headquarter in Riyad, where he met the CEO of Arabsat, Khalid Balkheyour, and his team work who gave a presentation to His Highness on the goals of the organization that was founded in 1976 by the 21 member states of the Arab League, meeting the needs of the Arab world for more than 40 years since then from its headquarter in Riyadh, Saudi Arabia. His Highness witnessed a presentation on the organization goals, future vision, and the satellites that were launched to serve the Arab region, broadcasting to tens of millions of homes in

more than 100 countries in the Middle East, Africa, Europe and Central Asia, watched by more than 170 million viewers in 21 Arab countries, broadcasting from two ground stations to control satellites in Riyadh and Tunisia. Balkheyour praised the great support provided by the Kingdom of Saudi Arabia to the organization, as the Kingdom is one of the largest countries contributing to Arabsat, valuing the great role of His Royal Highness Prince Sultan bin Salman, the first Arab Muslim astronaut, who participated in the mission of launching the first satellite of Arabsat In 1985, which was an inspiration to the whole region to discover space, for the benefit of the region and humanity. He also indicated that the organization today has more than 15 satellites in the orbit and is considered the 6th largest satellite operator in the world.

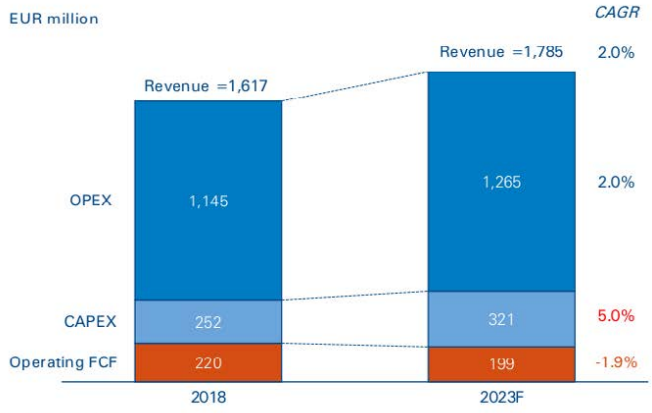
Arthur D. Little Releases Annual Study on the Telecom Industry

"Embrace the future", the 2019 edition of Arthur D. Little's annual study on the telecom industry, is based upon more than 100 interviews drawing from senior industry executives, investors / shareholders, 4,300 deals in relevant sectors, and an analysis of operator strategies across the globe. To secure future growth, telcos will have to take advantage of the possibility of mutualizing assets and creating focused platforms for growth, transformation and value creation, which is facilitated by the disaggregation of the telecom value chain. To do this, telcos need to continue to invest in a balanced way between organic and inorganic options

- Innovate the core, driven by local competition
- Build capabilities to prepare for the future, in particular for digital transformation
- Secure reasons to be part of sustainable economics or drive the in-market consolidation to reach sustainable economics
- Accelerate M&A in resultant focus areas

beyond core – i.e. in B2C as well as in ICT, B2B2X and wholesale to prepare for the future (to compensate for the stagnating / declining core business)

Figure 5: Our base-case forecast for the global telco industry



Source: Eikon – Thompson Reuters, Arthur D. Little

Arthur D. Little Releases "5G for Business a 2030 Market Compass" in Partnership with Ericsson

In our 4th report on the series in partnership with Ericsson, we extend the projections of 5G industry digitalization business potential, and highlight that the journey to capture value of 5G beyond mobile broadband starts now. Key takeaways from the report are:

- As 5G networks are rolled out faster than expected, service providers need to identify which areas to prioritize for future growth
- Of the total projected value of digitalization that 5G will enable in 2030, almost half will be addressable by service providers
- With 5G deployments underway across most geographies, there are now more specific insights available
- Balancing strengths, potential and competition, there is significant opportunity for service providers to expand into the service enablement layer

AT&T Integrating 5G with Microsoft Cloud

Microsoft and AT&T are ramping up innovation in the early days of their strategic alliance announced in July. One area of focus is aimed at enabling new 5G, cloud and edge computing solutions to drive enterprise capabilities for companies around the world. The companies are opening select preview availability for Network Edge Compute (NEC) technology, which weaves Microsoft Azure cloud services into AT&T network edge locations closer to customers. This means AT&T's software-defined and virtualized 5G core – what the company calls the Network Cloud – is now capable of delivering Azure services. NEC will initially be available for a limited set of select customers in Dallas. Next year, Los Angeles and Atlanta are targeted for select customer availability. From making the world's first 5G millimeter wave browsing session on a commercial 5G device to groundbreaking commercial installations in healthcare, manufacturing and entertainment, AT&T has proved itself to be a leader in 5G. The company recently activated an industry-first 400-gigabit connection between Dallas and Atlanta to support video, gaming and other 5G needs. AT&T serves parts of 21 cities with its 5G network using millimeter wave spectrum (5G+) and plans to offer nationwide 5G in the first half of 2020. "The first smartphones on 3G networks introduced the idea of mobile apps over a decade ago. A few years later, 4G LTE made it feasible to connect those devices faster to cloud applications to stream videos, hail rides, and broadcast content to the world," said Mo Katibeh, EVP and chief marketing officer, AT&T Business. "With our 5G and edge computing, AT&T is collaborating uniquely with Microsoft to marry their cloud capabilities with our network to create lower latency between the device and the cloud that will unlock new, future scenarios for consumers and businesses. We've said all year developers and businesses will be the early 5G adopters, and this puts both at the forefront of this revolution." This innovation points to a future where high-end augmented reality glasses are as thin and stylish as a standard pair of eyeglasses, lightweight drones can track themselves and thousands of nearby companions in near-real time, and autonomous cars have access to nearly-instant data processing capabilities without having to install a mini data center in the trunk. "We are helping AT&T light up a wide range of unique solutions powered by Microsoft's cloud, both for its business and our mutual customers in a secure and trusted way," said Corey Sanders, corporate vice president, Microsoft Solutions. "The collaboration reaches across AT&T, bringing the hyperscale of Microsoft Azure together with AT&T's network to innovate with 5G and edge computing across every industry."

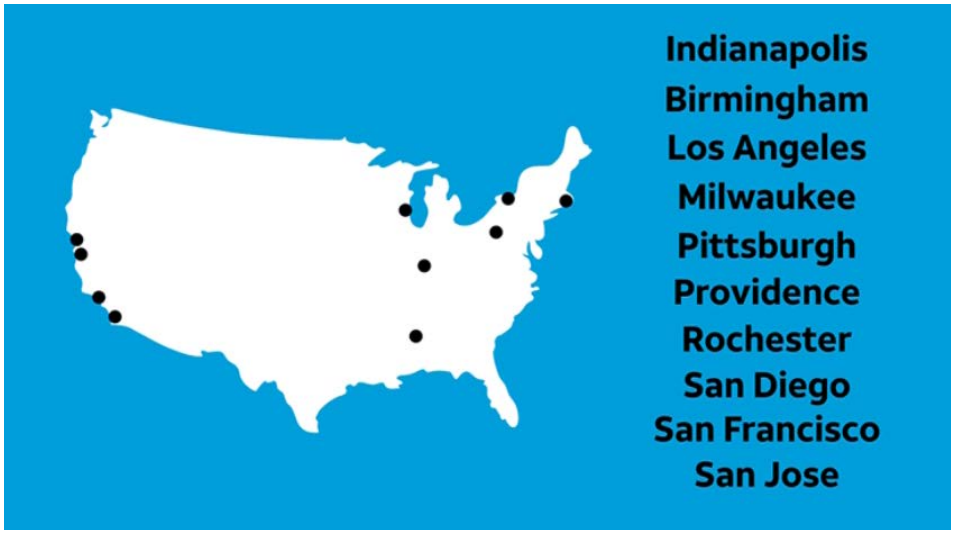
5G and edge for gaming, drones, and more

One example of how edge computing can unlock new scenarios and experiences is in mobile gaming, where gaming company Game Cloud Network has created a unique 5G game that's hosted on the network edge with Microsoft Azure. Game Cloud Network is a pioneer in developing game-based brand engagement and a customer of AT&T. The company is now showcasing its new "Tap & Field" game, which utilizes Microsoft's Azure PlayFab services. In the game, users race each other in near-real time via this track-and-field-style game, enabled by the speed of 5G-connected devices. "5G gaming provides consumers with the best of both worlds: highly-immersive experiences on lightweight mobile devices," said Aaron Baker, chief executive officer, Game Cloud Network. "AT&T and Microsoft are building the perfect environment for game developers to create amazing new possibilities for gamers. 5G and edge computing have the potential to radically change how we play together and launch new business opportunities for brands and game publishers." Through AT&T Foundry, AT&T and Microsoft are exploring proofs-of-concept including augmented and virtual reality scenarios and drones. For example, both companies continue to work with Israeli startup Vorpal, helping its VigilAir product track drones in commercial zones, airports, and other areas with near-instant positioning. The companies also recently demoed using Microsoft HoloLens to provide 3D schematic overlays for technicians making repairs to airplanes and other industrial equipment.

Progress toward a "public-cloud first company" and more

Microsoft is also helping AT&T Communications become a "public-cloud first" company by migrating most non-network workloads to the public cloud by 2024, and this migration to Azure is already underway. Another important part of AT&T's strategy is to empower much of its workforce with Microsoft 365. This includes cloud-connected Office apps on Windows 10, and modern collaboration with Microsoft Teams, SharePoint and OneDrive. AT&T has begun rolling out these solutions to tens of thousands of employees to help drive a culture of modern work. AT&T and Microsoft will have more to share over the coming months and years as this unique alliance continues to evolve and expand. The two companies will both create and adopt new technologies to develop tools, commercial services and consumer applications that benefit everyone.

AT&T Activates Low Band 5G Service in Ten Cities



AT&T Communications has confirmed that its new low band 5G service went live in ten markets on 13 December. The new 5G markets have been named as Birmingham, AL; Indianapolis, IN; Los Angeles, CA; Milwaukee, WI; Pittsburgh, PA; Providence, RI; Rochester, NY; San Diego, CA; San Francisco, CA; and San Jose, CA. Subscribers can access the network using the Samsung Galaxy Note10+ 5G handset. US telecoms news site Fierce Wireless quotes an unnamed AT&T representative as confirming that the new network utilizes the 850MHz band, while the cellco's original 5G network (launched in December 2018) uses 39GHz millimeter wave (mmWave) frequencies. TeleGeography notes that the 850MHz band was previously used for 3G services. AT&T's 3G networks will be shut down from February 2022 and in March 2019 the telco confirmed that it was in the process of 'redeploying spectrum currently used for 3G services to support mobile services on our 4G LTE and 5G networks based on market-by-market evaluations'.

AT&T Begins to Roll Out 5G for Channel Programs

As part of its continued commitment to our indirect channel programs, AT&T is rolling out new products and services within AT&T Partner Solutions to support the growth of 5G, starting with the Samsung Galaxy S10 5G smartphone. We are also re-aligning the AT&T Alliance ChannelTM and ACC Business sales teams to enhance support for the different business models of our solution providers. "We continue to put solution providers at the center of our indirect channel strategy," said Stacey Marx, senior vice president and channel chief, AT&T Partner Solutions. "Whether we are one of the first channel programs to launch next generation solutions like 5G or we are investing in new sales and support tools, we are committed to helping enable our solution providers to take advantage of that next element of innovation and growth for their business." 5G will ultimately be transformational for businesses. We are laying the groundwork so that solution providers can start taking advantage of 5G, following our key strategic pillars of mobile 5G, fixed wireless and edge compute.

Mobile 5G – Solution providers can now start offering Samsung Galaxy S10 5G smartphones on the AT&T 5G+ (mmWave) network. Our 5G+ service is available today in parts of 21 cities, with plans to reach parts of at least 30 cities by early 2020. The Samsung Galaxy S10 5G is available to both AT&T Partner Exchange and AT&T Alliance Channel solution providers. In addition, we are aligned with AT&T Business to offer 5G capable smartphones that can access our 5G low band (sub-6) network we will start deploying this year and that we plan to have nationwide in the first half of 2020. Business customers will need a 5G-enabled rate plan to access 5G service.

Edge Computing –Businesses have been implementing AT&T Multi-Access Edge Compute (MEC) solutions in their initial pilot deployments as well as some commercial production and we

are now starting down that path with solution providers. AT&T MEC (Multi-access Edge Compute) allows customers to split off designated cellular data traffic from the AT&T software defined network for faster on-premises edge processing and greater privacy and control. Fixed Wireless Solution providers can already offer AT&T Wireless Broadband which is a stepping stone to our future fixed 5G solutions. This current fixed wireless offering, which works over AT&T 4G LTE and 5G Evolution, is a cost-effective network alternative for business-critical applications that can be deployed quickly for new and remote locations. And with AT&T Business Fast Track bundled in the solution today, businesses can rank their application data in order of importance, to help keep their critical business data flowing smoothly.

AT&T Alliance Channel and ACC Business

The AT&T Alliance Channel is going through a transformation. We know that not every solution provider has the same business model. That is why we are re-aligning our sales teams to provide dedicated support for our master and traditional solution providers. In addition, we are integrating the ACC Business sales and support teams within the Alliance Channel to utilize the strengths of both programs. We continue to invest in sales and support tools for

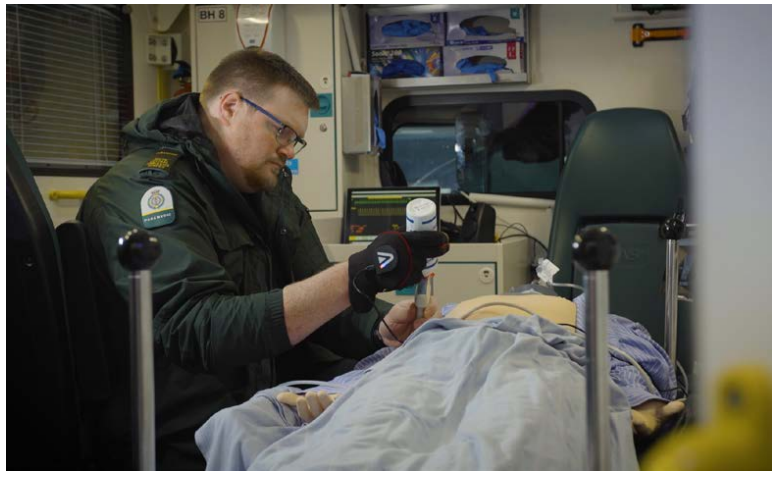
our Alliance Channel program. Now, we are simplifying and streamlining parts of the order entry process for our master solution providers to save them time. We've also launched a new Alliance Channel partner marketing tool that enhances program members ability to promote AT&T products and solutions using advertising, email and social media campaigns.

AT&T Partner Exchange

AT&T Partner Exchange is giving its solution providers more ways to earn business. We recently launched a new set of ecosystem partner programs for our IoT, AT&T Cybersecurity, and mobility product offerings. The programs allow solution providers to team up with other businesses within Partner Exchange to resell or refer new business. The partnerships also help to bridge the gap for solution providers who may not have a mature practice in these product areas but do have customers that need these solutions. "The ecosystem partnership has allowed us to expand into new product lines without having to use up a lot of resources. And we have been able to meet customer demand in ways we couldn't before," said John Agathon, senior partner, Atron Solutions, LLC. "It is a valuable addition to our business. The ability to offer a plan with no overages has been the closer for customers who wish to control costs and not have runaway usage charges." Earlier this year we launched Fiber Fast, which speeds up the installation of AT&T Dedicated Internet to as little as 5 to 20 days. Now we have automated the process, allowing solution providers to qualify and quote an address for Fiber Fast in near real-time within the AT&T Partner Exchange portal or via our API platform. AT&T continues to be the largest U.S.-based provider of fiber for business services. Nationwide, more than 8 million business customer locations are on or within 1,000 feet of our fiber, and we connect more than 2.5 million U.S. business customer locations with fiber today.

BT Demos VR and AR Over 5G for Connected Ambulance Applications

BT has demonstrated the use of virtual and augmented reality (VR/AR) over 5G to allow clinicians to remotely assess and diagnose a patient, and view medical records. The showcase took place with University Hospitals Birmingham NHS Foundation Trust (UHB), following the launch of BT's 5G network in Birmingham earlier this year. It also follows the UK's first demonstration of a remote-controlled ultrasound scan over the 5G network in June. The presentation showed a paramedic working from an ambulance in the Edgbaston area of Birmingham, being linked over the 5G network to a clinician based over two miles away at the Medical Devices Testing and Evaluation Centre (MD-TEC) in UHB's simulation lab. Wearing a specially equipped VR headset, the clinician can visualize exactly what the paramedic sees in the ambulance. Using a joystick, the clinician can remotely direct the paramedic. They can also send control signals to a robotic or 'haptic' glove worn by the paramedic. The glove creates small vibrations that direct the paramedic's hand to where the clinician wants the ultrasound sensor to be moved. A camera in the ambulance transmits a high-definition view of the inside of the ambulance, paramedic and patient. Together with live feeds of the patient's ultrasound scan, the clinician can recognize vital signs and view medical records in real-time via the VR headset. Fotis Karonis, CTIO and 5G executive lead for BT Enterprise, said, "Not only is 5G capable of ultrafast speeds, it has much lower latency meaning there is little to no delay when transmitting data over the network." This means things happen in 'real-time' so this is of significant interest to the NHS because of its potential for medical applications, such as diagnostics and preventative healthcare. "This capability provides efficiency opportunities



for both hospital and ambulance trusts by reducing the number of referrals into hospital and patient trips." Dave Rosser, UHB Chief Executive, said: "We are excited by the huge potential of 5G technology and how it can help transform healthcare in the future. We believe it has the potential to create more efficient use of healthcare resources, particularly with regards to easing the burden on A&E services which are facing unprecedented demand." He added, "At present, the urgent care system is based on an antiquated model and our centers are dealing with huge numbers of patients every day. The characteristics of 5G mean it should provide many advantages, including speeding up diagnoses for patients and potentially reducing the number of ambulance and A&E department visits. "In particular, being able to perform diagnoses remotely means a doctor or clinician could determine an appropriate care pathway without necessarily having to see someone in hospital."

BT Agrees Sale of Spanish Arm

BT reached an agreement to sell its operations in Spain to private equity company Portobello Capital, as part of plans to cut down its Global Services division and refocus on core operations. In a statement, BT said the deal involves the sale of 5,600km of optical fiber networks and three data centers, with completion expected during the first half of 2020 following regulatory approval. Through a wholesale agreement, BT will continue to have access to the Spanish infrastructure and the company will retain offices in Madrid and Barcelona. BT's Spanish arm provides networking services to 600 enterprises, and generated around £230 million in revenue during the operator's fiscal 2018/19, covering the period to end-March. Bas Burger, CEO of BT Global Services, said the deal would make the company "a more agile and customer-focused business". In August, BT was reportedly in talks to sell its Republic of Ireland corporate business to Mayfair Equity Partners for more than £300 million. Assets in the Netherlands and Italy are also reportedly up for sale as part of a £1.1 billion cost cutting program implemented by CEO Philip Jansen.

BT Launches New Support for SMEs in Scotland

Small and medium sized businesses in Glasgow are being given the chance to learn vital digital skills for free. BT is working with Google Digital Garage to deliver the training. The sessions are part of BT's Skills for Tomorrow initiative - a major new program designed to empower 10 million people by giving them the skills they need to flourish for the digital future. BT has collaborated with leading digital skills organizations to collate the best courses and information, in one easy to navigate place, with these free resources available to anyone. Everyone is included - from school children to older people; from young adults looking for employment; to SMEs looking for growth. At BT's first Scottish Skills for Tomorrow training event for SMEs held at Glasgow Science Centre, hundreds of businesses received expert advice on how to build a digital marketing plan; how to use data analytics to find new insights; and how to ensure greater visibility online. Event leaders also covered areas such as growing a business internationally and utilizing social media to reach new customers. This comes off the back of BT's latest research tapping into SME opportunities and challenges, heading into the New Year. Almost 30 per cent of SMEs agree that acquiring the right digital skills in business and enhancing online presence is a key challenge in the next 12 months. And, almost 40 per cent of Scottish SMEs believe that BT should play a role in providing digital skills training. Scotland faces a digital skills gap, which is having a profound impact on the country. The rapid pace of change is leaving people behind – as many as 11.3m UK adults and 10% of the UK workforce lack basic digital skills. The tech sector is forecast to be the fastest growing sector in Scotland to 2024, in terms of GVA – growing more than twice as fast as the economy overall. This digital skills gap is costing the UK economy an estimated £63bn a year, according to BT's latest Digital Impact and Sustainability Report. Chris Sims, Managing Director, SME, BT, said: "In this digital era, the fact is, every SME needs to be a technology business to succeed. But, as our research indicates, many SMEs struggle to keep up with the pace of technology. We believe that the key to closing the digital divide is in empowering SMEs with the right tools to radically improve operations and cement business success." Akash Chopra, co-founder of Vuabl, who attended the event said: "Today's event provided a useful taster of the digital skills any business needs and it's great that BT is helping businesses take advantage of the latest technology. Our virtual reality property company, Vuabl, brings a fully immersive 3D experience to property hunters and our growth depends on us reaching our target markets around the world." Another attendee, Pamela Kennedy, owner of Adore Baby who design and make Christening wear for babies all over the world, said: "Being a small e-commerce business, keeping up-to-date with current digital marketing trends is vital to the continuing success of our company. The speakers were great and had a wealth of knowledge, leaving me excited to implement some of the many ideas." The event coincides with BT's new services and commitments to Scottish businesses, including free upgrades to superfast fiber broadband and a new team of specialist Tech Experts for small business customers. This team will

carry out personalized set-up of products and services that are most critical to the running of each customer's business. BT supports thousands of SMEs in Scotland who play an important part in the economic success of the nation. Ensuring that businesses can best take advantage of digital services, BT is investing and using its local presence to provide the best collaboration, connectivity, and security services, with 24/7 customer support anywhere in the world through new business support teams. By upgrading more than 70,000 homes and businesses in Scotland to superfast broadband by summer 2020 at no extra cost, BT is giving customers faster, more reliable connections – boosting their average speeds from around 10Mbps to 50Mbps and providing better Wi-Fi through upgraded Smart Hubs. BT has also stopped selling standard broadband connections on the legacy BT copper network to 90% of the UK. For the 10% that cannot get superfast connections today, BT will use all available technologies to provide the fastest connections possible including 4G and 5G broadband, and full fiber. BT was one of the first mobile providers in the UK to launch 5G mobile plans, ahead of other major networks, giving businesses faster, more reliable mobile connections. Built on the EE 5G network, the first and largest in the UK, customers in Edinburgh and Glasgow can now enjoy speeds typically 100-150 Mbps faster than 4G connections even in the busiest areas. EE has 5G in more places in the UK than other network, and is targeting 5G connectivity in 45 UK cities and large towns by the end of the year.

Cisco Unveils Plan for Building Internet for the Next Decade of Digital Innovation

Cisco has unveiled further details behind its technology strategy for building a new internet — one designed to push digital innovation beyond the performance, economic and power consumption limitations of current infrastructure. A multi-year approach that is defining the Internet for decades to come, Cisco's strategy is already delivering technology breakthroughs to pave the way for the world's developers to create applications and services they have only begun to imagine.Cisco introduced its latest innovation including Cisco Silicon OneTM, the industry's only networking silicon architecture of its kind; released the new Cisco 8000 Series, the world's most powerful carrier class routers built on the new silicon; and announced new purchasing options that enable customers to consume the company's technology through disaggregated business models. “Innovation requires focused investment, the right team and a culture that values imagination,” said Chuck Robbins, chairman and CEO of Cisco. “We are dedicated to transforming the industry to build a new internet for the 5G era. Our latest solutions in silicon, optics and software represent the continued innovation we're driving that helps our customers stay ahead of the curve and create new, ground-breaking experiences for their customers and end users for decades to come."

Building Blocks for the Internet for the Future

Over the next decade, digital experiences will be created with advanced technologies — virtual and augmented reality, 16K streaming, AI, 5G, 10G, quantum computing, adaptive and predictive cybersecurity, intelligent IOT, and others not yet invented. These future generations of applications will drive complexity beyond the capabilities current internet infrastructure can viably support. For the past five years, Cisco has driven a technology strategy that is building the internet our customers will need for the future success of their business in an advanced digital world. Aimed at solving the toughest problems that will emerge as digital transformation taxes current infrastructure to its breaking point, this strategy will lead to the next-generation of internet infrastructure that combines Cisco's new silicon architecture with its next-generation of optics. Cisco's strategy will change the economics behind how the internet will be built to support the demands of future, digital applications and will enable customers to operate

their businesses with simpler, more cost-effective networks. Cisco's strategy is based on development and investments in three key technology areas: silicon, optics and software. "Pushing the boundaries of innovation to the next level — far beyond what we experience today — is critical for the future and we believe silicon, optics and software are the technology levers that will deliver this outcome," said David Goeckeler, executive vice president and general manager of the Networking and Security Business at Cisco. "Cisco's technology strategy is not about the next-generation of a single product area. We have spent the past several years investing in whole categories of independent technologies that we believe will converge in the future — and ultimately will allow us to solve the hardest problems on the verge of eroding the advancement of digital innovation. This strategy is delivering the most ambitious development project the company has ever achieved."

Introducing Cisco Silicon One – Breakthrough Unified, Programmable Silicon Architecture

The new Cisco Silicon One will be the foundation of Cisco's routing portfolio going forward, with expected near-term performance availability up to 25 Terabits per second (Tbps). This is the industry's first networking chip designed to be universally adaptable across service provider and web-scale markets. Designed for both fixed and modular platforms, it can manage the most challenging requirements in a way that's never been done before. The first Cisco Silicon One 'Q100' model surpasses the 10 Tbps routing milestone for network bandwidth without sacrificing programmability, buffering, power efficiency, scale or feature flexibility. Traditionally, multiple types of silicon with different capabilities are used across a network and even within a single device. Developing new features and testing can be lengthy and expensive. Unified and programmable silicon will allow for network operators to greatly reduce costs of operations and reduce time-to-value for new services. "We look forward to working with Cisco as it enters the high-end routing silicon space, collaborating to help meet the next generation of network demands for higher speeds and greater capacity," said Amin Vahdat, fellow and vice president of Systems Infrastructure, Google Cloud. "Facebook has been a strong advocate for network disaggregation and open ecosystems, launching key industry initiatives such as the Open Compute Project and the Telecom Infrastructure Project to transform the networking industry," said Najam Ahmad, vice president, Network Engineering at Facebook. "Cisco's new Silicon One architecture is aligned with this vision, and we believe this model offers network operators diverse and flexible options through a disaggregated approach." "Cisco is changing the economics of powering the Internet, innovating across hardware, software, optics and silicon to help its customers better manage the operational costs to function on a larger scale for the next phase of the Internet," said Ray Mota, CEO and principal analyst at ACG Research. "As we move to 2020, the timing of delivering operational efficiency will be vital."

Introducing: Cisco 8000 Series Platform Powered by Cisco Silicon One– Industry Leading Performance

The new Cisco 8000 series is the first platform built with Cisco Silicon One Q100. It is engineered to help service providers and web-scale companies reduce the costs of building and operating mass-scale networks for the 5G, AI and IOT era. Standout features include:

- Optimized for 400 Gbps and beyond, starting at 10.8 Tbps in just a single rack unit
- Powered by the new, cloud-enhanced Cisco IOS XR7 networking operating system software, designed to simplify operations and lower operational costs
- Offers enhanced cybersecurity with integrated trust technology for real-time insights into the trustworthiness of your critical infrastructure
- Service providers gain more bandwidth scale and programmability to deliver Tbps in even the most power and space constrained network locations

Global Customer Deployments and Trials

Cisco is working with a group of pioneering customers on deployments and trials of the Cisco 8000 Series. STC, the leading telecom services provider in the Middle East, Northern Africa region, marks the first customer deploying the new technology. Ongoing trials include Comcast and NTT Communications among others.

Optics for 400G and Beyond

Building a new internet that can support future digital innovation will depend on continued breakthroughs in silicon and optics technologies. Cisco is unique in the industry with advanced intellectual property in both areas. As port rates increase from 100G to 400G and beyond, optics become an increasingly larger portion of the cost to build and operate internet infrastructure. Cisco is investing organically to assure our customers that as router and switch port rates continue to increase, optics will be designed to meet the industry's stringent reliability and quality standards. Through the company's qualification program, Cisco will test its optics to comply with industry standards and operate in Cisco – and non-Cisco hosts. With this program, customers can utilize Cisco optics in applications where non-Cisco hosts have been deployed and have confidence that the optics will meet the reliability and quality standards that they have come to expect from Cisco. In addition, as silicon and silicon photonics advance, functions that were traditionally delivered in separate chassis-based solutions will soon be available in pluggable form factors. This transition has significant potential benefits for network operators in terms of operational simplicity. Cisco is investing in silicon photonics technologies to effect architectural transitions in datacenter networks and service provider networks that will drive down cost, reduce power and space, and simplify network operations.

Changing the Economics of the Internet with Flexible Business Models

Cisco also announced plans to offer flexible consumption models first established with Cisco's Optics portfolio, followed by the disaggregation of the Cisco IOS XR7 software, and now including Cisco Silicon One. This new model is highly adaptable and offers customers choice of components, white box, or integrated systems to build their networks. This approach matches the evolving nature of operators selecting discrete or aggregated technology elements for their buildout and creates new economics of the Internet to provide significant business value.

Cisco Meraki Simplifies Security and Expands Platform

Cisco Meraki has announced an expansion of its portfolio along with additional integration of Cisco networking and security innovation into its solutions. New, cloud-managed networking and security offerings will simplify the customer journey to secure, next-generation networking technology. The new solutions also enable customers to further realize Cisco Meraki's overarching mission to make a digital business as simple to run as possible without sacrificing performance or security. In today's world, employees work from anywhere around the world and are using an ever-increasing number of devices that need to be managed, but many businesses cannot afford to run networks that were not built for these new digital demands. Those with lean IT teams should not have to choose between innovation and security, so Cisco Meraki offers an intent-based architecture that provides the secure foundation businesses need and equips an IT organization of any size with the capabilities to grow and innovate with confidence. The new innovations introduced today build on Cisco's legacy of industry-leading networking and security solutions, and allow for IT to easily extend management across network domains. The new Cisco Meraki solutions include:

MS390: A next-generation access switch that combines the simplicity of Meraki with the power of Cisco switching innovations. Building on Cisco Meraki's intent-based networking solution, this is the first Meraki switch built with Cisco Catalyst hardware innovations combined with Cisco Meraki software innovations.

Adaptive Policy: Cisco Meraki Adaptive Policy allows organizations to group users, applications and devices to easily apply the right policies. Adaptive Policy is a part of Cisco's Zero Trust Security initiative, and will enable advanced multi-domain policy support between Meraki and a SD-Access fabric deployment.

Cisco Meraki Security Innovations: Cisco Meraki is introducing new security features, as well as further multi-domain integrations with Cisco's industry-leading security portfolio. This includes the introduction of Meraki Trusted Access, which provides device authentication without the need for an MDM solution. Other innovations include DNS traffic protection and content filtering on the Meraki MR powered by Umbrella, and enhanced Security Appliance Firewall rules.

Meraki Gateway (MG): A new product line for Cisco Meraki, Meraki Gateway (MG) is a wireless WAN cellular gateway that unlocks the power of cellular connectivity while offering simple provisioning and management.

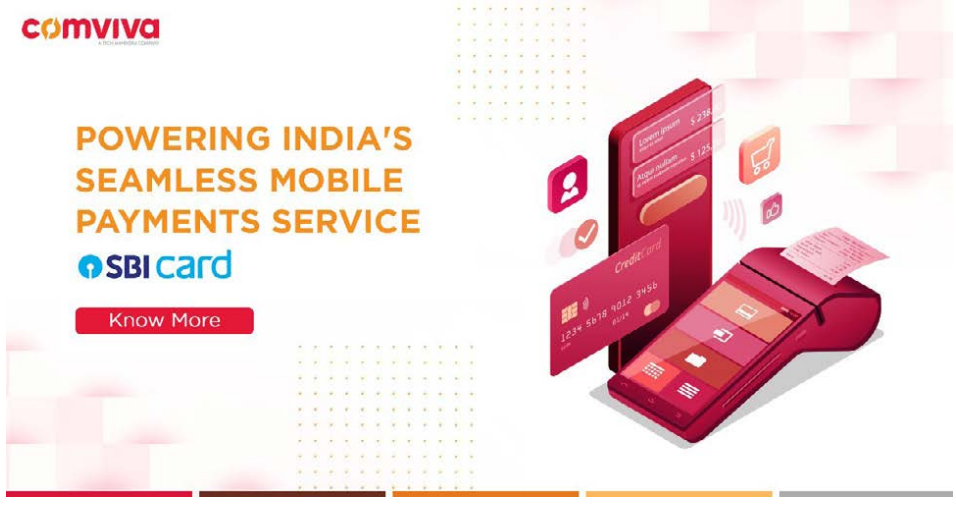
"Our goal has always been to empower our customers to do what's best for their business by providing a network solution that allows them to focus on what is most important," said Todd Nightingale, SVP/GM, Cisco Meraki. "LTE, Wi-Fi 6, IoT and the other countless networking innovations available today can seem daunting, but with the right architecture and the right security in place, IT can be adapted to meet the needs of the business at any scale. So, whether it is someone managing one site or one hundred sites, we aim to provide our customers with the most powerful and most simple option." For partners, Cisco Meraki's approach to networking has provided immense growth opportunities. By simplifying the implementation of networking and security, Cisco Meraki partners are able to spend less time building networks for customers, getting customers up and running sooner. In addition, Cisco Meraki's network is open and extensible, enabling partners to integrate and build value-added applications and services on top of Cisco Meraki's platform. With today's news, Cisco Meraki is continuing its commitment to partners by extending its portfolio and expanding partners' addressable market. "The new Meraki MS390 combines the simplicity of deployment and management of Meraki with the power of Cisco switching innovation," said Brian Ortbals, Vice President, Advanced Technology at World Wide Technology. "The MS390 creates a scalable way to aggregate high-density Wi-Fi deployments while providing the ultimate user experience. In addition to scale, the MS390 offers extensibility for new feature development, including new security policy that organizations will want to take immediate advantage of."

Comviva to Drive Zain Jordan's Digital Ecosystem

Comviva, a global leader in mobility solutions, has signed its first strategic digital business management deal with Zain Jordan. As part of the multi-layer deal, Comviva will provide its Digital Business Management Suite which includes Digital Services Delivery Platform (DSDP 2.0) and its expertise in Business Operations and digital content, which will help Zain to drive its growing digital ecosystem. Comviva is a leader in mobility solutions, especially in areas of telecommunication, payments and banking. The company caters to about two billion mobile users globally with an expansive suite of productized solutions. The company is currently managing UAE telecom provider du's end-to-end digital content services business for premium services that offer facilities such as wireless-application-protocol (WAP) services, mobile contests, mobile games and over-the-top (OTT) internet app aggregation. It also manages Ooredoo Kuwait's digital content services for all premium services. Comviva's DSDP 2.0 platform, combined with its expertise in business operations and digital content will help Zain overcome these challenges, helping the operator to stay focused on creating winning digital experience for subscribers, while optimizing systems and processes for cost minimization and revenue gains. In a statement on the occasion, Ramy Moselhy, VP & head of MENA Region at Comviva said, "This deal is of strategic advantage to Comviva, as it has given us a footing in the Jordanian market. We are extremely excited to extend our innovative value proposition to Zain, which will help the operator in overcoming the major hurdles in the digital service delivery. Zain Jordan announced in a statement that it is glad to be partnering with Comviva as its digital business aggregator, and is looking forward to benefiting from their expertise to help us boost its content related revenue while maintaining utmost customer experience and cost optimization. With the rising demand for digital services bringing increasing complexity in the content partner ecosystem, Zain Jordan has always desired to make the latest technology tie-ups in storage, access, fraud prevention and customer experience, while bringing whole-scale process improvements for optimizing operations. Comviva's DSDP 2.0 platform provides a mediating layer between Zain Jordan and digital service providers, specializing in various content formats like caller ring-back tone (CRBT), video, games, music, live streaming and so on. Unlike earlier, when content providers (CPs) would be dealing with invoices, billing and customer-relationship-management (CRM) integration separately for every new service, now there's a single DSDP 2.0 layer for service integration, making it easier for CPs to integrate services in Zain's growing digital ecosystem. With the aim of broad-basing the ecosystem of digital services, DSDP 2.0 will enable CPs to create an end-to-end service, helping those who have a rich content catalogue but lack the means to monetize their content. It provides support to new and exciting content mediums like augmented reality (AR) and virtual reality (VR), live streaming, e-sports, catering to new digital customer. Data and analytics-driven technologies will help the Zain to automate certain transactions with a greater degree of certainty, adding to the robustness of the system. With a single repository for digital service, the customer's digital journey will be uniform on various channels, such as IVR, SMS, app and so on. Similarly, DSDP 2.0's single business view, will allow the operator to take faster and more informed decisions on matters affecting their business.

Comviva Leverages HCE Technology to Power the SBI Card Pay Service

SBI Card has recently launched the SBI Card Pay service that enables customers to create a virtual card on their mobile phone for their physical Visa SBI credit card. The customers can now simply tap their mobile phone on a Near Field Communication (NFC)-enabled point of sale (POS) terminal to make payments. Besides SBI Card app, the service is powered by Comviva's HCE Module from its mobiquity® Banking suite, that leverages host card emulation (HCE) technology and tokenization to deliver swift, seamless, secure and convenient contactless mobile payments to customers. To avail of the SBI Card Pay service, customers with an Android smartphone (housing Android OS KitKat version 4.4 and above) have to register their Visa SBI credit card on the SBI Card mobile application. This creates a virtual version of the physical card. Thereafter, customers can make payments



at merchants by unlocking their mobile phone screen using fingerprints, the screen lock facility or an MPIN and tapping the phone at an NFC POS. This simple "tap and pay" process has made contactless mobile payments swifter and more seamless for customers. Hardayal Prasad, Managing Director and Chief Executive Officer, SBI Card said, "SBI Card Pay is leveraging next-gen technologies like HCE to deliver faster, secure and more convenient contactless mobile payments to our consumers, redefining their payment experience. This new service will accelerate the growth of contactless mobile payments in India and make the country digitally empowered in the field of payments technology." Srinivas Nidugondi, Executive Vice President and Chief Operating Officer, Mobile Financial Solutions, Comviva said, "With the growing NFC POS infrastructure in India and mobile phones becoming de facto wallets for consumers, we expect "tap and pay" to become the future of contactless payments in India. We are happy to say that Comviva is supporting SBI Cards to make this future possible through its mobiquity® Banking suite. The suite leverages HCE and tokenization for seamless and secure contactless mobile payments and to bring the payment experience in India on par with the developed world." Security has remained a priority, whilst launching this service. The SBI Card Pay service uses tokenization to convert a customer's card information into a device-specific digital token. Hence, while executing a transaction, a digital token is shared and the customer's actual card information is never revealed to the merchant, thus securing the transaction. In case the customer's mobile device is misplaced, details of the card remain secure, as it is stored as digital tokens. Moreover, customer convenience remains paramount. The service is a part of the SBI Card mobile application, which is a one-stop shop for managing credit card account, as well as making payments. Customers do not need to download any additional mobile application for this service. SBI Cards also allows customers the choice to set limits pertaining to per transaction and daily transactions. In case the customer's mobile device is misplaced and the digital token has been blocked, the physical card can still be utilized. Comviva's mobiquity® Banking suite provides a comprehensive solution to banks and financial institutions, to not only build, manage and control the Omni-channel experiences, but also continuously iterate and engage the consumers, through instant configuration capability, marketing automation, personalization and experimentation engine. This empowers the bank to deliver a hyper-personalized experience, thereby enhancing the customer's value, and, subsequently, profitably transition to the digital age. Moreover, the product also delivers agile and secure contactless payment experience to the customer, by leveraging HCE and tokenization. HCE enables the customer to have a digital version of the credit or debit card in their mobile phone and use it at payWave/ payPass certified POS machines. This eliminates the requirement of a physical card. Tokenization ensures that payments are executed in a secure manner, as details of the card are not shared with the merchant, while the transaction is being processed. mobiquity® is a multi-token service provider (TSSP) solution, which is readily integrated and certified for usage with Visa's VTS and Mastercard's MDES solutions. It provides support for any other TSP as well, using a single proprietary SDK, across devices.

Eutelsat Releases First Quarter 2019-20 Revenues

Eutelsat Communications reports revenues for the First Quarter ended 30 September 2019. Rodolphe Belmer, Chief Executive Officer, commented: "The first Quarter has seen a number of milestones in our Connectivity strategy, with the procurement of EUTELSAT 10B with significant pre-commitments in the mobility segment and the foundations laid for the IoT strategy, notably with the order of our first ELO constellation nanosatellites. Elsewhere, we have added a further lever to our cash flow strategy with the roll-out of the LEAP 2 cost-savings plan, aiming to generate opex economies of €20-25 million by FY 2021-22, which will be reinvested in our future growth verticals whilst preserving our EBITDA margin. Despite our expectation that the revenues profile for the current year will be back-end loaded, the outturn of the First Quarter is slightly below our expectations, notably due to worsening trends in Data & Professional Video and the unplanned return of a couple of transponders in Russia. On the other hand, the coming quarters will benefit from easing comps in Government Services and Data & Professional Video, the contribution of new capacity and the ramp-up of African Broadband. We therefore confirm our Full Year objective of revenues for the Operating Verticals of between€1,280 million and €1,320 million, albeit with an increased likelihood of a landing in the lower half of this range. All other elements of the financial outlook are also reiterated. These objectives are subject to a nominal deployment plan, and notably the outcome of tests on the condition of the EUTELSAT 5 West B satellite."

[1]Change at constant currency and perimeter. The variation is calculated as follows: i) Q1 2019-20 USD revenues are converted at Q1 2018-19 rates; ii) Q1 2018-19 revenues are restated from the disposal of Eutelsat's interest in Eutelsat 25B which occurred in August 2019.

[2]Other revenues include mainly compensation paid on the settlement of business-related litigations, the impact of EUR/USD revenue currency hedging, the provision of various services or consulting/ engineering fees and termination fees.

Facebook Changes Corporate Logo to Distinguish Products from Main App

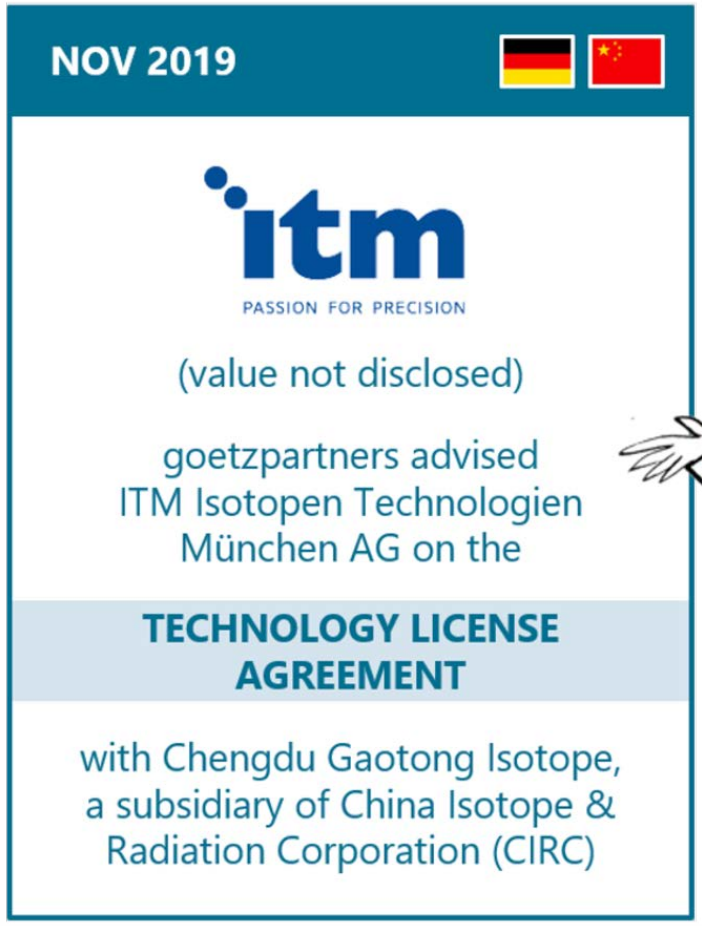
Facebook's new wordmark can change colors to reflect the product it's associated with. Facebook's logo is getting a refresh. The social media giant said it's changing its corporate logo from one that's synonymous with its main Facebook app and website to one that can better mesh with the other products it owns and operates, including Instagram, WhatsApp and Oculus. Antonio Lucio, Facebook's Chief Marketing Officer, said in a blog post that the new branding -- which has the Facebook name spelled out in a different font than the one that's adorned its namesake service for years -- was "designed for clarity, and uses custom typography and capitalization to create visual distinction between the company and app." The new logo is designed to pair with its various services, changing color to match the product it's accompanying, such as green for WhatsApp or the purple and orange hue that's associated with Instagram. The move is also a sign that Facebook is trying to make it more obvious to consumers that it owns other social networks and messaging services. In October, the Pew Research Center released a survey that showed only 29% of Americans know Facebook owns both WhatsApp and Instagram. The change comes as the Federal Trade Commission and multiple state attorneys general are looking into whether Facebook purchased Instagram and WhatsApp to stifle competition and if these actions harmed consumers. The company has also faced calls from politicians and even a co-founder to split WhatsApp and Instagram from Facebook. At the same time, Facebook is working on a way for people who use Facebook Messenger, Instagram direct message and WhatsApp to send messages to each other without having to switch apps. The new branding makes it more pronounced that Facebook owns Instagram and WhatsApp. The tech giant said in August it was rebranding Instagram and WhatsApp so users know they're part of Facebook. Currently, Instagram's login screen says it's "from Facebook" but the information is in gray text. With the new change, the word Facebook is all capital letters and includes colors associated with Instagram at the bottom of the login screen. "People should know which companies make the products they use," Lucio wrote in the blog post. "This brand change is a way to better communicate our ownership structure to the people and businesses who use our services to connect, share, build community and grow their audiences."

Facebook and Banglalink Join Forces to Bring Digital Empowerment to Women

Banglalink, digital communications service providers in Bangladesh, has joined forces with Facebook to train women with less access to digital facilities on how to participate in the digital world in a safe and responsible way. The recently launched campaign 'Learn More, be More' will train women from selected communities on how they can use Facebook for free. In addition to receiving the training, they will participate in educational workshops on health, safety, child education and saving money. Scheduled to be run till the end of December, the program will be held in 180 garment factories in Gazipur, Savar and Narayanganj areas. More than 16,000 women will benefit from this initiative, a press release from Banglalink said. "We believe that one of the most effective ways of eradicating digital divide from the society is to ensure women's participation in the digital movement. The campaign will encourage participants to explore the world of internet and embrace the digital way of life. We are grateful to Facebook for coming forward and being a partner in this great initiative," Upanga Dutta, the Chief Commercial Officer of Banglalink said. As a part of Banglalink's Digital Literacy Program, earlier it launched similar campaigns with Facebook and GSMA (the Global Mobile Industry Association), which saw significant outcomes in eradicating digital divide. In addition to providing customers with quality digital services, Banglalink will keep playing a pioneering role in digitalizing Bangladesh by building an inclusive digital infrastructure in the country, the press release said.

goetzpartners Advised ITM on a Technology License Agreement for Medical Radioisotopes with CIRC in China

goetzpartners advised ITM Isotopen Technologien München AG (ITM), a biotechnology and radiopharmaceutical group of companies on a technology license agreement with Chengdu Gaotong Isotope Co., Ltd. a subsidiary of China Isotope & Radiation Corporation (CIRC), a nuclear technology application products manufacturer and supplier. The agreement is in relation to the production and distribution of Germanium-68/Gallium-68 Generators and no-carrier-added (n.c.a) Lutetium-177 (EndolucinBeta®) in China. ITM and CIRC have already been working together in a successful partnership for almost 10 years in which CIRC has distributed ITM's medical radioisotopes, generators, and equipment to the Chinese market. China's radiopharmaceutical market is now growing rapidly in line with the fast expanding clinical evidence and use of Targeted Radionuclide Therapies worldwide. In order to meet the rising demand for Targeted Radionuclide Therapy in China, ITM and CIRC have decided to enter into a technology license agreement. Under the terms of the agreement, CIRC's subsidiary Gaotong will implement the production of 68Ge/68Ga Generators and n.c.a. Lutetium-177 (EndolucinBeta®), in China for the Chinese market, as well as joining ITM's global network of OEM suppliers in support of ITM's international framework agreements with strategic partners. With this new partnership, CIRC is now the fourth partner to join the global ITM OEM Processing and Production Network. "ITM has developed a strong presence in the Chinese market through CIRC as our distribution partner, supplying 68Ge/68Ga Generators and no-carrier-added Lutetium-177 since 2010", said Steffen Schuster, CEO of ITM. "Now we are excited to take our established partnership to the next level. This agreement with CIRC allows us to share our manufacturing expertise in producing high-quality theranostic radioisotopes with a reliable partner who is able to implement and set highest quality standards in China. This gives us the opportunity to provide locally manufactured radioisotopes for Chinese cancer patients and also for cancer patients worldwide via our OEM Network. Through this expanded relationship with CIRC and Gaotong, we are looking forward to making Targeted Radionuclide Therapy available to a growing number of cancer patients and to jointly improving patients' outcomes and quality of life." Mr. Wu Jian, General Manager of CIRC added: "We can look back on a long-standing and reliable relationship with ITM through which we have been able to offer the best next-generation medical isotope products available to the emerging Chinese radiopharmaceutical market from the very beginning. With this important agreement, we are taking the next step in serving Chinese cancer patients through China's nuclear medicine practitioners in a better and timely manner and deepening our relationship with ITM at the same time. We believe that on the basis of our decades of experiences in radionuclides and radiopharmaceutical research and production, by manufacturing radioisotopes according to the unique methodologies developed by ITM and internationally accepted quality standards, particularly the theranostic pair Gallium-68 and the unrivaled no-carrier-added Lutetium-177, we will be able to supply high quality products to help many cancer patients in China and provide an economically sustainable solution for the Chinese Health Care System." goetzpartners Corporate Finance acted as exclusive advisor to ITM, further underlining our competence as advisor of choice in the healthcare industry and in cross-border transactions. Additional terms of the agreement are not disclosed.



Huawei Opens 5G Innovation & Experience Centre in London

Huawei has launched its 5G Innovation and Experience Centre in London to promote greater collaboration between businesses and innovators in the development of 5G ecosystems. Huawei's 5G Innovation and Experience Centre, a base for 5G knowledge and skill-sharing, aims to enhance 5G cooperation across the UK and showcase the real-life impact of 5G in the UK and around the world. Visitors will be able to experience extraordinary real-time and interactive gaming, perform with their favorite bands with the help of virtual and augmented reality and learn about the endless future possibilities made real by 5G technology, such as smart manufacturing and advances in healthcare. Jerry Wang, CEO of Huawei UK, said: "With the opening of our 5G Innovation and Experience Centre in London we, as a leader of 5G, are taking another important step. What we have opened today will enable true collaboration amongst UK businesses and technologists and showcase the huge potential of 5G applications for both the private and business sectors." Huawei's Q3 2019 results reported more than 60 signed commercial contracts for 5G with leading global carriers, including all major operators in the UK. Together with customers and partners, Huawei will speed up digital transformation across various industry sectors worth trillions of US dollars, such as public utilities, finance, transportation and electricity. To mark the occasion, Huawei is hosting a live-stream panel discussion on the future of 5G. The 5G Innovation and Experience Centre sits within Cocoon Global, one of Europe's largest co-working spaces, aimed at bringing together the brightest startups and facilitating the exchange of technology ideas across cultures.

Huawei Placed as a Leader in Gartner's Magic Quadrant for LTE Network Infrastructure for the Third Successive Year

Huawei has been positioned as a Leader in the 2019 Magic Quadrant for LTE Network Infrastructure1 by Gartner, a world leading advisory and research firm. This is the third successive year Huawei has been positioned highest and furthest right for the Ability to Execute and Completeness of Vision in the Leaders Quadrant since 2017. Huawei, as an industry leader in LTE networks, firmly believes that LTE+NR combo will be the target network in the 5G era and LTE will remain the primary source of revenue for operators over the next few years. This belief drives Huawei to keep investing heavily in LTE R&D to improve network efficiency, simplify the network structure, and enhance the coordination between LTE and NR. The ongoing moves to phase out 2G and 3G means LTE will be the foundation network in the 5G era. User migration and increasing data consumption will see a tenfold increase in LTE traffic. Huawei has been actively promoting the LTE technology evolution and launched innovative multi-antenna multi-sector solutions, such as TDD/FDD Massive MIMO, TDD/FDD 8T8R, and 4T6S. These solutions are set to continuously improve spectral efficiency and enhance the LTE foundation network. In addition, Huawei is committed to building a simplified 5G network, leveraging software and hardware solutions such as SingleRAN Pro and CloudAIR to converge 2G, 3G, 4G and 5G, and eventually forging an efficient, coordinated LTE+NR target network. The ultimate goal is to help operators protect investment and improve network resource utilization. 4G has the most mature ecosystem and cost-effective performance. In the next few years, it will play an indispensable role in delivering cost-effective voice, data, and IoT services and helping global operators fulfill the social responsibility of connecting the unconnected and building a fully connected intelligent world. Huawei will continue to collaborate with operators and industry partners to further innovate in LTE to embrace the next golden decade of the LTE industry.

Huawei Mobile Services Wins the World's First Batch of ISO/IEC 27701: 2019 Certification

Huawei Mobile Services recently won the world's first batch of ISO/IEC 27701 certification issued by the British Standards Institution at the Annual Conference on European Data Protection 2019 in Brussels, Belgium. The win recognizes Huawei Mobile Services receiving great recognition from the industry for its world leading capacity in personal data protection and information security control. ISO and IEC officially released ISO/IEC 27701:2019 privacy information management system, an extension to ISO/IEC 27001 and ISO/IEC 27002 for privacy information management. This document provides private companies, government entities, not-for-profit organizations and other social organizations with a complete set of methods for personal data processing and a framework for privacy information management from multiple dimensions as organization governance, legal compliance, process specification, information technology, supervision and audit. It is also the world's most authoritative, strictest, most widely accepted and applied PIMS to date. Provided by Huawei to its end users, Huawei Mobile Services is a kind of digital life service, which involves diverse scenarios including smart household, sports & health, mobile office, smart travel, and entertainment. While earnestly serving users, Huawei Mobile Services has always adhered to its core value of "privacy is the fundamental right of users" following its tenet of privacy protection. Keeping in strict accordance with local laws and regulations, Huawei Mobile Services always adopts the industry leading security technologies with privacy protection as the cornerstone for its product design, and is devoted to offering users safe yet pleasant digital life services through its self-developed smart products like Huawei Cloud, Huawei Hi Assistant, Huawei App Store, Huawei Wallet, Huawei Skytone, Huawei Video, Huawei Music, Huawei Reading, Huawei Theme and Life Services. Huawei Mobile Services has won successive awards in security certification including ISO/IEC27001 and CSA Star security certification in 2015, and ISO /IEC 27018 privacy standard certification in October 2019. This time, Huawei becomes the first batch of cloud service providers winning ISO/IEC 27701:2019 certification, vividly proving that Huawei Mobile Services has gained great recognition from international authoritative organizations thanks to its outstanding performance in user privacy protection. With its design, R&D, operation, maintenance and other links continuously optimized, Huawei Mobile Services has formed mature personal information protection system and reached the world leading level in privacy management, transparency, and legal compliance of personal information. After winning the ISO/IEC 27701 certification, Huawei Mobile Services is committed to following strict management and technical standards for effective implementation.

Huawei and BT Ireland Jointly Complete Industry's First 1.2Tb/s Transmission Real-Time Trial in a Live Network

BT Ireland and Huawei recently completed Industry's First 1.2Tb/s transmission real-time trial based on commercial product platform in a live network. This project uses Huawei-developed OptiXtreme series oDSP chips and high-performance optical transmission modules to implement ultra-high-speed interconnection between two data centers in Dublin with a record data rate of 1.2 Tb/s. The OptiXtreme series oDSP with unique Channel-Matched Shaping (CMS) technique and AI neuron modules can sense key parameters of optical channels, and compensate for link impairments and optimize the transmission spectrum efficiency accordingly. With Huawei's unique Super-C line system, single-fiber capacity of 48 Tb/s can be achieved, which is six times as large as that of today's common WDM systems based on 100G wavelength channels. According to the latest statistics by OVUM, Huawei's global high-speed port shipments have been ranked No.1 in the world for over 9 years. Huawei remains committed to open collaboration and actively promotes ICT development. With the advent of 5G, Huawei will further expand network bandwidth, create greater value for customers, and build a better connected world featuring ultra-broadband, simplicity, intelligence, and ubiquitous connectivity.

Huawei Preparing to Launch New 5G Products in Saudi Arabia

Today, we depend on a fast and reliable Internet connection for performing a number of tasks throughout the day and to keep us connected with friends, family and colleagues. We need a fast connection for responding to messages, downloading and sharing documents, streaming content and staying connected on social media. There is almost no situation that doesn't call for a strong, stable link between a device and a network. Since the dawn of the Internet, we've seen a constant evolution in connectivity with each new development helping to provide consumers with speedier devices, faster downloads and network connections. The demand for a more reliable and faster Internet has continued and with it a new era of connectivity: 5G. Huawei has always been committed to designing innovative devices to deliver the best possible network connectivity; and is also a global leader in telecommunications and network infrastructure. On the cusp of the new era, Huawei is once again leading the 5G transformation and providing a new level of reliable speed and connectivity, and in this regard the company will soon launch in Saudi its new level of connected intelligence, the HUAWEI 5G CPE, HUAWEI 5G Mobile WiFi Pro and the HUAWEI 5G Mobile WiFi. These new devices will offer users an immersive download speed with secure and rapid connectivity. These devices introduce the new Balong 5000 chipset that supports 5G standalone (SA) and non-standalone (NSA) networks with its intuitive antenna design to provide untouchable speed. The Balong 5000 modem heralds a new era of all-scenario Gigabit connectivity, connecting people, homes and cars together in a high speed, plug-and-play broadband network. Huawei has also developed the world's first "small cross-polarized" antenna that's designed to stop self-interference. These much anticipated devices will be available soon in the Saudi market.

Huawei Organizes Training on Artificial Intelligence in Pakistan

Huawei Technologies organized the first 'Train the Trainers' training for Huawei Certified Information and Communication Technologies (ICT) Associate or HCIA on Artificial Intelligence (AI). The training was managed by Huawei jointly with Pakistan's Higher Education Commission (HEC) at the HEC Secretariat in Islamabad. The eight-day training, conducted by Huawei AI Experts from China, was attended by trainers from 11 universities across Pakistan. The training is a part of Pakistan Presidential Initiative for Artificial Intelligence and Computing (PIAIC). The training aims at Artificial Intelligence talent development in Pakistan. The HCIA-AI training and certification will cultivate entrepreneurial talent for the professionals of Artificial Intelligence and help them to use the AI framework in the industry for development and innovation. Dr. Fateh Marri, Executive Director HEC, was chief guest in the closing ceremony, which was also attended by Shahzad Rasheed, Chief Technical Officer (CTO), Huawei Enterprise Business Group Pakistan and the delegates from various universities. Addressing the audience, Dr. Marri emphasized on the importance of Artificial Intelligence in understanding modern tools in education sector and its relevance for overall economic growth of any nation. He also mentioned the importance of close relationship between industry and academia to achieve the objective of problem solving in all aspects of life. Shahzad Rasheed congratulated the trainees for being selected for the prestigious training. He elaborated usefulness of Artificial Intelligence in building bridges for solving various problems faced by the country and assured Huawei's complete support. This week, Prime Minister Imran Khan invited Huawei, the Chinese telecom and IT giant, to explore huge business opportunities created in Pakistan under the new E-policy. Speaking to Chairman of the supervisory Board Huawei Li Jie - who called on him along with his delegation in Islamabad - Prime Minister Khan urged the company chairman to involve brilliant young minds of Pakistan working in technical fields. He said that Pakistan had inexpensive labor and this competent and enterprising youth potential of the country would help the foreign countries to further grow. He also highlighted attractive incentive package, being offered by the government to the potential relocating industries. The possibility of relocation of manufacturing units to Pakistan also came under discussion. Chairman Li Jie informed the Prime Minister about the progress being made by the company in the network domain and said that they have successfully established a new ecosystem so as to become independent of reliance on companies enjoying the monopoly in the field. He said the delegation was really impressed with the intellect of the Pakistani students. He said that they were running a Program of merit awards to the students of a Pakistani university. Meanwhile, after a great success of the Huawei Y9 Prime 2019 in the Pakistani market, now the Chinese mobile giant is going to launch Huawei Y9s in Pakistan. The details about the exact launch date are kept as a surprise but it is believed that soon the device will rock the Pakistani market. This new smartphone is running Android Pie-based EMUI 9.1 out of the box and comes with 128GB of storage that is expandable up to 512GB via microSD card. The fingerprint scanner is present at the side edge of the phone. The pre-orders of the phone are starting in the last week of the November while the stock will be available in the first week of December in the Market.

Huawei's 5G-Oriented Telco Cloud Solution Won Global Telecoms Award

The Global Telecoms Awards (GLOTEL Awards) was held in London recently. Huawei's 5G-oriented Telco Cloud solution won the "Telecoms Transformation" award, demonstrating the industry's strong recognition of Huawei's technological leadership and maturity in the 5G field. Cloudification is the foundation of 5G networks, and an irreversible trend for telecom networks. 5G enters into commercial scale deployment, with a broad range of prospective applications in many fields, such as smart industry, smart agriculture, smart city, and home entertainment. Agile service rollout, differentiated requirements, and deterministic experience have become the basic requirements for carrier 5G networks, accelerate the cloudification of the entire network. The 5G era is calling for more agile and efficient cloud-based networks, as service innovation relies on the flexibility of services and fast rollout brought by cloudification. With its cloud-native architecture, Huawei's 5G-oriented Telco Cloud solution takes the lead in the commercial use of key technologies such as stateless design, cross-DC deployment, and microservices. It provides the industry's only A/B test solution for commercial use, providing online upgrades with zero service interruption. In addition, Huawei has introduced innovative technologies such as containers, distributed heterogeneous hardware acceleration, and autonomous driving networks. It launched the industry's first fully containerized 5G core network, accelerating network deployment and service rollout, and helping carriers build more agile, flexible, efficient, and robust 5G networks. By Q3, 2019, Huawei had signed more than 670 commercial contracts for cloud core networks worldwide, and is determined to help carriers accelerate the cloudification of telecom networks, promote 5G service innovation, enable the digital transformation of the industry, and achieve business success. The GLOTEL Awards are organized by Telecoms.com, a well-known media agency, to commend carriers, equipment vendors, solution providers, and consulting firms that have made outstanding contributions and innovation in the global telecoms industry.

Microsoft 4Afrika Brings Technology and IT Skills Support to One Million Farmers Platform

Microsoft, through its 4Afrika Initiative, has pledged support to the One Million Farmers Platform, a World Bank initiative aiming to improve the productivity, profitability and resilience of one million African farmers through disruptive agricultural technologies. As part of the partnership, Microsoft will be providing technical and business support to the 14 Kenyan innovators selected to build technology solutions for the platform. Microsoft mentors will work closely with each innovator to provide mentorship around business development, technology architecture and go-to-market strategies. Additionally, innovators will have the opportunity to apply for Microsoft's AI for Earth grant – a US$50 million program that invests in solutions promoting sustainability around water, climate change, biodiversity and agriculture. The pledge comes just three months after Microsoft 4Afrika partnered with the Alliance for a Green Revolution (AGRA) in Africa, which similarly looks to promote data-driven agriculture to improve food

security in 11 countries. “Agriculture is a priority area of investment for us, not only because of the enormous number of livelihoods it supports and the economic growth it drives, but also because it has a high potential to be a data driven sector," says Amrote Abdella, Regional Director of Microsoft 4Afrika. “With an expanding population, there's an opportunity to use technology to improve farm productivity, optimize resource use and increase crop yields to combat rising food insecurity. We're fully committed to supporting agricultural transformation starting in Kenya – and the rest of Africa – and more critically, the innovators who are key drivers of this digital transformation." According to AGRA, smallholder farmers currently make up 70 percent of sub-Saharan Africa's population, contributing some 90 percent of food production. However, these famers are not currently reaching their full potential, challenged by limited access to markets, high cost of finance, low-yielding seeds and farm inputs, which leads to lower levels of productivity. For this reason, the One Million Farmers Platform is prioritizing digital solutions in extension, financial services, markets and data-driven applications, helping Africa to capture the current US$300 billion food market, which is projected to be worth $1 trillion by 2030. The One Million Farmers Platform will be working with the Ministry of Agriculture, Livestock, Fisheries and Irrigation, and 16 counties across Kenya, to ensure its success. Microsoft 4Afrika has committed to supporting these participating governments with technical skills development, both through workshops and by skilled resources through its programmes. “We're excited to have partners pledge their support to this initiative. Through combined networks, we hope to synergize investments at national and county level, accelerating the adoption of technology and driving agricultural transformation," says Vinay Vutukuru, Senior Agriculture Specialist, World Bank. “Meaningfully transforming agriculture requires a full ecosystem effort, and we look forward to developing this ecosystem with partners like Microsoft." In addition to its partnerships with AGRA and the World Bank, Microsoft's investments in agriculture include its FarmBeats project, which is using is low-cost sensors, drones and machine learning algorithms to support data-driven, precision farming. Previous winners of its AI for Earth grants in Africa include SunCulture, DHI Group and the International Centre for Tropical Agriculture, who are all using artificial intelligence to address food security and nutrition in Africa. Finally, through the 4Afrika Initiative, Microsoft has also provided technical support to agri-tech start-ups locally and across the continent.

Microsoft Brings Message of ‘Trust, Transform, Innovate – For the Future of Egypt' at Cairo ICT 2019

Microsoft Egypt announced its participation in the 23rd Cairo ICT, Egypt's largest technology trade and networking event, scheduled to run from 1 to 4 December at the Egypt International Exhibition Centre (EIEC). Microsoft's attendance at Cairo ICT 2019 will follow the theme of “Trust, Transform and Innovate – for the future of Egypt", reflecting the company's commitment to empower Egypt's people, businesses and government to achieve more. Microsoft has been a strategic partner of Cairo ICT since the event's 1996 debut and the company's involvement has consistently mirrored its dedication to Egypt's long-term economic ambitions, now formalised in the country's Sustainable Development Strategy (SDS), also known as Vision 2030. “The Egypt Vision 2030 is a cornerstone for the country's development to pave the way for economic, cultural and social prosperity." said Mohamad El Hawary, Marketing and Operations Lead, Microsoft Middle East. “We believe technology can be at the heart of this effort. Our presence at the Cairo ICT will reiterate Microsoft's commitment to further this vision by driving digital transformation in the country, and empower everyone to achieve more". At the four-day event, Microsoft will demonstrate how its intelligent cloud and AI tools can be leveraged to deliver state-of-the-art solutions to the healthcare industry that allow caregivers and medical professionals to better serve patients. Additionally, Microsoft will demonstrate its latest smart agriculture solutions, using AI to promote water-saving practices and smart farming. Experts at the Microsoft stand during Cairo ICT, will also highlight several innovative Internet of Things use cases in the areas of accessibility, cognitive services, industrial IoT and IoT-ready devices. visitors will experience how they can easily transform customer engagement by building AI-ready business apps for their teams. Addressing the region's elevated concerns over cybersecurity, Microsoft will show how new threats mean new rules, which require new tools and new allies. At the company's stand, delegates will witness first-hand how Microsoft's cloud-powered, intelligent security solutions help to protect users, data and everything in between. Microsoft will also highlight its work with the Egyptian government through “Digital Transformation in Citizen Service", showcasing the power of Microsoft's ecosystem in serving the Egyptian citizens. Also present at Microsoft's stand will be several global and regional partners, demonstrating their own solutions and customer case studies. These include Citrix, Atos, VeriPark, Link Development, HITS Solutions, Link Data Center, IPMagiX, Global Brands and PROART Consulting.

Microsoft and NTT Form a Strategic Alliance to Enable New Digital Solutions

NTT Corporation (NTT) and Microsoft Corp. announced a multi-year strategic alliance aimed at delivering secure and reliable solutions that help enterprise customers accelerate their digital transformations. The alliance will bring together NTT's best-in-class ICT infrastructure, managed services and cybersecurity expertise, with Microsoft's trusted cloud platform and AI technologies. Key initiatives of the alliance include the creation of a Global Digital Fabric, development of digital enterprise solutions built on Microsoft Azure, and co-innovation of next-generation technologies in the area of all-photonics network and digital twin computing. As one of the world's largest global technology and business solution organizations, NTT provides integrated services that include digital business consulting and managed services for cybersecurity, applications, cloud, datacenters and global networks in over 190 countries and regions. As part of the strategic alliance, NTT has chosen Microsoft Azure as its preferred cloud platform for modernizing its global IT infrastructure and customer solutions in the areas of advanced analytics for cybersecurity threat intelligence and the hybrid-IT management platform. "NTT is committed to helping enterprises realize their digital transformation initiatives to help create a smarter world. We believe that the combination of the Microsoft Azure platform along with NTT's connected infrastructure and service delivery capabilities will accelerate these efforts. Additionally, the companies will collaborate on IOWN, including areas such as all-photonics network and digital twin computing," said Jun Sawada, President and CEO of NTT. "Our strategic alliance combines NTT's global infrastructure and services expertise with the power of Azure," said Satya Nadella, CEO, Microsoft. "Together, we will build new solutions spanning AI, cybersecurity and hybrid cloud, as we work to help enterprise customers everywhere accelerate their digital transformation."

Key initiatives of the alliance include:

Formation of a Global Digital Fabric

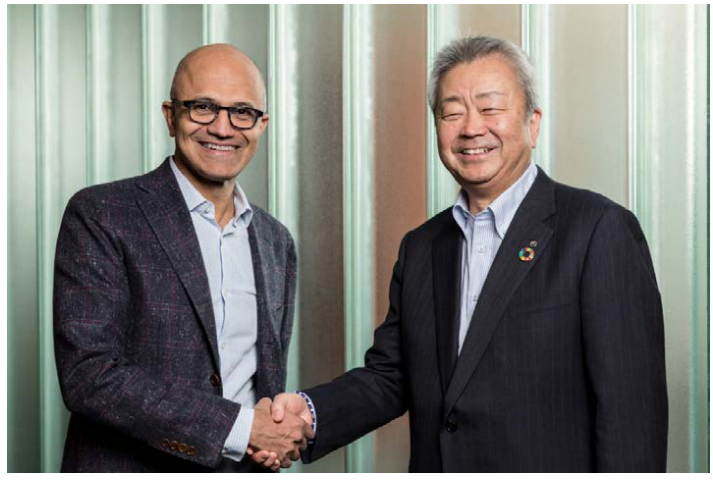
Global Digital Fabric is a combination of Microsoft Cloud and NTT's globally connected ICT infrastructure. It brings together the strengths of the two companies in the areas of productivity solutions, public cloud, global datacenter and network infrastructure. The Global Digital Fabric aims to create a highly sustainable, secure and robust environment for enterprises to accelerate their digital ambitions around the world.

Development of digital enterprise solutions

The alliance also covers the development of digital solutions built on Microsoft Azure to empower enterprises to accelerate their digital transformation and to operate more securely from the enterprise to the edge to the cloud. Key initiatives include advanced analytics for cybersecurity threat intelligence, social robotics with relational AI for digital companions, digital workplace solutions, as well as knowledge discovery and management.

Co-innovation of next-generation technologies

The alliance will also explore research and development of all-photonics network and digital twin computing as part of NTT's Innovative Optical and Wireless Network (IOWN) concept. The goal is to provide a more natural interaction between people, nature and technology, and to support sustainable growth with an optical-based networking and information processing platform of the future. Furthermore, NTT and Microsoft are committed to harnessing the power of technology for a more sustainable future. The companies intend to work together to invest in innovative projects that leverage technology to build on NTT's sustainability initiatives and Microsoft's AI for Earth grants. "NTT and Microsoft have a long history of collaboration, and this strategic alliance will further deepen our partnership. We share the same vision of empowering enterprises and society with intelligent and secure technologies for a better and more sustainable future," said Jun Sawada, President and CEO of NTT.



KPMG Enters 5-Year Agreement with Microsoft to Accelerate Digital Transformation

KPMG, a global network of professional services firms providing Audit, Tax and Advisory services, has entered into a five-year agreement with Microsoft Corp. (MSFT) to accelerate digital transformation for KPMG member firms and mutual clients. KPMG anticipates to invest $5 billion in its digital strategy. KPMG is modernizing its workplace using the Microsoft 365 suite of cloud-based collaboration and productivity tools, including Microsoft Teams. The company is also utilizing Microsoft Azure and Azure AI for a new global cloud-based platform. Through this cloud platform, KPMG will create a set of cloud-based capabilities ranging from hosting infrastructure based on Microsoft Azure to more than 50 advanced solutions, such as AI, cyber and robotic process automation.

Microsoft Calls For New Wave Of Privacy Protection

Microsoft President Brad Smith outlined the importance for technology companies in delivering privacy protections to address new challenges raised by the digital era. He said with a new wave of technology there must also be a "new wave of privacy protection, security protection", along with measures to safeguard ethics. "We need to recognize as technology moves forward, we need to stop leaving people behind". "Today cloud computing is ubiquitous all around the world. It reduced the cost of access to technology, it has led to an explosion in data. We will start the next decade with 25-times as much digital data as we had in 2010", Smith predicted. Other trends the executive expects over the next decade include a combination of traditional computing with emerging quantum efforts, and a rise in the number of data centers along with innovations in how data is stored and processed. "We are going to see 5G become 6G and computing will become ambient, it will be in every device, every corner and every part of our homes". In a keynote, Smith addressed concerns around AI, predicting the conversation would move on to address more general deployments of the technology. He noted "any tool can also become a weapon", including AI, therefore, companies need to "think as never before about what it means in terms of broader societies". "We need to ask what computers shouldn't do. We are the first generation in the history of humanity who will empower machines to make decisions…If we get it wrong, every generation that follows us will pay a price", he said. Smith appealed for technology companies to work more closely with governments to address new challenges around accessibility and environmental sustainability and show the industry is "committed to use technology to solve the world's problems". He cited the use of AI to gather and analyze data to prevent illegal fishing as an example. Smith also called for the reach of technology to be broadened, noting that more than 20 million Americans still lack broadband access.

Nokia to Transform Finland's Nationwide Smart Grid for Better Support of Renewable Energy

Nokia announced that it has been selected by Fingrid, Finland's national transmission system operator, to build an IP/MPLS network to support the digital transformation of its national electrical grid. Fingrid will use the network to operate 120 high-voltage substations and control 14,600km of power transmission across the country. The new smart grid is needed to manage the growing adoption of variable distributed energy resources, such as wind, solar and micro-generation using bioenergy. As one of Europe's leading users of renewable energy, Finland's power transmission network is constantly being upgraded in order to meet the changing character of energy generation. Solar and wind generation, for example, require a much more agile and automated grid to manage the variable, two-way power flows by automatically ramping and balancing inputs and outputs. This calls for new distributed energy resource management systems, which need a highly reliable, secure communications system to monitor, control, coordinate, and manage distributed energy assets. Nokia's mission-critical IP/MPLS network solution has been deployed by transmission system operators worldwide — supporting these new grid applications along with other critical ones, such as supervisory control and data acquisition systems (SCADA), teleprotection and current differential systems, which demand stringent control of latency and jitter. This project is in partnership with NetNordic, a longstanding Nokia channel partner. Kari Suominen, head of ICT for Fingrid, said: "We are committed to realizing the potential of renewable energy generation and are embarking on an ambitious transformation of our national grid to make it smarter and more flexible. Nokia's IP/MPLS solution plays an important role in the digital transformation of our distributed energy resource management by providing us with a reliable, secure and agile communications system that has the potential to support all of our power management needs." Kamal Ballout, Global Vice President of Energy Practice for Nokia, said: "Fingrid joins our long list of transmission system operator customers who are modernizing their networks and transforming their businesses by embracing more distributed and renewable energy sources. Through continued investment in our IP portfolio, we are able to meet the specific requirements of today's energy market, helping them evolve their infrastructure for a more sustainable future."

Nokia and Innventure Collaborate to Innovate and Scale Disruptive Technologies

Nokia and Innventure, which commercializes innovative technologies, have established a relationship designed to accelerate commercialization of disruptive Nokia Bell Labs satellite communications technology and intellectual property in areas beyond Nokia core businesses. The collaboration with Innventure will be led by Nokia Technologies, the company's licensing arm. Innventure and Nokia will focus initially on Adaptive Bandwidth Management (ABM) technology, which improves bandwidth utilization, security and resilience of satellite systems. The technology and inventions originate from Nokia Bell Labs. Over its more than 90-year history, many of the foundational technologies that underpin digital devices, systems and communications networks such as 5G have been invented by Nokia Bell Labs. Innventure will acquire rights to the ABM technology from Nokia and be responsible for further development and commercialization of this technology. "Nokia continues to explore new ways to help others benefit from Nokia innovations, while creating value from our industry leading portfolio of technologies and innovation. Innventure's approach has strong potential to further develop selected Nokia innovations on a commercial level," said Jenni Lukander, president of Nokia Technologies. Innventure identifies, starts and manages early-stage new companies with disruptive technologies sourced from leading multinational pipeline partners. The firm evaluates these technologies through its proprietary DownSelect process to determine which technologies have substantial market opportunities. Nokia becomes Innventure's third multinational technology partner to use Innventure's unique commercialization platform. Mike Otworth, Founder and CEO of Innventure, said: "We are thrilled to work with Nokia to bring the company's transformative innovations to new markets, businesses and customers. Nokia has a strong pipeline of positively disruptive technologies. We have already progressed our evaluation of the Adaptive Bandwidth Management technology to the point that we have secured global commercialization rights for Innventure."

Nokia Wins Deutsche Bahn Tender to Deliver and Test the World's First 5G-Based Network for Automated Rail Operation

Nokia has won a tender to test and deliver the world's first standalone (SA) 5G system for automated rail operation in Hamburg, Germany. The project is part of Deutsche Bahn's highly automated S-Bahn operation project. The proof-of-concept will test whether 5G technology is mature enough to be used as the connectivity layer for future, digitalized rail operations. The project constitutes an early and important step in the development of the Future Railway Mobile Communications System (FRMCS) standard, based on 5G, and sets the stage for the digital transformation of railway operations. Nokia is a leader in this market with extensive experience in providing GSM-R systems to rail operators in 22 countries, covering 109,000 km of track. Overall, Nokia has provided networking, cybersecurity, IoT and analytics solutions to 110+ operators for both mainline and metro rail. This project to deliver the first 5G SA solution for rail operation, further emphasizes Nokia's leadership position. By 2021, as part of the project "Digitale S-Bahn Hamburg", highly automated trains (with train drivers on board who keep safety responsibility) are expected to operate on a 23-kilometer section of the S-Bahn Line 21, starting at Berliner Tor, one of the main transport hubs in Hamburg. Part of the demonstration will include fully driverless shunting of empty trains in an area near Bergedorf station, based on the transmission of train control information over the Nokia 5G mobile network. The Nokia 5G solution is based on 3GPP standards for 5G mobile networks, allowing highly or fully automated trains to exchange relevant data with trackside equipment by 5G radio. This will have positive effects on cross-border operation, capacity of rail infrastructure, punctuality of trains and also on customer experience. Kathrin Buvac, President of Nokia Enterprise and Chief Strategy Officer, said: "We are very pleased to be Deutsche Bahn's partner, bringing digital technology to the forefront of the Hamburg S-Bahn network and rail system. Together, we have worked to research, develop and deliver the world's first 5G-based communication system for automated rail operation, an important milestone towards the Future Rail Mobile Communication System and a major step in making Industry 4.0 a reality."

Nokia's Common Software Foundation Platform Supports AWS

Nokia claims this offers communication service providers (CSPs) extra deployment choices and faster time to service when rolling out 5G or digital services. The company also says this is the next step in Nokia's move to deliver cloud-native network functions and applications, enabled by the company's Common Software Foundation (CSF). "Whether for opex optimization, on-demand capacity to optimize capex, quick time to market, or support of 5G and other edge compute applications, public cloud deployments of advanced network software are a critical new option for CSPs," said Dana Cooperson, Research Director, Analysys Mason. "Companies such as Nokia and AWS [Amazon Web Services] working together is a positive step in making this option a reality."

AWS' role

Since the start of the relationship in October 2017, AWS has played a role in Nokia Software's modernization efforts, spanning the development, delivery, and hosting services for its software infrastructure. This began with putting network functions and applications into containers, in a unified way, using CSF, and then enabling CSF and Nokia containerized software deployment on AWS. The first benefits of this collaboration include a CSF-based, cloud-native system for automating applications integration and customization procedures rolled out on AWS in June 2019. The system supports more than 1,000 of Nokia's applications delivery engineers across the globe. "Interest in AWS from the CSP market segment beyond IT workloads is growing rapidly," said Matt Garman, Vice President of AWS Compute Services, Amazon Web Services. "We are delighted to be working with Nokia and helping them leverage the power of AWS for their network infrastructure solutions and business and operational support applications."

Applications on AWS

Nokia offers several applications on AWS, including customer experience, service fulfilment, and orchestration solutions. Through this engineering collaboration, Nokia will prioritize 5G solutions including mobile core, network and service orchestration, and device management and operational support systems suites. In future, all new Nokia Software cloud-native network functions and applications will be available on AWS upon release. "Our Common Software Foundation continues to drive commercial value forward for our customers including choice of deployment options. CSF now enables all our cloud-native network functions and applications on AWS," said Bhaskar Gorti, President of Nokia Software. "And when we combine Nokia pre-engineered solutions with AWS deployment, CSPs will be able to commission a new 5G mobile core or provision a new service offering with the click of a button – meaningfully changing CSPs' economics and operational time frames."

Nokia and VMware Expand Partnership to Ease Large-Scale, Multi-Cloud Operations

Nokia and VMware today announced an expanded partnership that includes the development of integrated solutions to support communications service providers' (CSPs) drive for operational improvements and cost efficiency through large-scale, multi-cloud operations. After years of working with virtual or cloud-based network functions in limited production deployments, CSPs need to build out these functions at scale to handle the increasing use of new data-intensive applications for tomorrow's 5G and edge computing use cases. Success of this strategy is dependent on seamless interoperability and efficient operations of cloud-based network functions. VMware and Nokia have a broad mutual customer base globally, across both companies' portfolios. Through the expanded partnership announced today, the two companies will advance the interoperability between Nokia software applications and VMware's Telco Cloud, including VMware vCloud NFV. Nokia and VMware will also increase their investments in a deeper partnership with technology collaboration and advanced research & development to develop integrated solutions. As a result, CSPs will be able to more easily meet their business and use case objectives, using VMware cloud infrastructure that is engineered to work together with Nokia virtualized and containerized network functions. Nokia and VMware have been working together to create seamless cloud redundancy by running Nokia's applications, such as Nokia Service Management Platform, on VMware's Telco Cloud platform and VMware HCX, an application mobility platform designed for simplifying application migration, workload

rebalancing, and optimized disaster recovery across data centers and clouds. This will enable customers to embrace a multi-cloud strategy to unify network and IT environments and connect them to private enterprise clouds, edge clouds, and public clouds. Nokia will continue to focus on the technical certification of Nokia VNFs and software applications on VMware vCloud NFV platform through a dedicated, on-site VMware Ready for NFV Certification Lab. The new lab includes performance characterization to enable CSPs to properly configure their technology environments for the best results. With the Certification Lab, Nokia and VMware will serve customers in an accelerated fashion, keeping pace with new features and releases and enabling better roadmap alignment between the two companies' portfolios. Several Nokia software applications, such as Nokia CloudBand Application Manager and Nokia Smart Plan Suite, along with virtual IMS, virtual packet core and session border controller are already certified for operations in VMware cloud environments. Dr. Alex Jinsung Choi, Senior Vice President, Strategy & Technology Innovation, Deutsche Telekom, said: "We are pleased to see Nokia and VMware come closer together to enable a more seamless deployment of Nokia VNFs and CNFs on VMware's Telco Cloud platform. We see great value in these two companies' portfolios featuring greater interoperability and believe the contribution this expanded partnership will make to a viable ecosystem will help us accelerate our digital transformation." Shekar Ayyar, Executive Vice President and General Manager, Telco and Edge Cloud, VMware, said: "With the advent of 5G and edge computing, customers are adopting VMware's container-ready Telco Cloud supported by innovative efforts like Project Maestro multi-domain orchestrator. We are delighted to partner with Nokia to enable faster deployment of Nokia virtual and containerized virtual functions on VMware cloud infrastructure, ultimately helping our customers prepare their telco cloud networks for the future." Bhaskar Gorti, President of Nokia Software, said: "In today's digital era, communications service providers expect software solutions to be cloud-native and hardware-agnostic, with multi-vendor and multi-network capabilities built in. The expanded partnership we are announcing today gives Nokia and VMware greater scope and capacity to accelerate innovation and best anticipate and deliver against the expectations of our mutual customers."

Nokia and Zain's 5G Launch Improves Digital Life Across KSA

Nokia says the recent launch of 5G with Zain in KSA plays an important role contributing to the government's National Transformation Plan 2020 and Saudi Vision 2030. Zain and Nokia have been working together on 5G in KSA since the companies signed a Memorandum of Understanding back in 2017. In June 2019, the companies firmed up the relationship with a three-year, end-to-end contract to roll-out 5G to 4,000 sites, then in October 2019 they launched their 5G networks and services that covered multiple cities including Jeddah and the holy city of Mekkah. This saw the Zain-Nokia partnership rolling out more than 1,000 5G sites in the three-month period. The first phase of 5G deployment will provide a network of 2,000 sites to cover a total of 26 Saudi cities by the end of 2019. As well as enhancing mobile broadband services in KSA, the ultra-high bandwidth and low-latency 5G network provided by Zain will enable new applications and services offering advanced industrial automation, improved education, healthcare, entertainment and immersive Virtual Reality services, similar to the services offered at Hajj this year. This is central to a wider national strategy designed to improve the digital infrastructure and digital life of the country and will ensure widespread socio-economic benefits across KSA.

PCCW Solutions Acquires HCL Insys to Accelerate Growth in Southeast Asia

PCCW Solutions, the IT services flagship of PCCW Limited, has acquired HCL Insys Pte. Ltd. (HCL Insys), which, prior to the acquisition, was a wholly owned Singapore-based step-down subsidiary of India's premier technology company HCL Infosystems Limited. Established in 2012, HCL Insys is a leading IT solutions and outsourcing service provider, offering managed services including end user computing, data center, service desk and networking solutions for customers in Singapore. The acquisition enables PCCW Solutions to accelerate its reach by leveraging HCL Insys' proven capabilities. This joint team will deliver end-to-end IT services, ranging from application development, system integration to digital solutions, and capture opportunities across industries. In addition, the synergies created will further strengthen PCCW Solutions' overall capabilities in infrastructure, cloud and automation across the region. Mr. Ramez Younan, Managing Director of PCCW Solutions, said, "The transaction is a milestone for PCCW Solutions as we continue to expand our Southeast Asia business. The complementary businesses enhance our presence, capabilities and reach, enabling PCCW Solutions to offer integrated solutions and accelerate growth." Mr. Younan added, "We welcome our new colleagues and together we aim to create additional value to our customers in the Singapore market and beyond, a key region for PCCW Solutions." The transaction does not constitute a notifiable transaction of PCCW Limited under Chapter 14 of the Rules Governing the Listing of Securities on The Stock Exchange of Hong Kong Limited.

Viu Offers Top-Notch Content from GMM Grammy

Viu, a leading pan-regional OTT video service from PCCW Media Group with more than 36 million monthly active users (MAU), and GMM Grammy, Thailand's entertainment media giant, announced an extended collaboration to include additional top-ranked Thai content on Viu Thailand. Collaboration between the two companies is now in its second year and a wide variety of entertainment crafted by talented GMM content creators is being made available on Viu. In this expanded collaboration, in addition to GMM 25 content, Viu will also offer content from GMM MUSIC, GMM TV and CHANGE2561 that includes drama series, variety and talk shows starring a succession of Thai idols, as well as music to satisfy fans of all genres. This will triple the volume of GMM programming from that of last year Furthermore, Viu Thailand users will be the first audience to enjoy exclusive online access to GMM 25 and GMM MUSIC content within just two hours of its initial broadcast on local TV channels. Shows featuring top artists from GMM MUSIC will be made exclusively available on Viu 45 days before appearing on any other service platform, and primetime TV dramas from GMM 25 and CHANGE2561 will now appear on Viu 30 days before being broadcasted by any other service platform. Mr. Thawatvongse Silamanonda, Country Manager of Viu Thailand, said, "We are committed to providing premium content, which is why we have been pursuing partnership opportunities with GMM, Thailand's leading media and entertainment group. The result is that we are able to serve up local programming that resonates well with our highly-engaged users in Thailand." Mr. Silamanonda added, "Viu regards this partnership as a win-win growth strategy by which we expand our audience, while GMM is able to reach its Gen Z and millennial viewers via digital screens from our platform. The tie-up also provides Viu with an opportunity to help develop the Thai entertainment ecosystem." Mr. Phawit Chitrakorn, Chief Executive Officer, GMM Music Business, said, "We see significant value in this partnership with Viu. As a leading music company, we understand how music is much more sensuous than something created just for listening to and watching. Our talented producers are committed to continuous improvement of our music ecosystem via other platforms. Current trends are seeing consumers shifting to online content, which underscores the importance of our decision to join forces with Viu and benefit from its leading regional streaming platform. GMM Grammy sees this as a great opportunity to move its business forward. Working with Viu, we are creating artistic content to serve consumer tastes under subject headings such as tourism and food, as well as variety and game shows, plus offerings based on the popularity of certain artists." Mr. Sataporn Panichraksapong, Chief Executive Officer, GMM CHANNEL, said, "We have sourced quality content with meticulous care in order to appeal to GMM 25's target group, which ranges in age from 15 to 35 years. This content includes top-ranked primetime drama series such as The Mistress, Flames of Desire and Love for Folksongs, as well as series produced by CHANGE2561, which includes Club Friday The Series, plus variety entertainment such as the Club Friday Show. Making all this highly-engaging content available on the Viu platform will be popular among our viewers. In fact, we will leverage the Viu platform to make premium content available to Southeast Asian, Chinese and other markets, so we can grow our online viewer base. We will also include specifically-selected programming from GMM TV to appeal to millennial."

Tech Mahindra Recognized for Sustainability in 2019

Tech Mahindra Ltd. a leading provider of digital transformation, consulting, business reengineering and software solutions announced its commitment to sustainability to drive business profitability. The company has undertaken a thoughtful and comprehensive program to reduce its absolute scopes 1 and 2 GHG (Greenhouse Gas) emissions 22 per cent by 2030 and 50 per cent by 2050, from a 2016 base-year. Tech Mahindra aims to leverage technology enabled green solutions to tread on the path of responsible growth and is actively engaged in various smart cities projects to undertake a modernization drive. CP Gurnani, managing director and chief executive officer, Tech Mahindra, said, "Sustainability is a long-term issue that will require decades of persistence. At Tech Mahindra, we are committed to pursue plans that will have long-term impacts on the communities and will lead to a balance between sustainability and overall business profitability". As a responsible business entity, Tech Mahindra concentrates on integrating sustainability into all aspects of the business and develops strategies for Environmental, Social and Governance (ESG) Governance. Tech Mahindra was acclaimed a Leader in Dow Jones Sustainability World Index 2019 for the fifth consecutive year. It is one of only three companies from India to be included in the DJSI World Index, one of the twelve Indian companies in the Emerging markets category and amongst the top six companies globally in the IT services & Internet Software and Services segment. S&P Dow Jones Indices (DJI) is the gold standard for corporate sustainability and the first global index to track sustainability efforts among corporates. Sandeep Chandna, chief sustainability officer, Tech Mahindra, said, "We, at Tech Mahindra, take great pride in driving measures that focus on managing social and environmental impacts, improving operational efficiency while ensuring that corporate decisions lead to an equitable growth. Our inclusion in the DJSI World Index ranking for the fifth consecutive year is a validation of our continued efforts to make sustainability not just a business case, but an imperative for long term growth." Tech Mahindra also secured 94 percentile score, the highest Gold CSR Rating - 2019 by EcoVadis for Sustainability. EcoVadis is a global trusted provider of business sustainability ratings, intelligence and collaborative performance improvement tools. Tech Mahindra has taken ambitious emission targets, which have been approved by the SBTI (Science based Targets Initiative). Some of the other sustainability initiatives include reducing water and energy consumption across buildings, waste reduction, using renewable sources of energy for power generation, achieving carbon neutrality, making supply chains sustainable, and employee and customer engagement. With a structured stakeholder program, Tech Mahindra has been able to design strategies and initiatives to build solutions, which not just improve its sustainability credentials but reinforce the overall business philosophy too.

Tech Mahindra and Business Finland Sign MoU for Research and Development in 5G and 6G

Tech Mahindra, a leading provider of digital transformation, consulting and business reengineering services and solutions, has announced that it has signed a Memorandum of Understanding (MoU) with Business Finland, a government agency directed by the Finnish Minister of Employment and the Economy, for research and development in 5G and 6G. Tech Mahindra will set up an innovation lab in Finland to foster growth and innovation. The MoU was signed today at Tech Mahindra Noida campus in the presence of Timo Harakka, Minister of Employment, Finland and Jari Gustafsson, Permanent Secretary of Economic Affairs, Finland. As part of the collaboration, Tech Mahindra will develop, pilot and implement state of the art digital products and services to foster growth, productivity and innovations in the area of 5G and 6G. Tech Mahindra's innovation center will be a platform for key players in Finland such as universities, research institutes, government and

companies to collaborate. Timo Harakka, Finnish Minister for Employment, said, "The MoU between Tech Mahindra and Business Finland is an excellent step forward in the close collaboration between Finland and Mahindra group. Business Finland will work together with Tech Mahindra to explore the possibility of establishing 5G/6G Innovation Hub in Finland. I am sure that this cooperation will be mutually beneficial and provide great opportunities for both Finland and Tech Mahindra." Jagdish Mitra, Chief Strategy Officer and Head of Growth, Tech Mahindra, said, "The Finnish technology ecosystem is one of the most progressive in Europe. Their strategic focus on building 'technologies for the future' has been the cornerstone, and the initiative towards developing 6G technology and further working on 5G use-cases aligns well with our TechMNxt charter, which is our global initiative to leverage future technologies to solve real business problems. Our collaboration with Business Finland and the newly setup Innovation Centre will enable us to leverage their expertise in this space and establish us as a globally recognized leader in 5G and 6G." Business Finland's mission is to catalyze new growth and create opportunities for Finland through innovation and international cooperation. The strategy is to enable global growth for companies and to create world class business ecosystems and competitive business environment for Finland. Antti Aumo, Executive Director, Invest in Finland, Business Finland, said, "Finland has an active co-operation between the public and private sectors, combined with an active start-up scene and innovative testbeds. Innovation and investments in RDI have a huge direct linkage to economic productivity and employment growth, and Tech Mahindra´s decision to set up an innovation lab in Finland is excellent news for Finland and for Finnish companies, universities and research organizations." As part of its TechMNxt Charter, Tech Mahindra is focused on leveraging next generation technologies to cater to the customer's evolving and dynamic needs. As a leading digital transformation company, Tech Mahindra continues to deliver tangible business value and provide enhance experience to our customers globally.

Tech Mahindra and Celonis Announce Global Strategic Alliance to Accelerate Enterprise Performance

Tech Mahindra, a leading provider of digital transformation, consulting and business reengineering services and solutions and Celonis, a leader in Process Excellence software, announced a global strategic alliance to drive enterprise performance. They have deployed first of its kind Artificial Intelligence (AI) solution for BPS (Business Process Services) to support digital transformation of customers globally. The new partnership combines Tech Mahindra's core focus to drive greater business impact for global customers that will accelerate Smart Operations, Automation and Digital Customer Experience leveraging Celonis' core Process Mining technology. Celonis' Intelligent Business Cloud not only discovers friction points in customer processes, but monitors for continuous improvement for ways to take actions. Ritesh Idnani, Global Head - Business Process Services and Products and Platforms, Tech Mahindra, said, "As part of our TechMNxt charter, we continue to drive digital transformation for our customers by leveraging cutting edge technologies. We are very excited to partner with Celonis to align BPS (Business Process Services) with Artificial Intelligence based process mining technology that will help our customers to drive business outcomes. Celonis is a recognized leader in process mining and we see tremendous value in this partnership." The joint go-to-market approach will address key verticals like Communications, Media & Entertainment, Healthcare & Life Sciences, Retail & CPG (Consumer Packaged Goods), Banking & Financial Services, Insurance, Travel, Transportation & Hospitality, Hi Tech & Manufacturing, Energy & Utilities, Procurement, Finance Operations. "This partnership further strengthens our ability to drive process excellence initiatives for our customers by leveraging Tech Mahindra's Transformation, BPO, and SAP S/4 Managed Services deployment expertise. The partnership helps to significantly accelerate business transformation programs that deliver measurable outcomes for organizations," said, Bastian Nominacher, co-Founder and co-CEO of Celonis. This partnership is in line with Tech Mahindra's TechMNxt charter, focused on leveraging next generation technologies like Artificial Intelligence, Blockchain, 5G, Internet of Things, Cybersecurity, to disrupt and enable digital transformation, and to build cutting-edge technology solutions and services for the customers globally.

Tech Mahindra and Mahindra TEQO Partner to Create Digital Solutions for Global Renewable Energy Industry

Tech Mahindra, a leading provider of digital transformation, consulting and business re-engineering services and solutions, has announced a partnership with Mahindra TEQO (Technology, Quality and Operations), the newly formed renewable energy asset management company, to create digital solutions for the global renewable energy industry. The solutions, developed by leveraging next generation technologies like Artificial Intelligence, Machine Learning, Augmented Reality , Virtual Reality and IIoT (Industrial Internet of Things) have the potential to decrease operating and maintenance expenses by 20%, enabling customers to optimize their renewable energy assets. This partnership will create a digital ecosystem for the global renewable energy industry, deliver high quality, end-to-end, integrated solutions to customers worldwide and provide powerful support for customers throughout the lifecycle of the asset. Jagdish Mitra, Chief Strategy Officer & Head of Growth, Tech Mahindra, said, "At Tech Mahindra, our focus is to ensure that business decisions across industries and geographies, lead to an equitable and sustainable growth. The aim is to enhance our portfolio by developing and collaborating with partners like Mahindra TEQO to provide our global customer base a platform powered by next generation digital technologies like Artificial Intelligence and Data Science, to not only help in operational maintenance but also to optimize their renewable energy assets." Mahindra TEQO's SolarPulse, a cloud-based software application, which analyses plant performance data will be synergized with Tech Mahindra's AssetRise, which facilitates modular deployment of asset management and asset performance management, to improve asset monitoring. Customers will have a comprehensive understanding of asset performance using advanced interactive plant performance analysis, real-time alerts, energy and event log analysis, audit or report energy production and meter analysis, automatic fault localization, remote trouble shooting etc. Steve Odak, CEO, Mahindra TEQO, said, "The collaboration

with Tech Mahindra provides a great opportunity for us to deliver a growing ecosystem of advanced technology products and services, backed by a strong team with deep domain expertise globally. Tech Mahindra has clearly demonstrated its ability to apply its considerable resources and expertise not only to enter, but to lead major market segments. We are excited to partner with Tech Mahindra as we focus our combined energies on serving a broader range of customers with industry-leading renewable asset management solutions and end to end integration capabilities." As part of its TechMNxt Charter, Tech Mahindra is focused on leveraging next generation technologies to cater to the customer's evolving and dynamic needs. As a leading digital transformation company, Tech Mahindra continues to deliver tangible business value and experiences to solve real business problems.

Yahsat and Hughes Launch Satellite Services Joint Venture in Brazil

Hughes Network Systems, LLC (HUGHES), the global leader in broadband satellite networks and services, and Al Yah Satellite Communications Company (Yahsat), a leading global satellite operator based in the United Arab Emirates and wholly owned by Mubadala Investment Company (Mubadala), announced the commencement of a joint venture to provide satellite broadband services in Brazil. Now operational under the established Hughes do Brasil name, the new venture combines Hughes decades of experience delivering satellite networks and services in Brazil with Yahsat's strong position and capabilities in the region. "We are pleased to commence our Brazilian joint venture with Yahsat, our longstanding partner, in this important market," said Pradman Kaul, president, Hughes. "The partnership further leverages our commitment to bringing unserved and underserved communities and businesses throughout Brazil the many essential

advantages of connectivity." Masood M. Sharif Mahmood, Yahsat's Chief Executive Officer, added: "The start of this joint venture with Hughes will enable people across Brazil to realize economic and social benefits from both Hughes and Yahsat's high-performance satellite broadband services. We look forward to working together with Hughes to deliver superior connectivity solutions to all customer segments by leveraging the power of our combined missions, and look forward to growing this business together in the future." The agreement to form the joint venture was announced in May 2019, during the SATELLITE 2019 conference held in Washington, D.C., and was subject to regulatory and other approvals which have now been obtained. Resulting ownership of Hughes do Brasil is now 80% by Hughes and 20% by Yahsat. In addition to delivering services over the Hughes 65 West and Hughes 63 West satellites, Hughes do Brasil now offers services over Yahsat's Al Yah 3 Ka-band satellite. The company will deploy additional JUPITER™ System ground network technology – the de facto industry standard – to deliver high efficiency services over the Yahsat satellite across the country, optimizing performance and throughput. Services offered by Hughes do Brasil include HughesNet®, the number-one choice for high-speed satellite Internet for consumers and small- to medium-sized businesses; managed network services for enterprises, including all types of transport technologies; Community Wi-Fi Hotspots that bring affordable, pay-per-use Internet access to rural towns; and cellular backhaul solutions to help mobile network operators (MNOs) extend connectivity to people and communities throughout Brazil either unserved or underserved by terrestrial access.

Yahsat Appoints Khaled Al Qubaisi as New Chairman

Al Yah Satellite Communications Company (Yahsat) has announced the appointment of Khaled Al Qubaisi, CEO of Aerospace, Renewables & ICT at Mubadala Investment Company (Mubadala) as its new Chairman, and the appointment of Amal Al Ameri, Senior Vice President of Platform Finance in the Aerospace, Renewables & ICT Unit in Mubadala as a board member. Remarking on his new assignment, Khaled Al Qubaisi said: "I'm pleased to lead Yahsat's next phase of growth in the space and telecommunications sector. We are committed to realizing Yahsat's vision of providing satellite connectivity to consumers, government and commercial clients globally, to contribute in the social and economic growth of our markets, in addition to achieving our commitments towards our clients all over the world. This is an exciting time for us at the forefront of the 4th Industrial Revolution as we create revolutionary technologies and solutions disrupting our industry." Through his role in Mubadala, Al Qubaisi oversees the company's aerospace, information communications technology, renewables and utilities portfolio, he is also a member of Mubadala's Investment committee. He brings a wealth of strategic and management experience having held multiple Board and C-suite roles. Al Ameri also joins the Board, bringing extensive financial and operational expertise having served in several senior financial roles and multiple Boards at Mubadala and its wholly owned subsidiaries, respectively.

HUAWEI

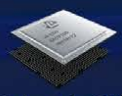
Huawei OceanStor Dorado

All Flash Storage

Extreme Performance，AI Powered

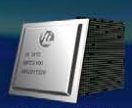
CPU Chip
Kunpeng 920

BMC Chip
Hi1710



Network Chip
Hi1822

AI Chip
Ascend 310



SSD Chip
Hi1812e

ARTICLE

Leaving No-one Behind in Digital Inclusion

> *In an intelligent world, the ultimate goal is to leave no-one behind. Digital inclusion means every individual and organization can equally access and use information and communications technology.*

Charles Yang
President
Huawei Middle East

Our world is rapidly advancing as technology accelerates the advent of the intelligent society. But while the convenience of science and technology propel the evolution of society, it is also creating what has become known as a digital gap, which separates members of the community who are technologically savvy versus those who are less familiar. Bridging this gap by actively pursuing digital inclusion is essential in order to create a cohesive society in which everyone benefits equally.

The digital gap is a global phenomenon. In many cities in China, elderly people may be unable to hail a taxi on the street because taxis today are booked predominantly through mobile phones. Inhabitants in the Comoros islands, as recently as two years ago, were isolated from the outside world because they had no communications network. In Bangladesh, women in particular have limited opportunities to learn about computers.

As the infrastructure of the intelligent world, the information and communications technology (ICT) industry has played a vital role in promoting national economic growth, as well as boosting social welfare and happiness. ICT can contribute to the realisation of the United Nations' Sustainable Development Goals (SDGs), enabling humanity to address challenges such as poverty, inequality, climate change, environmental deterioration, economic issues, and healthcare problems.

In an intelligent world, the ultimate goal is to leave no-one behind. Digital inclusion means every individual and organization can equally access and use information and communications technology. Technology shouldn't sit in an ivory tower. When it is accessible to all, it has the potential to be life-changing; it can provide visually impaired children with the joy of endless reading, enable people to decipher the frequencies that whales sing to their loved ones, and open up whole new worlds of experiences.

Access to technology education is the first step. Building an ecosystem that can benefit entire communities is the next. Technologies such as artificial intelligence (AI), cloud, and smart devices are by no means limited to big industry, office workers or personal use. They can be applied in healthcare, for example, to make an immeasurable difference in treatments.

This is the true meaning of digital inclusion. By working with international NGOs, we can address problems related to healthcare, education, development, and the environment on a much bigger scale. UNESCO understands that ICT and AI will help to achieve the SDGs more rapidly. The World Wildlife Fund will integrate AI into the monitoring, research, and conservation of endangered animals. These are just two of many examples in which technology is being used for the betterment of our planet as a whole, not just for humanity.

> *ICT can contribute to the realisation of the United Nations' Sustainable Development Goals (SDGs), enabling humanity to address challenges such as poverty, inequality, climate change, environmental deterioration, economic issues, and healthcare problems.*

> *Two years ago, we announced our company-wide vision and mission: to bring digital to every person, home, and organization for a fully connected, intelligent world. "Digital inclusion" best reflects the social value that Huawei can create through its vision.*

Technology will enable people, homes, and organisations to enjoy the beauty of the world, whether that is our natural environment or the digital landscape. It can help to protect vulnerable groups and make ordinary people extraordinary. We are just at the beginning of realising how far we can go when using technology as a tool for positive change. Collaborative efforts between all members of society will be key to unleashing its full potential.

Technological advancements are accelerating the advent of the intelligent world. While enjoying the conveniences of science and technology, we must also look at the other side of the story. The digital gaps still exist. Digital inclusion means using digital technology to promote inclusive development and leaving no-one behind.

Two years ago, we announced our companywide vision and mission: to bring digital to every person, home, and organization for a fully connected, intelligent world. "Digital inclusion" best reflects the social value that Huawei can create through its vision. Against this backdrop, Huawei's TECH4ALL was born, a recently lunched global initiative targeted at helping another 500 million people benefit from digital technology in the next five years. We want to protect vulnerable groups and make ordinary people extraordinary. This is the unique value of technology."

> *Digital inclusion will need the joint efforts of businesses, governments, and society at large. Currently, we have just made the first small steps. We welcome more people and organizations to join us.*

Digital inclusion will need the joint efforts of businesses, governments, and society at large. Currently, we have just made the first small steps. We welcome more people and organizations to join us."

For now, though, digital literacy, digital access, and digital infrastructure are all equally important components of an intelligent world – especially a world in which no-one is left behind.

REGIONAL NEWS

TRA UAE Holds 6th ICT Development Forum

The Telecommunications Regulatory Authority, TRA, has held its sixth 'ICT Development Forum', in the presence of the UAE's telecommunications service providers and a multitude of stakeholders and professionals. The forum, chaired by Abdul Rahman Al Nasser, Sr. Director of Infrastructure and Standards at the TRA, discussed various trends in the sector, relevant international developments, and results of the consultation on TRA's project to keep pace with technology and development. The forum also assessed the status quo of services based on the level of impact to the infrastructure and political landscape in the UAE. Commenting on the event proceedings, Al Nasser said, "We, in the UAE, are proud to have one of the best infrastructures in the world. The UAE has been at the forefront of Arab countries in the World Economic Forum's Networked Readiness Index 2016. This reflects the robust state of the telecommunications sector in the country and the government's success in reaching key milestones in the ICT sector to drive social and economic growth." "The UAE has also made great strides in the Telecommunication Infrastructure Index, TII, moving from 25th to 2nd in the world. The sixth edition of the Technology Development Forum comes to discuss issues related to infrastructure and the impact of OTT audio visual media services on infrastructure, and other telecom sector related issues," he added. During the forum, the TRA gave a presentation on the impact of OTT on infrastructure development and services provided to consumers. Emirates Integrated Telecommunications Company, du, also gave a presentation on the vision of OTT service providers in 2020. The forum included a workshop on new trends and challenges in OTT, bringing together a number of companies such as Microsoft, Google and others working in the same industry. The workshop resulted in a number of recommendations that will be studied with relevant departments and entities, the TRA noted. The TRA launched the ICT Development Forum in 2015, with an aim to drive innovation in the UAE ICT Sector. It began as a platform to share ideas and knowledge and witnessed the launch of a joint working mechanism to overcome challenges and obstacles. The forum also aims to promote the concepts of innovation and foresight in the ICT sector at the UAE level by fostering a culture of cooperation at the sector level, thus providing a supportive environment to ensure development of rules and legislation that allow leveraging the great and promising potential and opportunities in this area.

5G Will Launch in Nepal in 2021

Huawei Nepal CEO has forecasted that Nepal will be having a 5G network in the year 2021. Addressing the Media meet program in the capital organized by the company itself on Sunday, Huawei Nepal CEO Mr. Denny Deng expressed his view that the next-generation technology is in the coming. The company also launched Mate 30 Pro and 6 other products including smart accessories in the same program. Huawei claims itself the No. 1 telecom vendor in the world and also having the leading position for 5G. Their latest figure shows 60 commercial contracts in the world with 400,000 5G base station shipments. The latest one to have a 5G deal is with Telefonica in Germany, which is the second-largest network carrier there. They also share that their technology in 5G is 12 to 18 months ahead of their competitors. Huawei has also been at the forefront of the development of the telecom industry here in Nepal with more than 15,000 base stations in 2G, 3G, and 4G. That number is a great figure considering the fact that Nepal has one of the most difficult environments/terrains in the whole world including Everest Base Camp (EBC). All the telecom operators have had partnered with Huawei to run its mobile network. As a matter of fact, Huawei has a whole range of products and solutions for not only telecom operators but for the whole ICT industry. Here is a timeline, major milestones of the Huawei's 20 year service in the Telecom industry of Nepal.

UAE 5G Conference: National 5G Strategy under Full Implementation in Partnership with the Private Sector

The UAE 5G Conference, organized by the Telecommunications Regulatory Authority (TRA), with the participation of technologists, regulatory authority heads, officials from leading industry bodies and associations, including ITU, IEEE, ICNIRP, GSMA and SAMENA Telecommunications Council, and experts in the field of 5G, has addressed the reality, prospects, challenges and opportunities related to 5G. The Conference took place in the Westin Dubai Marina and Marina Beach Resort. During the conference, which brought together experts and officials from different countries, several sessions were held to discuss important issues relating to 5G and its potential impact on various aspects of economic, social, educational and commercial life. The agenda of the Conference included 5G implementation strategy of the UAE government and a way forward for the region, emerging technologies in 5G networks per sector, the impact of 5G in awakening the fourth industrial revolution, autonomous driving and machine learning, creating an enabling environment for 5G development, role of standards in making 5G a safe technology for mass-scale deployment, and needs to set incentives for Telecom Operators. H.E. Hamad Obaid Al Mansoori, DG of TRA-UAE, welcomed H.E. Houlin Zhao, Secretary-General of the International Telecommunication Union (ITU) as well as experts and speakers representing government, private and academic sectors, indicating that the conference is in line with the directives of the UAE government leadership, foreseeing the need to prepare for the digital future and shape it in a way that serves the community and individuals and enhances happiness in the UAE. H.E. Al Mansoori stated: "We believe in the future, and that technology should be at the service of humanity and its aspirations for a decent life, sustainable development and happiness. Therefore, we confirm that we have come a long way in establishing the foundations of 5G, in cooperation with our partners in the private sector. We have launched a national 5G strategy, and our telecom service providers have already started implementing 5G on a commercial scale with vigorous and measured steps based on the outcomes of the World Radiocommunication Conference held in Egypt, which resulted in the allocation of a number of frequency bands for IMT." The UAE 5G Conference has focused on the adoption and development of 5G by the region, and the factors affecting the deployment of technologies such as population density, nature of the region, human activity, etc. The conference brought forth latest experiences, developments, opportunities and the immediate need of the market, including the need to set policy-level incentives for Telecom Operators all around the region, as reiterated by SAMENA Council's CEO, Bocar BA. During the conference, TRA and Huawei have jointly announced the launch of the OpenLab for 5G and Internet of Things. This initiative aims to enhance the services of 5G and Internet of Things across the UAE, and to advance innovation and cooperation in various sectors to create an open ecosystem that promotes the development of the ICT sector throughout the country. Treading a path toward accelerated digitization, the UAE has been ranked first in the Arab Region and fourth globally in the launch and use of 5G networks, according to the Global Connectivity Index, issued by Carphone Warehouse, which is specialized in technology benchmarking. This achievement is the result of the efforts of the telecommunications sector in general, and TRA in particular, as the main driver of 5G launch in the UAE. In recent years, TRA has collaborated with Telecom Operators to raise the telecom sector readiness in order to enable the fifth-generation of mobile network technologies, which continue to contribute to the Emirates' global leadership in digitization and drive the creation of digital experiences for the UAE citizens.

TRA Bahrain Attends UAE 5G Conference

The Telecommunications Regulatory Authority of the Kingdom of Bahrain (TRA Bahrain) attended a key conference in the UAE centered on 5G, where Acting General Director of TRA Bahrain, Shaikh Nasser bin Mohamed Al Khalifa gave a keynote speech on the importance of collaboration in order to realize the full potential of 5G, and exploring use cases that apply to the GCC and Arab region. The event was organized by TRA UAE, in Dubai and attended by experts and business leaders. "We see more and more use cases for 5G every day that justify the need for its existence on both network and service levels. Autonomous vehicles, smart grids, autonomous farming, Internet of Things. The applications are endless, and the world is exploring them as we speak, at a rapid pace, I might add. With such powerful network capacity and speed, we have a duty to explore use cases that are relevant to us here in the region." Said Shaikh Nasser in his speech. Commenting on the event, Sh. Nasser stated that "Conferences like these are a vital opportunity to share knowledge and experience in the realm of 5G with our counterparts in the UAE, as well as our counterparts in the rest of the GCC and experts from all around the world. It's important to note that 5G is less about smartphones and more about the many devices and applications that smartphones will be connected to. The internet is entering into an age where we will see it come to life in the real world. If the opportunity is capitalized on by all stakeholders, and we all work together towards that goal, the world we know will change within a few short years. Bahrain can plant the seeds now to reap the benefits of that future." TRA started its experience with the 5G technology in Bahrain with the allocation of 300MHz of spectrum in the C-band, divided equally among mobile network operators. 5G commercial services launched in July this year, which led to witnessing a surge in peak download speeds more than 15 times faster than 4G.

Mobile Technologies and Services Adding $191bn a Year of Economic Value to Middle East and North Africa

The GSMA released two new reports at the annual 'GSMA Mobile 360 – MENA' event happening in Dubai. These reports highlight the positive economic impact of the mobile ecosystem on markets across the Middle East and North Africa (MENA) region, as well as the transformative impact of IoT technologies on regional governments' strategic national visions. The two reports from GSMA Intelligence – 'The Mobile Economy: Middle East and North Africa 2019' and 'Realizing the potential of IoT in MENA' reveal that mobile technologies and services added $191 billion to the region's economy in 2018 – equivalent to about 4.5 per cent of regional GDP. By 2023, mobile's economic contribution is forecast to reach more than $220 billion as countries increasingly benefit from the improvements in productivity and efficiency brought about by the increased uptake of mobile services, and 5G and IoT networks are widely deployed. To date 12 operators have launched commercial 5G services in five Gulf Cooperation Council (GCC) Arab States. Mobile operators in these countries are aiming to be global leaders in 5G deployments, supporting the digital transformation ambitions outlined in strategic national visions such as UAE Vision 2021 and Saudi Vision 2030. Meanwhile, IoT connections in the MENA region are growing at a rate second only to Asia-Pacific. There are forecast to be 470 million IoT connections in MENA by the end of 2019, rising to 1.1 billion by 2025. The deployment of IoT across MENA is expected to add $18 billion to regional GDP by 2025. "Backed by proactive government support, mobile operators, particularly in the GCC Arab States, have speedily deployed 5G technology," said Mats Granryd, Director General of the GSMA. "Beyond the GCC, the wider MENA region has an opportunity to benefit from the technological developments delivered by 5G and IoT. To fully embrace those benefits the region's governments must support regulatory frameworks and policies that ensure 5G flourishes, including making sufficient spectrum available."

Saudi ICT Sector's Seven Key Avenues of Growth

THE Kingdom of Saudi Arabia (KSA) is in the midst of a digital transformation as part of its Vision 2030 initiative. The country has embarked on a bold national-level change management program, driven by the significant growth already in motion in the ICT sector. In the latest EY report, 'Unlocking the digital economy potential of the Kingdom of Saudi Arabia', the company identified the seven key avenues of growth in the ICT sector that will close the degrees of separation between industries.

1. 5G growth agenda

The Saudi Government is already on track to become a world leader in 5G services and has made a major financial commitment to support its rollout. In fact, IBM predicts that 5G mobile subscriptions in KSA will reach US$ 23.2 million by the end of 2028.

2. IoT and big data scale-up

IoT is one of the most prominent growth areas in the ICT industry in KSA. The largest growth in terms of IoT deployment in the region will be recorded in the manufacturing, transportation, and healthcare sectors. The hospitality, retail, and entertainment sectors are more gradually adopting the technology to analyze consumer behavior. AI will be compulsory to analyze the huge amounts of data from IoT devices, allowing for preventive and predictive decision-making to take place.

3. E-commerce opportunities in KSA

KSA's large consumer market has always been at the center of discussions about e-commerce potential in the GCC region. The expansion of e-commerce in the country is one of the significant goals of its development agenda and the Government is keen to increase the contribution of alternative retail channels, including e-commerce, to 80% of retail sector activity by 2030.

4. Start-up focus

Saudi Arabia's current start-up ecosystem is currently in the early stages of development but has significant potential growth. The Government has mobilized substantial resources to provide a launchpad for start-ups and entrepreneurship, with year-on-year growth in funding and investment deals between 2018 and 2019.

5. Innovation accelerated through AI, AR, and robotics

The Saudi Vision 2030 plan highlights the country's goal to become a global leader in the adoption and application of AI. AI, AR, IoT and M2M communication are currently in the early stages of development compared to robotics, which makes it difficult to measure their impact on the industry. However, the city of Makkah has identified opportunities around IoT and AI for smart crowd management, traffic management, and waste management during the Hajj pilgrimage season.

6. Cloud uptake

The adoption of cloud computing in KSA has grown rapidly over the past few years, with IDC Saudi Arabia predicting that the annual spending on public cloud services in 2019 is expected to exceed US$ 260 million. This will no doubt rise as an increasing proportion of organizations in Saudi Arabia have adopted, or are on the way to integrating, cloud for their computing needs.

7. Proliferation of over-the-top (OTT) platforms

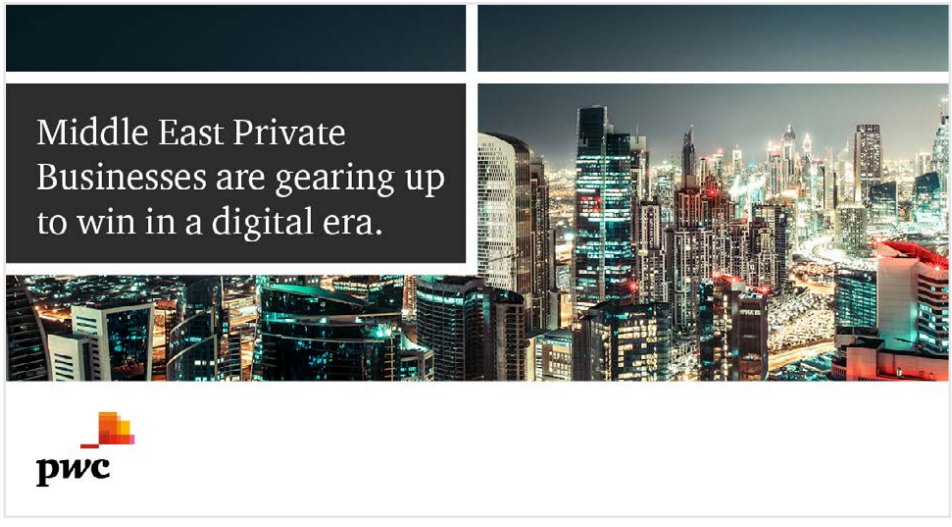
OTT video streaming services have changed the business model for content creators, TV networks, and distributors as the market for on-demand services continues to gain traction. Think with Google estimates that of the 6.3 million millennials in KSA, 97.7% are online every day and 97.8% are on smartphone devices. With the onset of 5G technology and higher network speeds, industry players will have a wider range of options to reach their audiences on the go. It's clear that Saudi Arabia has the necessary components and protocols in place, along with defined targets, to achieve its digital ambitions. Now it must continue to focus on building the infrastructure required to support a mature ICT sector that will fast-track the country's digital revolution. At the third edition of the Future Investment Initiative this week, EY will further explore how the digital transformation of KSA is redefining how the country does business both locally and on a global scale.

KSA ICT market, 2016-22, US$ billion

Source: IDC, 2019

Digitalization Seen as a Competitive Advantage by Middle East Private Businesses

Private businesses in the Middle East recognize the potential for growth that comes with building their digital capabilities, according to the 2019 Middle East Private Business Survey, released today by PwC, for which 200 private businesses across nine Middle East countries were interviewed. However, the levels of investment and implementation when it comes to digital technologies are still far from being advanced when compared to European counterparts and there is much work to be done. A critical factor that may urge private businesses to act is the changing economic environment. Although half of the survey respondents report that they expect their companies' revenues to improve over the next twelve months, there is concern about the general business climate. "The cautious mood in the Middle East echoes the global sentiment that the pace of economic activity has been weak. Many note clear evidence of a global slowdown in 2019, which looks set to continue, driven largely by declining growth in China and uncertainty caused by the US-China trade war – and trade friction between the US and India and Mexico too. And in October, the International Monetary Fund cut its growth forecasts for the Middle East and Central Asia to 0.9 per cent, compared to 1.9 per cent in 2018." Peter Englisch, PwC EMEA entrepreneurial and private business leader, said. However, downturns often bring opportunities, and companies that prepare early – and advance rather than retreat – can benefit enormously during difficult times and beyond. Companies that see digital transformation as the key to unlocking the next stage of growth – and get the implementation right- have a fighting chance of growing faster when the next upturn comes." According to PwC's survey, 78 per cent of Middle East private businesses acknowledge that digitalization will impact the long-term viability of their business. Adnan Zaidi, PwC Middle East Entrepreneurial & Private Business Leader, emphasizes on the importance of developing a digital strategy and following through with the right implementation in order to win in the market in times of disruption: "Private businesses in the Middle East increasingly recognize the importance of having a strategy for digital transformation, however many are still just at the initial stages of digitalization. The current economic downturn is putting ME private businesses to the test. A cooling business climate – and potentially reduced growth rates, or even falling revenues – will likely force leaders to review costs... Private business leaders need to plan ahead and carefully balance potential cost savings with digital investment needs", Adnan Zaidi continues. "In order to thrive during disruptive times, private businesses should employ a digital strategy that addresses every area of a company to meet present and future needs. If private business leaders don't think strategically about how to transform their companies now, they risk being unprepared for any possible disruption to their business." While private businesses recognize the value of digitalization, they are still reluctant to commit to large related investments. Only 18 per cent of companies intend to allocate more than five per cent of their overall investment to building their digital capabilities. This allocation varies by industry. The service sector stands out with 34 per cent of respondents saying they would spend more than five per cent of investments on digitalization, compared with 17 per cent in industry and manufacturing and just 12 per cent in retail. There is also a discrepancy between theory and implementation when it comes to digitalization: While looking at eight key emerging technologies - PwC's "Essential Eight" which include 3D Printing, Artificial Intelligence (AI), Augmented Reality (AR), Blockchain, Drones, the Internet of Things, (IoT), Robotics and Virtual Reality (VR) -, it becomes apparent that Middle East private business leaders acknowledge their importance in future-proofing their businesses, however implementation is still lagging. The top three reasons reported for this discrepancy are cost constraints (42 per cent), resistance to change (42 per cent), and lack of corporate vision (33 per cent). In fact, corporate vision and championing digital transformation from the top throughout the ranks of the organization are essential to achieve sustainable change. Similarly important is finding the right skillset, particularly as the digital era in particular asks for increased specialization. Thirty-nine percent of private business leaders reported that skill shortages are costing those 5% or more in potential revenue growth. Adnan Zaidi concludes: "Private business leaders need to a) define their digital ambition though clearly developed and communicated strategies, b) ensure the commitment of the board and the senior leadership, c) choose the right digital technologies for their business, d) attract the right skillset and e) develop a culture of change. The combination of these factors is what will help them be competitive in the future.



TRA Organizes 3rd Roundtable Program for Arab Ministers of Telecommunications

The 3rd Roundtable Program for Arab Ministers of Telecommunications and Heads of Arab Telecommunications Regulatory and Information Technology Regulators discussed the latest developments and challenges and how to stay protected against cyber threats and risks faced by governments in the Arab world. Organized by the Telecommunications Regulatory Authority, TRA, in cooperation with the Ripe Network Coordination Centre, RIPE NCC, in Dubai today, the meeting focused on the important role of governments and regulators to develop the Internet sector. In his opening speech, Hamad Obaid Al Mansoori, TRA Director-General, said, "We have important strategic issues to examine and discuss and we have a lot of headlines that represent opportunities and challenges at the same time. These include the future of the Internet in light of the growing scope of users across the region, prospects for the implementation of Internet Protocol version 6, IPv6, and the consequent necessities of coordination and mutual benefit from expertise and experience." He added, "We also have the challenge of cybersecurity, especially in light of the uncertainty surrounding the digital future. We are heading into a world that is completely different from what humanity has known in recent decades. This requires assessing the challenges in a holistic approach, to serve the region and the world." The program's activities discussed the results of the second roundtable meeting in Riyadh in 2018. The participants debated over cooperation with governments and regulators in support of the Internet-enabling environment, the risks of running out of IPv6

and its economic importance. Participants also discussed ways to enhance cooperation and technical support with security and government entities. The agenda of the meeting also included an open discussion on the most important issues and developments related to the Internet. The event is part of a Memorandum of Understanding signed between the TRA and RIPE NCC, aimed at enhancing cooperation and exchanging expertise in the various sectors of Internet development. The UAE achieved the first position in the Middle East for its transformation to IPv6, according to statistics issued by Ripe NCC, Akamai Technologies, and Google.

Polish Firms Keen to Invest in Pakistan's Telecom Sector

Poland is interested in further enhancing bilateral trade with Pakistan as the two countries have good potential to trade many goods with each other, said Poland Ambassador to Pakistan Piotr A Opalinski. Speaking to the business community during his visit to the Islamabad Chamber of Commerce and Industry (ICCI), Opalinski said the bilateral trade volume between Poland and Pakistan had increased to over half a billion euros but there was a vast scope for further enhancing it. He pointed out that around 90% of Pakistan's exports to Poland comprised textile products and stressed that Pakistan should focus on diversification of exports in order to achieve better results. He said both countries had good potential to cooperate in the IT sector as Polish companies wanted to contribute to the growth of 5G and telecom infrastructure in Pakistan. The envoy said Poland was located in central Europe and could become a hub for Pakistan's exports to the EU. He also highlighted that Polish companies had been doing business in Pakistan's oil and gas sector for the past 20 years and more could invest in the country. Talking about the China-Pakistan Economic Corridor, Opalinski said the project was a game changer for Pakistan and Polish companies had also been encouraged to pour money into the project. He shared that Poland had created good conditions for foreign investors and a Pakistani businessman had opened the first Halal restaurant in the European country while more Pakistani investors could invest in the country. He suggested that the Pakistani business community should develop contacts with the Polish Investment Agency and Polish National Chamber of Commerce to explore business opportunities in his country. Speaking on the occasion, ICCI President Muhammad Ahmed Waheed said there was a vast scope for bilateral cooperation between the two countries, which could be realised with more efforts by both sides. He said both countries should encourage regular exchange of trade delegations to explore all untapped areas of mutual collaboration. Waheed stressed that Polish investors should set up joint ventures in Pakistan in textile and other sectors.

Saudi ICT Spending to Hit US$2.13 Billion in 2020

Saudi Arabia's government organizations are expected to increase their 2020 spending on information and communication technologies (ICT) by 6.1 percent compared to the anticipated spend for 2019, International Data Corporation (IDC) said. The global technology research and consulting services firm also expects government ICT spending in the kingdom to increase at a compound annual growth rate (CAGR) of 6.4 percent over the 2018–2023 period, outperforming the overall enterprise market's CAGR of 4.7 percent. "As the Kingdom continues to pursue the goals of its National Transformation Program (NTP), much of the government's ICT spending focus will be directed towards digital transformation (DX) enabling technologies," says Massimiliano Claps, IDC's Research Director for Government Insights across Europe, the Middle East, and Africa. "In this era of rapid evolution, pressures on resources and structural changes across government agencies can constrain opportunities. Given that the Saudi government is at the forefront of driving DX in the Kingdom as part of its ambitious Saudi Vision 2030 initiative, the need for a comprehensive platform that addresses the various aspects of DX in government is more pressing than ever before," he added.

TRA Bahrain Organizes 5G Network Training Session

The Telecommunications Regulatory Authority (TRA), in collaboration with Huawei, Ericsson & the GSM Association, held a 5G network training session for telecom service providers, government officials and business leaders in the Kingdom of Bahrain on November 26. The event aims at raising awareness of the next wave of 5G technology and cultivating local ICT talent under the umbrella of the Fourth National Telecoms Plan (NTP4). Among the subjects discussed in the panel and workshop was 5G motivation and developments in the market, 5G network architecture and key technologies, as well as presenting recent use cases for 5G and international best practices. It also addressed the key challenges facing the sector, including the procedures needed to embrace the Kingdom's telecommunications networks. The 5G age in Bahrain is inevitable as companies are working to phase out the next level of technology nationally. TRA says mobile service carriers began deploying 5G towers as early as July 2019, rendering the Kingdom a leader in implementing 5G not only in the country, but worldwide.

Saudi Arabia Ranks Third for Competitiveness in MENA

King Salman's Vision 2030 and the economic and social reforms that the Kingdom has implemented in the last few years have had monumental effects on the market. It has improved its' competitiveness, access to the market and opened opportunities for foreign investors and innovation in the Kingdom. These changes helped moved Saudi Arabia up 3 positions globally, who now sits in 36th place for global competitiveness, and third in the MENA region. As the Saudi government continue to diversify their economy away from oil, the structural transformation is most evident in the ICT adoption pillar, improving by 16 positions. This is primarily due to a sweeping adoption of broadband and internet users around the country. Leading to an increase in innovation capability, number of patent applications and expenditure on research and development. As e-commerce and fintech grows in the Kingdom, it placed Saudi in third place among G20 countries for IT governance, defined as a country's ability to adapt to digital technologies. Creating opportunity for foreign investors to expand into the Kingdom and allowing the market to evolve into a diverse and dynamic economy. The Saudi government are continually improving conditions of the Saudi market to attract foreign investors into the Kingdom and boost the economy. Evidently, their efforts are producing positive results which we see has drawn numbers of foreign investors into the Kingdom.

UAE Artificial Intelligence Network Launched to Accelerate Adoption of AI

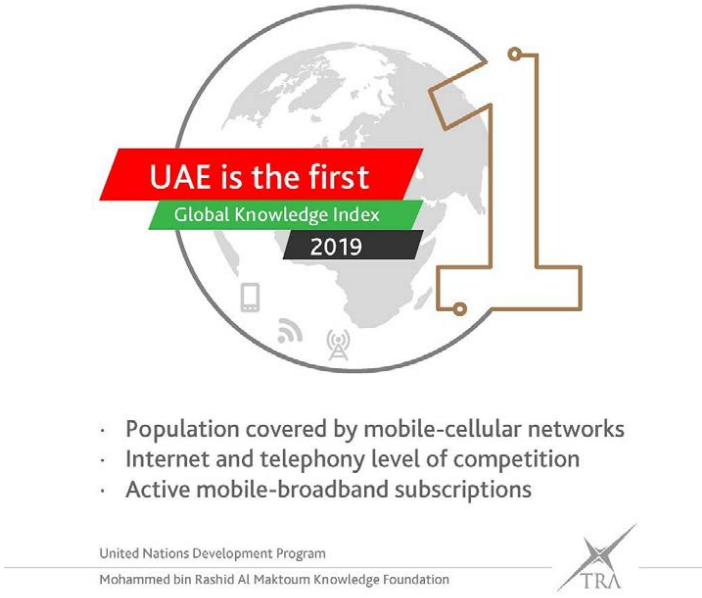
Omar Sultan Al Olama, Minister of State for Artificial Intelligence, AI, said that the rapid change of technology and its impact on key sectors calls for strategic collaborations and international partnerships to accelerate the adoption of AI across various sectors. This came during the launch of the UAE Artificial Intelligence Network, a network dedicated to gathering academics, researchers, experts and start-ups in the field of AI, further strengthening the country's position globally as a preferred destination for AI development and adoption. Al Olama highlighted that this new initiative contributes towards realizing the UAE Strategy for Artificial Intelligence 2031, launched by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President, Prime Minister and Ruler of Dubai, to embrace and accelerate the employment of AI and achieve tangible progress in all areas of business, life and government services. "The UAE has made significant growth in its AI development and adoption roadmap globally, by connecting governments, private entities and international organizations to provide supportive platforms for this technology. The UAE AI Network is a concrete step towards achieving our leadership's vision in positioning the UAE as a global leader in AI by 2031, as well as developing an integrated system that employs AI in vital areas in the UAE," he added. Through established partnerships and collaborations, the UAE Artificial Intelligence Network seeks to bring together governments, private entities, international organizations, start-ups, research centers, academic institutions, business incubators and accelerators under one roof to discuss and exchange expertise in the field of AI, and identify challenges and roadblocks that affect the adoption of AI, and how to solve them. The UAE Artificial Intelligence Network offers its members the opportunity to participate in various local and international events, including the annual AI Conferences organized by the UAE National Program for AI, as well as AI-focused seminars, conferences, workshops, meetings and sessions. Members also benefit by networking with AI experts, working closely with AI pioneers and decision makers, as well as the opportunity to contribute with recommendations to the UAE Council for Artificial Intelligence.

Pakistan Telecom Imports Surged to $375.221 Million in July-September

Pakistan's telecom imports surged to $375.221 million in July-Sept 2019, which are higher by 14.21 percent, official figures say. Increase in telecom imports now stands at $46.68 million in July-Sept 2019 from $328.541 million in July-Sept 2018, Pakistan Bureau of Statistics shows. In Sept 2019, the country imported 20.43 per cent or $23.053 million more telecom goods to $135.879 million compared to $112.826 million in Sept 2018. The country's import of cellular phones went up by 35.05 per cent or $69.827 million to $269.051 million in July-Sept 2019 from $199.224 million in July-Sept 2018. Pakistan grew its mobile phones import phenomenally to $105.567 million in Sept 2019 from $62.307 million in Sept 2018, showing an increase of 69.43 per cent or $43.26 million. Imports of other apparatuses, however, slumped to $106.170 million in July-Sept 2019 from $129.317 million in July-Sept 2018, indicating a fall of 18 per cent or $23.147 million. The country also reduced its imports of other apparatuses significantly by 40 per cent or $20.207 million to $30.312 million in Sept 2019 from $50.519 million in Sep 2018.

UAE Maintains Top Position in ICT Sector among 134 Countries

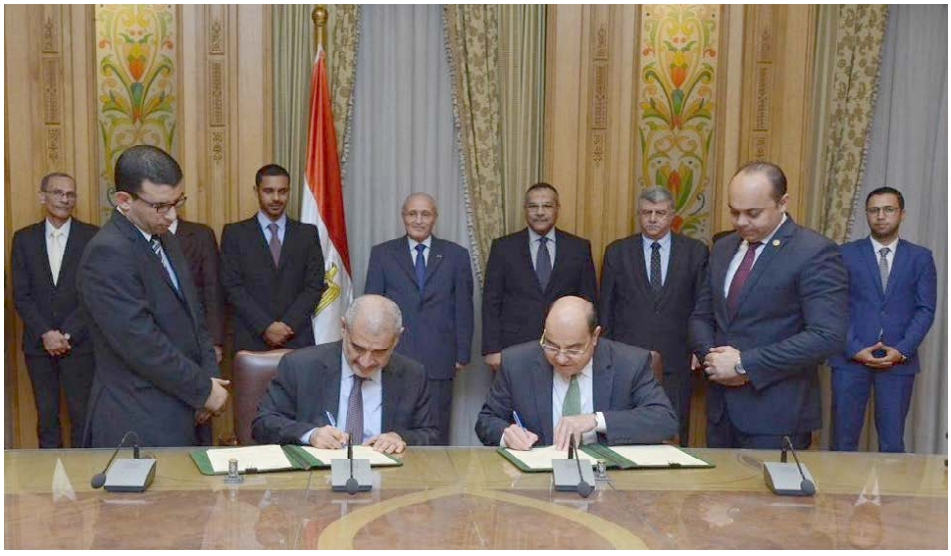
The UAE has kept its pivotal place in a number of indicators, including global competitiveness indicators related to the information and communications technology (ICT) sector according to the Global Knowledge Index (GKI) 2019, outpacing 134 countries. The UAE topped the list in the population covered by mobile-cellular networks, Internet and telephony level of competition, and active mobile-broadband subscriptions, along with a remarkable record of fixed-broadband subscribers, International Internet bandwidth per Internet user, ICT Inputs, and Internet users, said a press release. The country has seen major advance in investment in telecom services, rising to the fourth globally in 2019 from the 86th in 2018, while being the second globally in terms of subscriptions in 2019 after it was in the seventh place in 2018. The report was released by Mohammed Bin Rashid Al Maktoum Knowledge Foundation in collaboration with the Regional Bureau for Arab States and the United Nations Development Program (UNDP). "These results are the outcome of the great efforts made by TRA team at The Telecommunications Sector, in cooperation with TRA's strategic partners, in line with the directives of the wise leadership and keen to achieve the UAE's vision and future goals," said TRA's Director General, Hamad Obaid Al Mansoori. He added, "Today we are on the threshold of a new phase of Artificial Intelligence (AI), digital transformation and smart services. This stage requires us to develop new plans and strategy through which we foresee the future, understand its requirements and work to achieve it based on the national human cadres." It is worth noting that the GKI 2019 assists leaders in preparing their citizens for the future knowledge setting along with equipping them with sufficient skills. It primarily works for comprehensive and sustainable development, therefore, it measures the knowledge related to different dimensions of contemporary human life and transforms it into intelligent knowledge-based development.



Bahrain Readies for $320 Billion Middle East AI Boom with WEF Future Technology Workshop

The World Economic Forum's Centre for the Fourth Industrial Revolution Network has hosted a workshop in Manama to discuss the future of public Artificial Intelligence (AI) procurement, in partnership with the Bahrain Economic Development board and Bahrain's Information & eGovernment Authority (iGA). The workshop follows closely on from the WEF Annual Meeting of the New Champions in Dalian, China. During the major global event, the World Economic Forum announced that Bahrain would pilot new guidelines for the procurement of AI in the public sector, produced by WEF's Centre for the Fourth Industrial Revolution. Eddan Katz, project lead, AI and Machine Learning of WEF C4IR said: "The readiness of Bahrain's public sector for the social and economic development anticipated by the dawn of artificial intelligence is impressive. Visionary leadership enabling multidisciplinary coordination across sectors demonstrates how a commitment to responsible innovation can transform how government works and help improve people's lives." The workshop, held between November 5th and 7th, brought together Bahrain government stakeholders, entrepreneurs and experts to identify key opportunities and challenges for the high-tech industry. The sessions also helped to gather evidence and feedback on the guidelines for AI procurement in the public sector and developed a roadmap to advance this goal among the government of Bahrain. PwC predicted an AI boom in the Middle East, with the sector contributing $320 billion to the region's economy by 2030 – positioning Bahrain and neighboring nations as a strategic development springboard. "Bahrain is a world leader when it comes to the testing, governance and regulation of emerging technologies, making it the ideal partner for this World Economic Forum project. Governments around the world may be hesitant to adopt AI systems when faced with complex procurement processes, but by working together we can create a model that truly powers the public sector into the next generation of technology," said Khalid Humaidan, chief executive of the Bahrain EDB.

Egypt, Kuwait's Sign MoU on Smart City Technology Cooperation



State Minister for Military Production Mohamed Saeed el Assar witnessed the signing ceremony of a memorandum of understanding (MoU) with Kuwait's MEASC Safe Smart Cities. The MoU aims to develop a framework for joint projects, to be carried out between both sides to transfer the technology of smart cities to Egypt in the coming period. Under the agreement, both sides are set to cooperate to implement joint projects to develop intelligent transportation systems and establish a smart logistic services center, among others. The MoU is part of the Egyptian state's ambitious plan to develop smart cities in terms of economic development achieved in Egypt. MEASC Chairman Abdulmohsen Al-Babtain praised the Egyptian government's intention to adopt the establishment of new smart cities under its plan for digital transformation.

5G, AI and Cloud 'Bahrain Digital Hub's Vital Pillars'

Huawei Middle East president Charles Yang highlighted the company's unique contributions in Bahrain throughout the past 15 years and stressed the company's commitment and promise of 'In Bahrain, for Bahrain'. The celebration was held under the patronage of Deputy Prime Minister and Supreme Committee for Information and Communication Technology chairman Shaikh Mohammed bin Mubarak Al Khalifa. Also present were Deputy Prime Ministers Shaikh Khalid bin Abdulla Al Khalifa and Jawad Al Arrayedh, other ministers and senior business executives in Bahrain. "Huawei's vision is to bring digital to every person, home and organization for a fully-connected, intelligent world. We are committed to bringing the latest technologies and resources to Bahrain, and will continue to invest in joint innovation with our customers and partners as well as local ICT talent development to support Economic Vision 2030," said Mr. Yang. He also addressed the three top areas of focus for Huawei's efforts in enabling the kingdom's future digital transformation – development of key technologies, joint ecosystem development and nurturing local talent were highlighted as top priorities:

Build Bahrain as a safe, efficient and intelligent kingdom:

As an industry pioneer, today Huawei is at the forefront of innovation and is a leading provider of safe city solutions globally. So far, Huawei has supported over 700 cities in more than 100 countries around the world to build safe cities. The company is committed to working together with the government to help Bahrain in building a safe, efficient and intelligent kingdom aligned with the national vision.

Enable Bahrain to be a global digital hub:

5G and AI will enhance the ways in which future societies live, work, and interact with the world.

In today's digital economy, information, technology and talent development are the key priorities to realize the full potential of digital transformation and create a digital hub. Huawei will continuously support the kingdom to become a digital hub through joint innovation projects that provide the latest and next generation ICT technology.

Support ICT Talent Development:

ICT talent is crucial for creating future jobs and supporting sustainable development in realizing the national vision. Huawei has led various initiatives within Bahrain to support the next generation of ICT talent, including Seeds for the Future talent development program, ICT Competition, and various work-readiness initiatives run in partnership with the Labor Fund 'Tamkeen'. According to Mr. Yang, nurturing talented young Bahrainis and empowering them with the skills required to carry on their country's digital legacy is one of our key priorities for the future. Huawei plans to cultivate more than 100 youth as Huawei Seeds, cover 800 students in the ICT competition, and provide ICT certification to more than 2,000 technical talents over the next three years. During the past 15 years, Huawei has made significant local investments including hiring of 500+ employees, creating 800+ jobs, developing 50+ local partners, cultivating 40+ future talent seeds, and knowledge transfer to 10,000+ trainees.

ITC and Sofrecom Partnership to Deploy Fiber Network in the Kingdom of Saudi Arabia

Almost two years after the announcement of their partnership to pilot the implementation and management of Outside Plant (OSP) across Saudi Arabia's regions by 2020, the Integrated Telecom Company (ITC), leader in information and communication technologies in Saudi Arabia and Sofrecom, a subsidiary of the Orange Group, specialized in Consulting and engineering in the telecommunications sector, are proud to announce that they have connected more than 400,000 households to the FTTH network. "This major project actively contributes to the program with the Ministry of Communications and Information Technology (MCIT) for the deployment of the very high fixed flow in Saudi Arabia as part of the strategic plan «Saudi Vision 2030». Indeed, the Kingdom's 2030 National Transformation Plan aims to deploy FTTH in 90 per cent of densely populated cities and 66 per cent in other urban zones," Ghassan Itani, ITC President & CEO, said. The partnership which started in 2017 between ITC and Sofrecom, leads to sharing the experience and technological expertise of the Orange Group in the FTTH network. The detailed design and supervision of this network rollout is handled by Sofrecom. The Design methods and tool optimization proposed by Sofrecom contribute remarkably to the productivity enhancement of ITC teams. In addition, Sofrecom's teams monitor the deployment and effective implementation of the network in accordance with ITC's engineering rules and by ensuring its operation and sustainability. This project will enable ITC to ensure optimal and sustainable network service quality. Customers will benefit from new services such as high definition television, video-on- demand and home entertainment through fiber architecture to the user (FTTx). "This major project actively contributes to the program with the Ministry of Communications and Information Technology (MCIT) for the deployment of the very high fixed flow in Saudi Arabia as part of the strategic plan «Saudi Vision 2030». Indeed, the Kingdom's 2030 National Transformation Plan aims to deploy FTTH in 90 per cent of densely populated cities and 66 per cent in other urban zones," Ghassan Itani, ITC President & CEO, said. "I am proud of the trust shown by the ITC group by holding Sofrecom to design, supervise and control the deployment of the FTTH network of the Kingdom. This major project will bring very high flows to the Kingdom's households and businesses. Our teams are fully committed to the success of this major project," said Guillaume Boudin, CEO of Sofrecom Group.

TRC Oman Provides Platform to Explore Science, Innovation

Among its various events, The Research Council has organized two hackathons — Family Hackathon and Talent Hackathon — both of which encourage creativity, innovation and imagination at the Oman Science Festival 2019. For the Family Hackathon, family members solve issues using modern technology, especially using the techniques of the 4th Industrial Revolution (4IR). On the other hand, the Talent Hackathon (YouTube) involves those interested in technology who find innovative solutions to local problems and challenges using the technologies of the 4th Industrial Revolution, such as virtual reality and augmented reality, the use of 'Internet of Things' and their applications in smart cities and interactive big data analysis through its competition. This year's festival is a five-day event that started from November 4th and will conclude on November 8th 2019 at Oman Convention and Exhibition Center (OCEC). This year's festival consists of 300 events and more than 1,200 participants, in addition to leading programming and robot competitions, various hackathons, drone competitions, scientific films as well as scientific presentations. In addition to the hackathons, TRC has a booth that provides visitors with new and enriching experiences in the use of virtual reality screens and 3D printers. There are also interactive competitions with valuable prizes in relation to the field of science and innovation. The booth aims to spread awareness of the roles of TRC and its various programs, including Innovation Park Muscat (IPM). In the second and third day of the festival, presenters from all around the world took the stage and delivered thought-provoking presentations within the different fields of science. Presenters from TRC also participated in the sessions such as Dr. Jamilla Al Hinai, Project Manager of the National Strategy for Research and Development 2040, who delivered a presentation on the preparation of the National Strategy for Research and Development (NSRD) 2020-2040 project. Dr. Sausan Al Riyami, Renewable Energy Researcher at TRC, gave a presentation titled as 'Can H2 be the Future Green Energy?' in which she discussed how Oman can contribute to allowing hydrogen to become a 'game-changer' source of energy, while Dr. Zahra Al Rawahi, Director of the Innovative Capacity Building at TRC, contributed to the topic of 'Artificial Intelligence and the Future Economy' at the festival with her presentation on 'Toward a National Strategy for Artificial Intelligence: Vision and trends'. Moreover, Dr. Abdullah Al Abri, Executive Director of EJAAD, elaborated on how hydrogen can be a real opportunity in Oman through his presentation 'Oman Renewables: An Engine for Economic Growth'. With its participation in the Oman Science Festival, TRC aims to promote the culture of scientific research and innovation in the Sultanate through its interactive competitions, hackathons and scientific presentations.

MCIT Concludes Strategic Partnership with 'JollyChic' To Promote E-Commerce

Ministry of Communications and Information Technology (MCIT) has signed a memorandum of understanding (MoU) for cooperation and knowledge exchange with the leading e-commerce company 'JollyChic' on the sidelines of the third session of the Future Investment Initiative (FII2019), taking place in Riyadh from 29 to 31 October in Riyadh under the auspices of the Custodian of the Two Holy Mosques King Salman bin Abdulaziz Al Saud –may Allah save him. JollyChic, as a remarkable e-commerce company and according to the MoU, intends to make new investments in the Kingdom to enhance its efforts in building a comprehensive digital integrated local ecosystem as part of its commitment to strengthen partnerships with local entities, including government agencies. The MoU was signed by Deputy Minister for Technology and Digital Capacities Development Dr. Ahmed Al-Thenayyan and the founder and CEO of JollyChic Mr. Aaron Li, in the presence of His Excellency Eng. Haitham Al-Ohali, Vice Minister of Communications and Information Technology. Dr. Al-Thunayan pointed out that this specific MoU came within the ICT Strategy 2023 recently endorsed by the Council of Ministers, aimed at attracting foreign companies in priority fieldds and localizing their services. He stressed that it would have a positive impact in creating job opportunities and localizing global technologies, in addition to qualifying national cadres in promising digital fields such as e-commerce, data center management, call centers, and e-finance solutions. Al-Thunayan said, "Attracting such international companies will enhance the competitiveness of the market by supporting the expansion of logistics services for e-stores and various digital services that enable the Kingdom to seize the opportunity of its strategic location as the hub connecting the three continents." "The company's operations provide a remarkable example of Chinese businesses in the Kingdom that rely on Saudi manpower and the growing digital infrastructure. Under the MoU, JollyChic will share innovative technology mechanisms with MCIT, and will make extensive efforts to upgrade local warehouse jobs, increase delivery capacity and expand the national delivery network. The company intends to expand logistics facilitation measures in order to raise the level of warehouse functioning and obtain licenses of Last Mile Delivery (LMD) in coordination with the relevant regulators.

IT Sector Exports Witness 14 Percent Growth in Pakistan

Pakistan information technology sector exports witnessed 14 percent growth in the first quarter (July-September) 2019-2020 and remained $234.607 million compared to $205.797 million during the same period of the last year. This was revealed by officials of the Ministry of Information Technology and Telecommunication while talking to Business Recorder. The officials said that following the directives of the Federal Minister for Information Technology and Telecommunication, Secretary Ministry of IT and Telecommunication Shoaib Ahmad Siddiqui reviewed the performance of Pakistan Software Export Board (PSEB) during the first three months of Financial Year 2019-20 (July-September). Managing Director (MD) and senior management of PSEB briefed the federal secretary about PSEB performance during the period from July to September this year. The Secretary was apprised that 14 percent increase in IT exports has been witnessed in the period from July-September 2019 as compared to first 3 months of the financial year 2018-19 as it increased from $205.797 million to $234.607 million. The secretary was apprised that the number of PSEB registered IT and IT enabled services companies has risen to 2,059 as of September this year, as compared to 1,820 valid registrations by September 2018, showing a growth rate of 13.13 percent. The MD PSEB said that PSEB facilitated participation of Pakistan's IT companies in international events in GiTEX Dubai 2019, Pakistan Tech Summit 2019, and Norway and Canada-Pakistan ICT Forum held in Toronto in September. He further told that PSEB organized participation of 20 IT companies in ITCN Asia 2019 held in Karachi in September. The Secretary was also apprised that PSEB arranged a training session for commercial counselors to apprise them of the IT industry of Pakistan. The chair was told that the process for 11 IT companies' international certifications, including ISO 27001, ISO20001 and CMMI level-2, has been initiated with the collaboration of PSEB. The secretary appreciated the PSEB management for good performance during the first three months of financial year 2019-20.


IoT SERVICES
CONNECTING
REMOTE ASSETS GLOBALLY
For assets and infrastructures in remote environments, a reliable connection beyond terrestrial network coverage is vital to ensure a resilient communication channel.
Connect remote assets, anywhere, inexpensively, with IoT FIRST. The simple, innovative satellite-based solution extends IoT networks, offering truly ubiquitous coverage for objects with limited or no access to terrestrial networks.
Find out more at:
www.eutelsat.com/iot-services
Global connectivity,
Local delivery
eutelsat

ARTICLE

Connecting Remote Assets in IoT Networks

Simple, affordable satellite communications extend IoT networks to remote assets

> *Connectivity was not always within reach for every enterprise – until now. In 2019, Eutelsat, one of the world's leading satellite operators, entered the satellite IoT market, proposing a portfolio of satellite IoT offerings, with new satellite technologies to extend the coverage of terrestrial IoT networks.*

Across all industries, enterprises are fast harnessing the power of the Internet of Things (IoT) and billions of remote assets will soon be connected to increase productivity, reduce costs, and create new revenue streams, in ways previously unthinkable. From industrial applications, like the monitoring of power plants and oil and gas pipelines, to Smart Cities, farming, point-of-sales, and the latest security solutions; from highly valuable industrial assets to the smallest devices - data will power the world of tomorrow.

Today, however, many enterprises don't have access to a global, reliable IoT connectivity service. They are unable to reach remote assets due to insufficient coverage, or prohibitively expensive solutions. Terrestrial networks only cover 15% of the Earth's surface, albeit 50% of the land mass. While this is acceptable for consumer voice and data requirements, it's far from sufficient for objects in remote environments. Satellite technology is the ideal complement to terrestrial IoT networks, providing a truly ubiquitous coverage, however previous solutions were too expensive and complex to deploy.

Connectivity was not always within reach for every enterprise – until now. In 2019, Eutelsat, one of the world's leading satellite operators, entered the satellite IoT market, proposing a portfolio of satellite IoT offerings, with new satellite technologies to extend the coverage of terrestrial IoT networks.

Luc PERARD
SVP IoT Business
Eutelsat

> *Eutelsat will be at the core of the Internet of Things revolution, connecting businesses to assets in ways not possible before. Through a global fleet of geostationary satellites, and soon via a unique constellation of Low-Earth Orbit nanosatellites, Eutelsat is redefining the rules of global IoT connectivity.*

The Internet of Things will connect billions of assets

As customer expectations become increasingly demanding, and delivery technologies push the art of the possible, the need to connect remote assets which exchange data with cloud-based applications and solutions has massive implications for enterprises. With more data from more sources, and faster data processing, the business opportunities enabled by IoT are limitless. Consequently, the number of connected assets is forecast to grow massively, from 8.3 billion in 2019 to 21.5 billion in 2025 (IoT Analytics Research 2018).

With such a diverse range of industries concerned, from telecoms, to oil and gas, agriculture and banking, assets must be connected on very remote objects, however, the vast majority do not require high-speed communication and the amount of data exchanged is small, typically ranging from a few to a few hundred Megabytes per month per asset. Nevertheless, connecting remote assets remains a challenge. Terrestrial networks – whether wired or wireless – are far from ubiquitous. They are designed to connect people and as such, only cover the more populated places. But assets can be located anywhere, including rural and environmentally-challenging territories such as mountains, deserts, or at sea, and dispersed across multiple territories. In these situations, where secure, guaranteed, cost-effective connectivity is just as essential, satellite is the only technology capable of delivering reliable connectivity to these assets.

Redefining the rules of global IoT connectivity

Eutelsat will be at the core of the Internet of Things revolution, connecting businesses to assets in ways not possible before. Through a global fleet of geostationary satellites, and soon via a unique constellation of Low-Earth Orbit nanosatellites, Eutelsat is redefining the rules of global IoT connectivity. Whether fixed or on the move, across land and ocean, Eutelsat will revolutionise the way businesses access and use data from assets, no matter where they are deployed, in a simple and affordable way.

IoT FIRST is Eutelsat's inaugural IoT service. A simple, innovative satellite-based IP connectivity solution, it is designed to connect businesses to remote assets, anywhere, inexpensively. Whether you need to monitor industrial pipelines, or connect rural ATMs, Eutelsat IoT FIRST enables enterprises to transmit data between remote assets and the cloud, ensuring faster, more efficient and more reliable communications than any other method.

In the second half of 2020, Eutelsat will expand its portfolio of IoT solutions to the mobility market, enabling enterprises to connect assets on the move, addressing verticals like transportation and logistics, automotive and maritime industries.

IoT FIRST – simple, inexpensive IoT connectivity via satellite

IoT FIRST is a simple, integrated solution delivering two-way IP connectivity between remote assets and the cloud. Leveraging shared platforms for space and ground segments, IoT FIRST is based on Eutelsat's own and partners' technologies. Designed to meet the specific IoT technical & business requirements, terminals have low power consumption with advanced power saving modes, and operate with small, inexpensive antenna. The hub has high spectral efficiency with no data overheads and can support hundreds of thousands of terminals.

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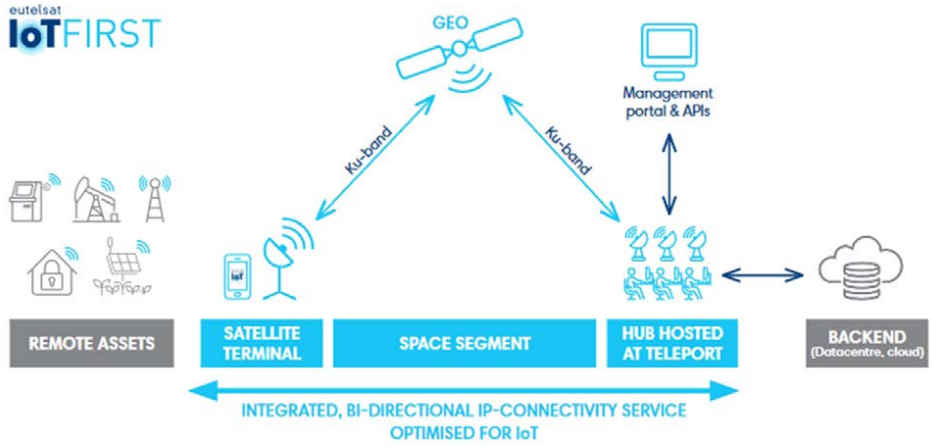
The bundled, turnkey service, with a single subscription fee, is proposed at the lowest price-point of alternative satellite-based solutions, in the range of cellular IoT connectivity services. Unlike traditional VSAT terminals, the integrated solution includes a compact, low-power satellite



IoT FIRST is a turnkey communication service managed by Eutelsat

terminal, Ku-band satellite capacity, and an IoT-dedicated hub, operated and managed by Eutelsat. Terminals are easily and rapidly installed and configured via an interactive Smartphone app. A web-based portal and API enables customers to manage their connectivity service and terminals.

In addition to satellite's inherent advantages of ubiquitous, secure, resilient communications, IoT FIRST operates as a private satellite network, with outstanding SLA's and 24x7 support. Advanced networking features including IPSec encryption, VRF/VLAN, Public IP and embedded crypto-core.

Eutelsat IoT FIRST enables enterprises to focus their time and resources on their core business, rather than asset connectivity. It's ideal for enterprises to connect fixed assets such as smart meters, ATMs, and alarms, or service operators to backhaul IoT networks, offload IoT traffic from LTE links, and deliver IoT connectivity outside licensed territories.

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Transforming millions of businesses across the globe

IoT has become critical for enterprises to stay in business and thrive, and the market represents a massive growth opportunity for IoT solution providers. For critical assets and infrastructures located in remote environments, a connection beyond terrestrial network coverage is needed to ensure a highly reliable, resilient communication channel.

Satellite has unique advantages to connect IoT assets, offering truly ubiquitous coverage which can reach objects with limited or no access to terrestrial networks. It is highly reliable with guaranteed SLA's and delivers a consistent service across the coverage. Combining satellite technology with terrestrial IoT will be key to accessing the economies of scale required to deploy global IoT, extending the reach of terrestrial IoT cellular networks with ubiquitous, global coverage across land and sea.

Eutelsat's IoT services enable service providers to broaden and differentiate their portfolio of services with offerings designed and optimised for IoT. With IoT FIRST, service providers can offer an extensive, reliable, low-power, inexpensive IoT service, enabling them to grow revenue and margins immediately with ready-to-sell IoT connectivity solutions.

SATELLITE NEWS

Egypt's First Telecoms Satellite Tiba-1 Arrives at Orbit

Egypt's newly launched satellite Tiba-1 has arrived at its targeted orbit, at an altitude of 35,786 kilometres, a specialist at the International Telecommunication Union (ITU) said. The telecommunications satellite was launched last Tuesday from a space center in French Guiana in South America. "The French company [Arianespace] is currently working on adjustment to locate the satellite into its exact orbital slot position at 35.5 degrees to the East, which will take a few days since this position is jammed with other satellites," ITU specialist Rami Ahmed Fathy said. Launched by an Ariane 5 rocket, Egypt's first telecommunication satellite was initially scheduled to launch last November, but the launch was postponed twice due to a malfunction followed by bad weather conditions. Tiba-1 will cover all of Egypt and provide telecommunication and internet services to remote and isolated areas. It was developed by Thales Alenia Space and Airbus Defence and Space as co-prime contractors. It will be owned and operated by the government of Egypt. Airbus Defence and Space supplied the platform and also assembled and tested the spacecraft. Thales Alenia Space designed and built the communications payload, which will provide broadband communications in ka band. Tiba-1 is the fourth satellite launched by Arianespace for Egypt. Egypt became the first Arab country to put a telecommunications satellite into space with the launch of NileSat 101 in 1998. It was followed in 2000 by Nilesat 102, which helped distribute hundreds of satellite TV channels. In 2007, Egypt launched EgyptSat 1, which became the first Egyptian remote-sensing satellite, and was manufactured in cooperation between Egypt's National Authority for Remote Sensing and Space Sciences (NARSS) and Ukraine's Yuzhnoye State Design Office. In February 2019, EgyptSat A, a remote-sensing satellite, was launched from the Russian Baikonur Cosmodrome, a spaceport in Kazakhstan leased to Russia. The satellite replaced the former satellite EgyptSat 2, which was launched in April 2014 and lost in February 2015, and is Egypt's third remote-sensing satellite.

Brazil and China to Launch Satellite Created in Collaboration

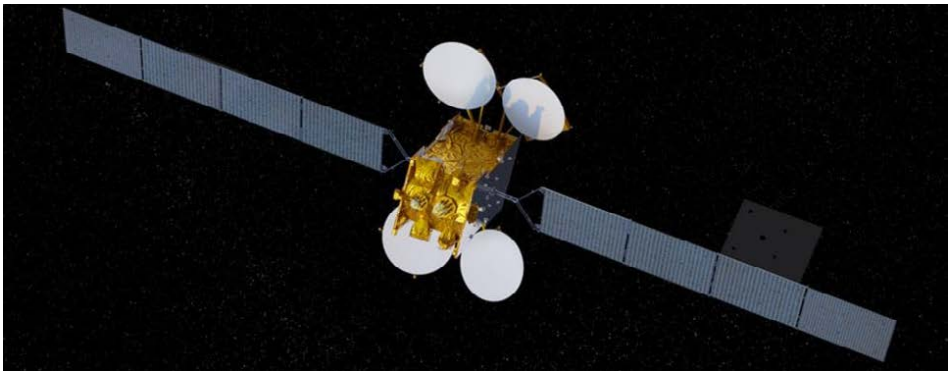
The CBERS-4A satellite, created in collaboration between Brazil and China, will be launched on December 17, according to the National Institute for Space Research. This sixth remote sensing satellite developed and manufactured by the two countries has been tested since May at the Laboratory of the China Academy of Space Technology (CAST). The satellite will be put into orbit from the Taiyuan Launch Base, about 500 kilometers from Beijing, by a Chinese rocket. According to the National Institute for Space Research, the device went through a series of assembly, integration and testing activities in its laboratories during the 18 months it was in Brazil. The so-called China/Brazil Earth Resources Satellite program (CBERS) is a joint project initiated more than two decades ago that has allowed both countries to master the technology of remote surveillance with cameras and sensors for Earth observation. Such an initiative, which offers free satellite images to different countries in Latin America and Africa, is considered the greatest spatial cooperation project among developing countries.

Kacific1 Satellite Launch to Bring Affordable Internet to Remote Parts of Asia and Pacific

Kacific Broadband Satellites International Ltd has launched the Kacific1 satellite to expand high-speed broadband internet access across Asia and the Pacific. The Asian Development Bank (ADB) provided 50 million dollars in financing to Kacific for the satellite to deliver internet that will enable better education and health services, improve access to information, and drive more trade and connectivity between countries. Kacific1, launched by SpaceX's Falcon 9 rocket from Cape Canaveral will orbit in the same location above Asia and the Pacific region during its estimated 15-year service life. "The satellite will be able to deliver the most powerful signal ever achieved by a commercial satellite in the region, providing affordable broadband access to people in remote regions, many of whom have never had internet connectivity before," ADB said in a statement. Remote and rural communities are typically beyond the reach of traditional fiber optics as terrestrial distribution and infrastructure take time to build and is expensive. Kacific1 will cover these communities in Pacific island nations and in archipelagic countries like Indonesia and the Philippines. The satellite will also have beams over south Asia, New Zealand, and Papua New Guinea. "Satellite internet services, like those that will be provided by Kacific1, are very effective in reaching the last mile of internet access, connecting remote areas that would otherwise remain isolated and lacking crucial services that can improve livelihoods and incomes," said Jackie B Surtani, Infrastructure Finance Division Director for southeast Asia, east Asia and the Pacific at ADB's Private Sector Operations Department. "Information and communications connectivity are powerful tools in fighting poverty through better education, health care, and disaster resilience. ADB sees these innovative technologies as vital channels bringing inclusive development to the most remote corners of our region," he said. Access to broadband internet can accelerate progress towards realizing the Sustainable Development Goals. It also helps ADB to meet operational priorities such as human development and social inclusion, improved education, better health access, gender equality and food security. This project can assist in climate adaptation and disaster resilience as well as climate-smart agricultural practices, ADB said.

Arianespace to Launch MEASAT-3d Satellite

Arianespace and Measat, a Malaysian satellite operator, signed a launch services contract for MEASAT-3d, a new multi-mission telecommunications satellite. The satellite launched into geostationary transfer orbit by an Ariane 5 heavy-lift launch vehicle from the Guiana Space Center, Europe's Spaceport in Kourou, French Guiana (South America) in 2021. MEASAT-3d aims to serve the growth requirements of 4G and 5G mobile networks in Malaysia while continuing to provide redundancy and additional distribution capacity for video in HD, 4K, and ultimately 8K in the Asia-Pacific region. When positioned at 91.5 degrees East, MEASAT-3d will be co-located with MEASAT-3a and MEASAT-3b satellites to replace and enhance capacity in Malaysia, Asia, Middle East and Africa. The new MEASAT-3d satellite will carry multiple payload types: C- and Ku-band payloads for direct-to-home television broadcasting and other telecom services, as well as a high-throughput Ka-band payload for internet connectivity. MEASAT-3d also will carry an L-band navigation payload for Korean satellite operator Kt sat as part of the Korea Augmentation Satellite System. Commenting on this latest contract, Arianespace Chief Executive Officer Stéphane Israël said: "We are honored that MEASAT entrusted the launch of MEASAT-3d to Arianespace, renewing a long standing partnership with this Malaysian operator that dates back to 1996. With one new commercial success for Ariane 5, the Ariane family reasserts itself as the best-suited solution to reach the geostationary orbit, just a few weeks before the 40 years of Ariane and before the advent of Ariane 6 in 2020".



Ethiopia Launches First Satellite Into Space

The satellite, which was launched from the Taiyuan space in northern China, will be used for weather forecast and crop monitoring, officials said. Ethiopia launched its first satellite into space on Friday, as more sub-Saharan African nations strive to develop space programs to advance their development goals and encourage scientific innovation. A Chinese Long March 4B rocket hoisted the first Ethiopian Remote Sensing Satellite (ETRSS-1) aloft from the Taiyuan space base in northern China. The 70-kilogramme (154-pound) satellite was developed by the Chinese Academy of Space Technology with the help of 21 Ethiopian scientists, according to the specialist website Africa News. China covered most of the satellite's $8 million cost, according to an official involved in Ethiopia's space program who spoke on condition of anonymity because he was not authorized to disclose details of the project. At the launch event broadcast on state television, Deputy Prime Minister Demeke Mekonnen said: "This will be a foundation for our historic journey to prosperity. Space is food, space is job creation, a tool for technology...sovereignty, to reduce poverty, everything for Ethiopian to achieve universal and sustainable development." The launch makes Ethiopia the eleventh African country to have a satellite into space. Egypt was the first in 1998.

NBN Co Launches New Business Satellite Services

NBN Co has begun offering business-grade wholesale broadband from its SkyMuster satellite to enterprise and government customers in regional areas. The network owner said that its services will initially focus on remote customers that require high-data internet access and IoT use cases, such as mining and resources, oil and gas, emergency services, forestry, construction, education, agriculture, tourism and health. Business NBN Satellite Services currently offers two products. The first is Virtual ISP, a standard wholesale offering with options for 30/1Mbps speeds, 30/5Mbps or 13/13Mbps. There's no committed wholesale speed, and will include 1000GB of data as a standard with additional charges in 100GB increments. The other is an IoT offering with speeds up to 2/2Mbps and no data quota, given data transfers are typically much smaller in IoT use cases. NBN Co said it will launch more products next year, including access bandwidth services which will provide committed wholesale speeds for critical applications for large enterprises and government customers. All offerings are planned to have a number of configurable options and a choice of three service assurance levels. NBN Co's newly appointed chief development officer, regional & remote Gavin Williams said the new business satellite service was designed to raise the digital capabilities for a wide range of customers Australia-wide. "Regional and remote businesses in areas as diverse as mining and resources, tourism, agribusiness and health, now have access to a range of customizable wholesale options from NBN designed to meet their needs, regardless of how far they are from town." NBN Co also announced that it has launched a new business unit focused on regional and remote communities, those typically covered by satellite services. The new business will be led by Williams, who was promoted from his previous role as executive general manager for products at NBN Co. NBN Co said in a statement that the new business unit would combine aspects of the fixed wireless and satellite teams, and will work to ensure regional and rural customers remain "front and center" of the NBN rollout. "We're redoubling our commitment to regional Australia with a focused business unit responsible for engaging with regional customers and meeting their needs," said NBN Co CEO Stephen Rue. "The regional rollout of the NBN is almost complete with more than 98 percent of premises in regional Australia now able to access the network or with construction underway."

China to Offer Satellite TV to 500 Villages in Ivory Coast

In Ivory Coast, representatives of the Chinese government have just launched the local part of the project to offer satellite television to 10,000 African villages. The Ivorian part of the initiative will see 500 villages receiving the necessary infrastructure to receive the bouquet of clear channels provided by the project. As part of the project, technicians from StarTimes, China's technical partner for the project, will install satellite dishes and provide 20-home decoders in each village. For the maintenance of the equipment, the pay-TV operator trained young Ivorians who will take care of the repair of all equipment in case of breakdowns. Launched in 2015 and targeting 25 countries on the African continent, the Chinese initiative has already allowed many villages in the continent, Benin, Senegal and Nigeria, for example, to access satellite television.

Sudan Launches Its First Ever Satellite in Partnership with China

Sudan's first ever satellite for conducting research in military, economic and space technology has been launched by China, the northeast African country's ruling body said. General Abdel Fattah al-Burhan, who heads Sudan's sovereign council, announced the launch of the satellite at a meeting of his top security officials held in Khartoum. China's state news agency, Xinhua, reported that the satellite was launched on Sunday from north China's Shanxi Province. "The satellite aims to develop research in space technology, acquire data as well as discover natural resources for the country's military needs," a statement issued by the council said. The spokesman of the ruling body Mohamed al-Fakhi Sulaiman told AFP that "in a few months the satellite would be monitored from Sudan". "China launched the satellite as it is a partner in this project." Sudan, which is battling an economic crisis, has been involved in a national space program for decades covering activities such as remote sensing and geoinformatics. In 2013, the then Sudanese government of now ousted leader Omar al-Bashir established the Institute of Space Research and Aerospace (ISRA) as part of an overall plan to develop space technologies. Bashir was ousted by the army in April following a nationwide protest movement against his rule of three decades. The protests were triggered by the economic crisis led by acute shortage of foreign currency and high inflation.

Inmarsat Launches Fleet LTE Service in the North Sea

Inmarsat, the world leader in global mobile satellite communications, will extend its service portfolio for customers with the launch of Fleet LTE, following an agreement with subsea fiber and offshore LTE network operator, Tampnet. The new service which is primarily aimed at offshore support vessel operators, but could also be used by fishing and ferry operators operating in the area, leverages low-latency, high data speed communications available via a dedicated Access Point Name (APN) on the Tampnet North Sea LTE network and could be extended to other regions such as the Gulf of Mexico if successful. Inmarsat's new Fleet LTE service means customers can access high speed 4G, Fleet Xpress maritime VSAT Ka-band and continuous L-band connectivity within a single, fully managed hybrid package. "Inmarsat is a leader in a market that has significant untapped potential for Tampnet's premium LTE services, and we are really pleased to add such a great company to our list of partners," said Tampnet CEO, Per Helge Svensson. "Inmarsat provide services to large fleets of offshore vessels that fall in our LTE network footprint. The North Sea is a natural starting point, but we are also keen to explore how we can work with Inmarsat in other regions where Tampnet is present such as the Gulf of Mexico." The unique 'three-in-one' offer delivers 4G and VSAT Ka-band and L-band without the complication of dual billing or the risk of connectivity drop-off. "As demand for data continues to grow, especially in the realm of high-stakes decision-making where real time action is needed, such as for remotely operated vehicles or securing details on seabed conditions, low-latency LTE bandwidth and satellite connectivity play crucial roles," said Eric Griffin, VP of Offshore and Fishing, Inmarsat Maritime. Agreeing its own APN means Inmarsat can guarantee customers access to LTE services enabled via Tampnet's 3,000km subsea fiber network. "Being able to exploit business-critical decision-making tools helps operators to cut non-productive operational time," adds Griffin. Inmarsat Fleet LTE is available in a range of service bands that deliver data speeds of up to 40 Mbps with Round Trip Delay of around 35-40ms. However, when LTE is not available, services automatically switch over to Ka-band Fleet Xpress committed information rates, with continuous back-up from L-band FleetBroadband. Meanwhile, connectivity via FleetBroadband continues even outside the LTE coverage area. Service transition between LTE and VSAT is fully automated, with routing depending on data needs and network conditions, while vessels only need to add two LTE antenna and a modem on deck to enable the upgrade, which can be rented or purchased. "Inmarsat Fleet LTE also comes without hidden costs and offers owners plan flexibility to support business demand from third parties," said Griffin. "Owners can choose from various LTE plans up to 40 Mbps, upgrade and downgrade between packages without additional fees, and choose separated dedicated bandwidth plans for charterers." Inmarsat continuously seeks network solutions that best serve its customer base; recovering offshore market conditions have been persuasive in driving the value-added LTE proposition. "As a service provider also offering failsafe connectivity via L-band for reasons of maritime safety, guaranteeing resiliency and performance whether vessels are on station or moving to/from shore are first principles for Inmarsat," Griffin comments.

SpaceX Announces Second Starlink Satellite Launch in Two Weeks

SpaceX has announced its second planned Starlink satellite in two weeks, sticking to a trend that could see the company launch more than a thousand communications satellites over the next 12 months. Barely two weeks after SpaceX opened media accreditation for Starlink-2, the second launch of finalized 'v1.0' satellites and third dedicated launch overall, the company has announced that that late-December mission will be followed by another Starlink launch in January 2020. This tracks almost exactly with SpaceX's reported plans for as many as 24 dedicated Starlink launches in 2020, a feat that would singlehandedly break SpaceX's current record of 21 launches performed in a single year. Barely two weeks after SpaceX opened media accreditation for Starlink-2, the second launch of finalized 'v1.0' satellites and third dedicated launch overall; the company has announced that that late-December mission will be followed by another Starlink launch in January 2020. This tracks almost exactly with SpaceX's reported plans for as many as 24 dedicated Starlink launches in 2020, a feat that would singlehandedly break SpaceX's current record of 21 launches performed in a single year. Incredibly, if

those schedules hold, SpaceX will have gone from two satellites in orbit to the world's largest satellite constellation operator – by a large margin – in as few as nine months. In fact, after cresting that peak, it will take nothing short of a miracle for SpaceX to be usurped. The company hopes to launch as many as 24 Starlink missions in 2020 and is simply miles ahead of its competitors in its efforts to make high-performance orbital launches as efficient and affordable as possible. If SpaceX and its executives are to be believed, as early as the very first dedicated Starlink launch (May 2019), the cost of launching Falcon 9 was already significantly less than the cost of its payload of 60 Starlink v0.9 satellite prototypes. CEO Elon Musk and COO Gwynne Shotwell have strongly implied that the per-satellite cost is already well below $500,000, meaning that the absolute worst-case internal cost of a Falcon 9 launch is less than $30M. If, for example, each Starlink satellite already costs as little as $250,000 to build, it's possible that SpaceX can already launch a dedicated 60-satellite mission (including launch costs) at an internal cost of less than $30M ($15M for launch, $15M for 60 satellites). Even in the former scenario, a single Starlink launch might cost SpaceX has little as $60M in total. In a best-case scenario for megaconstellation competitor OneWeb, the company purchased up to 21 Soyuz launches from Roscosmos for "more than $1 billion", translating to roughly $50 million per launch (rocket costs only). Meanwhile, OneWeb's satellite design is far more traditional and Soyuz offers significantly less performance than Falcon 9, resulting in a cap of 34 ~150 kg (330 lb) per launch. Finally, OneWeb hopes to build each satellite for about $1M, translating to a best-case per-launch cost of ~$85 million. OneWeb aims to launch once per month after its first 34-satellite mission, currently NET January 30th, 2020. This is all a very roundabout way of illustrating the fact that once SpaceX becomes the world's largest satellite operator, nothing short of repeated launch failures or the company's outright collapse will prevent it from retaining that crown for the indefinite future. Once OneWeb has completed all 21 of its planned Soyuz launches, a milestone unlikely to come before mid-2021, it will have a constellation of ~700 satellites. Even if SpaceX falters and manages a monthly Starlink launch cadence over the next 13 months, the constellation could surpass OneWeb's Phase 1 plans as early as Q3 2020 – up to as early as June 2020 if SpaceX manages a biweekly cadence. By the time OneWeb's constellation is complete, SpaceX could potentially have more than 2000 operational satellites in orbit – perhaps ~600 metric tons of spacecraft compared to OneWeb's ~100 metric tons.

Talia Expands Satellite Services to Five African Countries

Talia Limited, a communications solutions provider serving the Middle East, Africa, Europe and the Americas, has announced the successful completion of beta testing of its Ka-band High Throughput Satellites (HTS) services in additional African countries including Cameroon, DRC, Gambia, Ghana and Congo. The announcement follows a week of constructive meetings with customers and partners at AfricaCom 2019 which took place in Cape Town earlier this month. Joining other influential industry players that are driving Africa's digital transformation, Talia held informational sessions about its latest connectivity solutions for Africa throughout the duration of the show. In addition to the completion of beta testing in multiple West and Central African countries, Talia announced that it has signed up three additional local resellers to provide fast and reliable Ka-band services to a diverse customer base throughout Africa. As the access to broadband connectivity remains sought after in many parts of Africa, Talia's is working alongside governments, ISP's and carriers to bridge the digital divide by providing affordable high-speed connectivity solutions to different sectors across the continent. "With low-cost and self-installed antennas as small as 74cm, Talia's Ka-band platform represents a robust and affordable solution that can reach places where fiber is not yet available while providing comparable high speeds at very reasonable costs", says Ayes Amewudah, VP Sales of Talia. "Bringing a wealth of benefits to users, Ka-band is the most cost-effective way of securing connectivity until terrestrial networks extend further into rural areas. It provides a user-friendly, self-reliant solution that can be deployed anywhere, regardless of the locations or existing infrastructure", adds Mr. Amewudah. Being committed to the sustainable and resilient development of sub-Saharans countries, by providing internet connectivity to schools, SME's and individual consumers, Talia is not only helping bridge the digital gap but also facilitating the social and economic growth of African populations. Talia is exploring opportunities for collaboration with several other governments and resellers across Central, East and West Africa to deliver its affordable and inclusive Ka-band solution to bring these communities online in a more sustainable and accessible way.

Thuraya Ramps up Aero Plans after Successful Demo

Thuraya's ambitions in the aero sector have been boosted thanks to a successful demonstration today. In partnership with SCOTTY, a developer of beyond line-of-sight (BLOS) satellite communication solutions based in Austria, Thuraya has conducted a live demonstration of its Aero Mobility capabilities platform – Thuraya Aero, replicating a real-time ISR (Intelligence, Surveillance & Reconnaissance) mission over satellite communications to key government customers. The technology demonstration aimed to highlight the reliability and effectiveness of Thuraya's Aero solution for various ISR operations associated with border patrol, maritime and environmental protection, in addition to disaster relief missions. The Aero service is available within Thuraya's satellite footprint, covering more than 160 countries across the Middle East, Asia, Europe, Africa and Australia regions. "By fulfilling the growing requirements for secure, always-on mobile satellite communications on land, at sea and in air, we are looking to expand our strong partnership with the UAE government. Today's successful demonstration is a testament towards Thuraya's capability to providing reliable aero mobility solutions to our global customers," said Ali Al Hashemi, Thuraya's CEO.

ARTICLE

AR and VR Use Cases in Smart Cities

Rohit Sethi
Principal
Arthur D. Little

> *Governmental entities, enterprises and individuals can leverage AR and VR to carry out their functions more efficiently and with an improved user experience.*

More cities are going 'Smart' with the intent to leverage the significant benefits that new technological advancements promise to offer towards transforming the way we live, work and recreate in the years to come, by enhancing our interaction with data and technology as never before. These technologies can also play a strong role in addressing issues that are more adversely impacting the urban areas globally. Increasing population density in the urban cities leads to growing concerns around safety, security and holistic wellbeing of individuals, and is becoming a top priority in the policymaker's agenda. Smart Cities are better geared towards addressing these problems through a combination of data and technology, ensuring a positive impact on the local community and the overall environment. Given the increased availability of affordable smartphones and other IoT devices as well as reliable broadband connectivity, Augmented Reality (AR) and Virtual Reality (VR) have emerged as key technologies that would enable unlocking of new opportunities in the vibrant Smart City ecosystem.

AR, where data interacts with the real environment, enables overlaying enhancements such as graphs, sound, text and effects to improve user's real-world experiences. While AR interacts with the real environment, VR is a simulated experience that can be similar or completely different from the real world. The power of VR lies in allowing a user to experience and interact in an artificial environment as if it were real. The combination of Smart devices and infrastructure with advanced AR/VR systems will allow users living in or even visiting Smart Cities, to make more optimal choices towards an enhanced standard of living/ experience.

Governmental entities, enterprises and individuals can leverage AR and VR to carry out their functions more efficiently and with an improved user experience. Most advanced uses cases built upon these technologies in the Smart City ecosystem include the following:

Urban planning: Cities are now having higher constraints than ever before in terms of space, mobility, privacy, security and sustainability. Supported by VR technology, Smart City planners

and developers can effectively assess whether urban planning models would fit the existing infrastructure, and have a better understanding of what to build and where. Additionally, VR could also involve stakeholders such as residents or investors in the decision-making process, giving them an opportunity to provide feedback as to how cities could be better transformed and developed. For example, in 2016, MIT collaborated with the City of Hamburg to model potential locations for refugee accommodations. Using optically-tagged LEGO bricks, simulation algorithms, and AR to model potential locations for refugee accommodation, local leaders and community members participated in this process, identifying 160 potential locations and finally building 10, successfully avoiding social opposition that these kinds of projects typically entail.

Emergency management & policing: Equipment and gadgets enhanced with AR technology can provide relevant information on the environment, improving the decision-making of police and emergency teams in critical situations. For example, AR could allow having access to 3D models of locations where an emergency is occurring, or provide information of previous or simultaneous events in real time. In addition, AR combined with object recognition, particularly face recognition, can help authorities to identify suspicious behavior and prevent crimes in their early stages. As futuristic as this may seem, Beijing-based AR company Xloong has created Smart glasses already used by the Chinese police, giving them access to real time facial, identification card and vehicle plate information that are linked with a national database. In addition, VR can immerse police officers into virtual training experiences, placing them into threat situations in a secure simulated environment. Exposing them to real life high-stakes situations and allowing them to deal with these in a controlled environment enhances officer effectiveness during actual crises. Without VR, providing such real life trainings would be both expensive and time-consuming.

Education & training: VR is ideally positioned to support enterprises and educational institutions in providing innovative and effective learning, overcoming the typical space and time constraints of urban cities as well as the potential risks associated with learning directly from real life situations. With the capacity to recreate real life experiences with a high level of detail, AR and VR could revolutionize training for students and professionals in many fields, for example, performance support in critical positions such as medical surgery or heavy machinery operation. Additionally, AR and VR will anyways enhance traditional learning with real time updated interactive content and exercises across the board.

Culture & tourism: AR can also transform the experience of visitors to a Smart City. Solutions such as AR real time translators or AR-enhanced visits to key tourist attractions providing additional historical/ cultural information to landmarks, can be leveraged by local businesses to improve customer experience and promote their services. In France, local entrepreneurs supported by the French Ministry of Culture and Communication have developed Culture Click, a mobile app that uses AR to discover geolocated works of art in high definition, to access French museums' information and to discover cultural events across cities.

Navigation: Navigation apps are already a tool of prime importance for urban commuters, recommending optimized routes and real time information about traffic events. However, current solutions are frequently unclear and inconvenient especially for drivers. Creating an AR layer for navigation that adds relevant content on top of the image captured by the camera of a smartphone, can significantly improve user experience and overall journey safety. In August 2019, Google Maps launched an AR mode for iOS and Android with new capabilities to its popular Navigation app.
Medical services: In addition to constantly enhancing the standard of living, Smart Cities also focus on improving individual mental health and overall well-being. AR applied to the healthcare sector can improve therapeutic methods as well as reduce customer discomfort. The technology can be used to evaluate the results of cosmetic surgery such as facial reconstruction, giving both the patient and the doctor the ability to see the results before the operation. Moreover, VR's ability to reproduce real life environments can be quite helpful in the treatment of mental health illnesses such as Post Traumatic Stress Disorder.

> *Adequate levels of safety and privacy/ security must also be critical considerations into the strategy and implementation for AR/VR use cases.*

While it is evident that significant value can be created by deployment of the above indicated use cases, a collaborative and cohesive effort is required across multiple stakeholders at the city level including governmental entities, corporates and local user communities, in order to ensure effective implementation of the use cases. Additionally, while the technology to enable most of the above is already available, it is imperative that each city prioritizes use cases specific to its unique context and requirement, to optimize on the cost of as well as on the value realized from such deployment. Adequate levels of safety and privacy/ security must also be critical considerations into the strategy and implementation for AR/VR use cases. As with any other connected technology, AR is vulnerable to security threats and unauthorized access by hacker attacks and malware. These attacks can result in a denial of service or overlay of wrong information, potentially even leading to severe, catastrophic consequences. Devising ways to preserve personal privacy with mass propagation of AR will also be a challenge required to be addressed. Successful overcoming the above challenges on an ongoing basis, as more and more innovative/ encompassing use cases emerge, Smart Cities would be able to realize the immense value that AR/ VR technologies can unlock for everyone.

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WHOLESALE NEWS

Altice, Morgan Stanley Create Portuguese Fiber Wholesaler

Altice Europe has announced that its subsidiary PT Portugal (trading as MEO) has signed an agreement with Morgan Stanley Infrastructure Partners to create a nationwide fiber wholesaler in Portugal. MEO will sell a minority equity stake of 49.99% in a new company – Altice Portugal FTTH – based on an enterprise value of EUR4.63 billion (USD5.15 billion). The new company comprises of all MEO's fiber assets in Portugal including fiber-to-the-home (FTTH) infrastructure and dark fiber; the telco's FTTH networks currently pass around four million Portuguese homes with fiber. The company seeks to sell wholesale services to all domestic operators at the same financial terms. Patrick Drahi, founder of Altice, commented: 'I am very pleased that our partnership with Morgan Stanley Infrastructure Partners, initiated in the context of our Portuguese tower transaction in 2018, now continues with a transformational fiber project. Following this transaction, Altice Europe has obtained cash proceeds in excess of EUR5.7 billion through the transformational SFR FTTH transaction [in France] and the various tower sales and partnerships announced in 2018. Altice's portfolio of infrastructure assets continues to grow.'

Windstream Wholesale Signs Its Largest Core Transport Deal

Windstream Wholesale says that it has executed the largest agreement in its history for core transport. The client was termed "a major hyperscale" entity but was not identified in the press release. The capacity will enable the client to interconnect data centers in key cities in the United States, the company says. "Our flexibility and customer-tailored routes coupled with our unique domestic network density in Tiers 1, 2 and 3 cities have positioned us as the 'go-to' provider for international carriers, content providers, fiber operators and others needing domestic diversity and redundancy," Joe Scattareggia, the executive vice president for Wholesale Sales at Windstream, said in a press release. "Our Wholesale business has been on a steady growth trajectory for some time. Hitting our single highest month of capacity sold is a great accomplishment and reflects the inflection point of marketplace bandwidth demand and our network solutions designed to meet this demand." The deal, according to the announcement made today, "combined with additional wave capacity contracted in October, and represents 5.7 terabits of capacity – the most sold in any single month at Windstream Wholesale." Windstream Wholesale utilizes multiple network platforms including a nationwide IP network, a proprietary cloud core architecture and a local and long-haul fiber network spanning approximately 150,000 miles. In addition to building up its U.S. presence, Windstream Wholesale has had a sharp focus on international opportunities in recent months. In June, the company established a presence in the MDC data center in El Paso, TX. The data center is located at network crossing points between the United States and Mexico. In January, Windstream Wholesale said that it had signed an agreement to use Telxius to connect with the Marea and Brusa Cable Station Landing in Virginia Beach, VA. The move was designed to increase its international connectivity. Telxius is the telecommunications infrastructure company of Telefónica Group. The day before, Windstream Wholesale said that it would use existing long-haul fiber to expand its core network by more than 200 miles to Montreal, Canada.

ICASA Probes MTN and Cell C Roaming Tie Up

The Independent Communications Authority of South Africa (ICASA) said it will investigate the new expanded roaming agreement between MTN and Cell C. The industry regulator confirmed that it has been informed of the roaming agreement by the parties. The new deal builds on an existing roaming deal dating from 2018, which provided 3G and 4G services to Cell C customers outside of main metro areas. Cell C said the new roaming agreement adheres to all applicable legal and regulatory requirements, adding that Cell C and MTN will maintain their spectrum and each party will use its own frequencies. ICASA CEO Willington Ngwepe said the question of whether any agreement that pertains to a regulated service or use of a licensed resource (such as spectrum) requires approval or triggers regulatory compliance requirements is one which the authority can never leave to the parties alone to determine.

Nkom to Introduce New Wholesale Broadband Obligation for Telenor Norge

Norway's National Communications Authority (Nasjonal kommunikasjonsmyndighet, Nkom) has proposed that fixed line incumbent Telenor Norge should be obliged to offer wholesale customers access to its fixed-wireless broadband network. In a press release regarding the matter, the Nkom said that, while acknowledging Telenor is already required to give competitors access to its fiber and copper infrastructure as per its most recent regulatory ruling on market 3b (wholesale central access provided at a fixed location for mass-market products), it should now be required to offer wholesale wireless access due to the telco's ongoing plans to decommission its copper network. In its opinion, extending wholesale access in this fashion would ensure Telenor's wholesale customers have access to a replacement technology as the incumbent moves forward with the phasing out of its copper network, and ensure competition is maintained in the country's broadband sector. As per the Nkom's proposals, it has directed Telenor to develop a standard offer for wholesale access to its fixed-wireless broadband network by 1 February 2020, with the product to be made available for order by 1 March that year. Pursuant to the above, the watchdog has called for comments on the matter from both Telenor and any other interested parties, setting a deadline of 19 December for submissions.

Zong 4G Announces Prepaid Data Roaming Bundles for China

Leveraging on the award-winning 4G services in Pakistan, Zong 4G, a leading telecommunication company, is now offering two affordable data bundles to its valued prepaid customers traveling to China. Making roaming services more accessible for prepaid customers and providing them with the best-in-class communication experience, Zong 4G is committed in its quest of transcending borders through its ubiquitous network. The prepaid bundles not only provide the most reasonable data rates but also provides access to WhatsApp, Facebook and all the other social media apps which are normally blocked in China. Offering these benefits plus fast speed data at a very economical rate, prompts all users to avail these roaming services. The roaming service can be activated without cost by dialing the 310 helpline. "Our earnest dedication towards our customers is the force behind our commitment to providing an unmatched roaming experience for our customers. The launch of these two bundles is in line with our strategy of providing our traveling customers with a seamless experience on Zong 4G's widest and largest network. With more customers traveling abroad, Zong 4G understands their data needs and is hence empowering them with the best possible 4G data roaming services, no matter where they are," said a company spokesperson. Zong 4G is the clear industry-leader in 4G roaming services, offering more than 70 4G roaming destinations to its customers.

Cell C Inks a New Roaming Deal with MTN

MTN South Africa and Cell C have signed a comprehensive new roaming deal, potentially making it more complicated for Telkom to pursue an acquisition of Cell C. The new "long-form roaming and services agreement" will allow Cell C to roam on MTN's network in all areas of the country. Previously, it only had access to MTN's 2G, 3G and 4G network in selected parts of the country. "This is aligned to MTN's strategy to further develop the group's wholesale business and will allow both MTN and Cell C to harness greater efficiencies in providing telecommunications services, while supporting a more sustainable and competitive industry," MTN said in a statement to shareholders on Monday morning. "MTN looks forward to transparent engagement with relevant stakeholders regarding this important industry milestone." The expanded deal with MTN was a prerequisite of a planned recapitalization of Cell C being led by the Buffet Consortium. Cell C has said previously that it hopes to have the Buffet deal wrapped up by the end of the year. However, Telkom last week said it is again interested in a possible acquisition of the troubled company. This is despite Telkom CEO Sipho Maseko having said previously that he is no longer interested in a deal.

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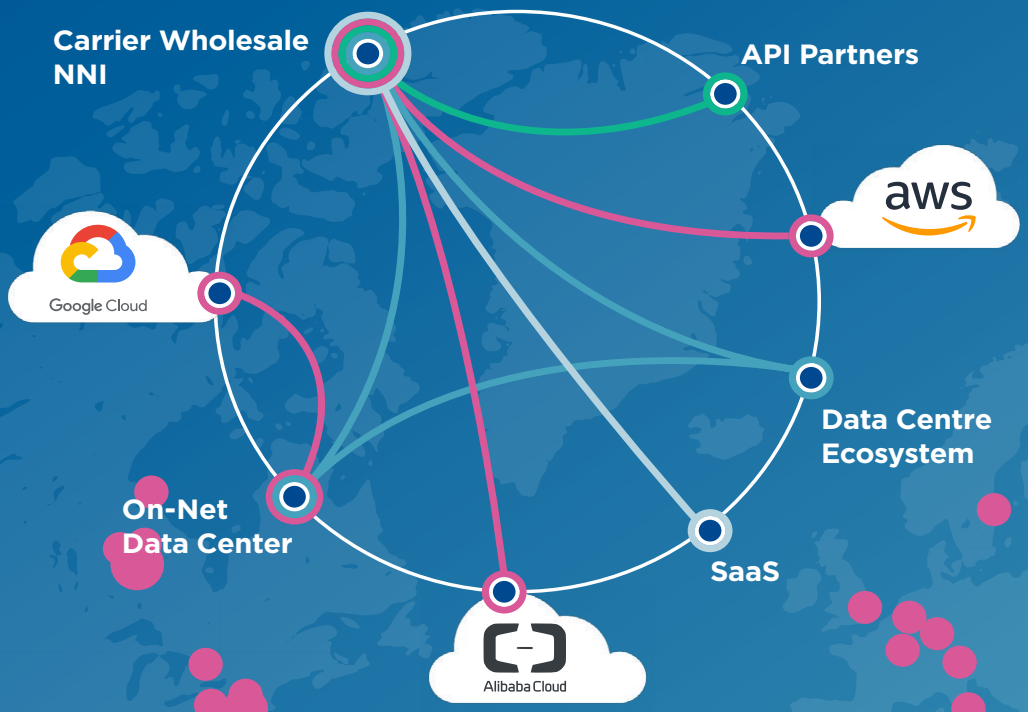

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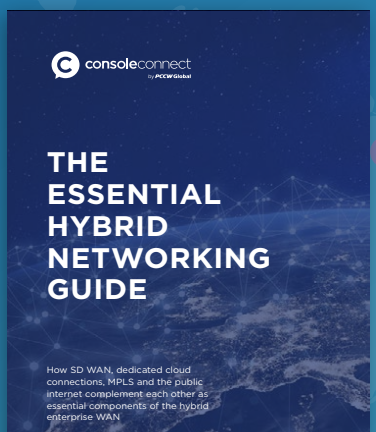

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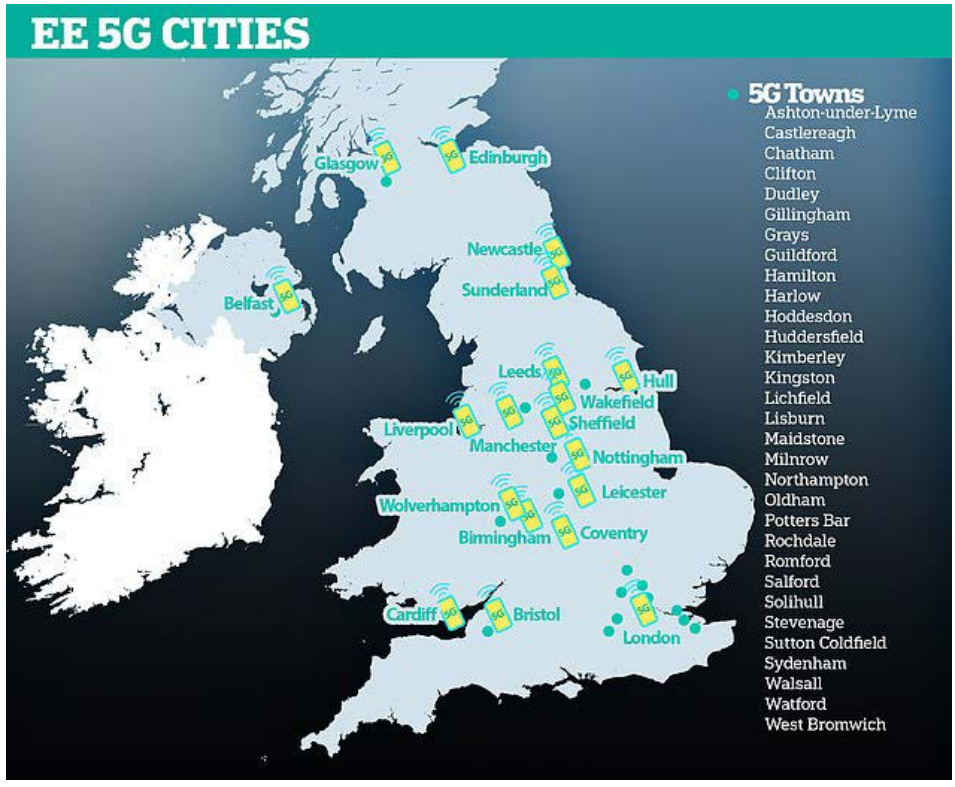
TECHNOLOGY NEWS

EE Extends 5G to Nine New Locations, Upping Total Coverage to 50

Mobile network operator (MNO) EE has announced the switch-on of its fifth-generation network in six new cities and three more towns in the United Kingdom, noting that this development means it is now offering 5G connectivity in a total of 50 locations across the country. In a press release the MNO confirmed that the six 'major' UK cities of Hull, Leeds, Newcastle, Nottingham, Sheffield and Sunderland were all now within its network footprint, while the three new towns to receive coverage were named as Northampton, Stevenage and Wakefield. With the network expansion meaning that EE has achieved its self-imposed target of offering 5G in at least 45 towns and cities by the end of 2019, it said it has now set a new goal of upping that figure to 70 by March 2020. Commenting, Marc Allera, CEO of EE parent company BT's consumer division, said: 'We switched on the UK's first 5G network in May, and this is another milestone towards keeping our customers connected 100% of the time. We're leading the way in the UK, with 4G and 5G coverage in more places than any other operator. Adding 5G to more cities and towns – and expanding our 5G coverage in each place – is helping us to always deliver the best mobile experience to our customers.'



Orange Luxembourg All Set for 5G, Awaiting Release of Spectrum

Orange has said it is ready to launch its 5G network in Luxembourg, after partnering with Ericsson to conduct tests in laboratory conditions. New antennas have been installed and the network can be switched once the required frequency has been allocated, claims the operator. 'We are convinced that 5G is a step that will bring a lot of disruption in terms of innovation. In a very responsible way, we want to make our customers benefit from the evolutions of the era of artificial intelligence and the Internet of Things. All this in order to participate in a new form of digital society,' noted Orange Luxembourg CEO, Corinne Loze. Luxembourg's capital is one of the 17 European cities in which Orange Group has been trialing 5G services. As previously reported by TeleGeography's CommsUpdate, the government has indicated that allocation of spectrum in the 700MHz and 3.6GHz bands will take place by mid-2020 at the latest, mostly likely via an auction.

Deutsche Bahn Opens Fiber-Optic Network to Telecoms Operators

German railway company Deutsche Bahn (DB) has opened up its fiber-optic network for use by the country's telecoms operators. DB's fiber infrastructure stretches 18,500km alongside its nationwide rail network. DB broadband, a wholly owned subsidiary of DB Netz, has been established to operate the new business.

First Laparoscopy Using 5G Technology Performed in Moscow

The first laparoscopy to be performed in Russia with the use of 5G technology was recently undertaken in the 5G pilot zone located in Skolkovo. Telecommunications company Beeline, together with Huawei and GMS Hospital partnered together to complete two such surgical procedures. The 5G pilot zone was rolled out in the operational block of the innovation center at Skolkovo, with the support of the Moscow Department of Information Technologies. Thanks to the work of all those involved, a cancer tumour was successfully removed with the use of a laparoscope and 4K camera connected to the 5G network, an anesthesiology console, several additional cameras and the Huawei 5G multimedia white board. The project was a first-hand demonstration of the capabilities of the 5G broadband and its low latency. The operation was conducted with the support of remote medical experts, with relevant information exchanged via 4K video conferencing, facilitating communication between the operating surgeon and consulting specialists. This included the patient's medical history, as well as real-time expert advice and instructions. "Skolkovo is one of several 5G pilot zones in the capital region. Over the past six months, innovators working across these centers have demonstrated how fifth generation communication can be used in urban services, be it for road safety or in the field of entertainment. Today, Beeline has demonstrated how 5G can benefit the medical field," said Eduard Lysenko, head of Moscow Department of Information Technology. "Thanks to fifth-generation communications, medicine and medical services are set to reach new heights, which, in the long run, are expected to improve quality of life for citizens. As such, the Moscow Department of Information Technology will continue to support research efforts and partnerships concerning 5G," he added. Expectations are that 5G will be widely used across Russian healthcare in the future. New generation networks will enable remote surgical procedures, so that it will no longer be necessary to transport a patient to a specific clinic or specialist. Furthermore, 5G makes for more mobile and comfortable operating theaters, thanks to its ability to connect medical equipment wirelessly. Finally, thanks to 5G, remote consultations will reduce the need for travel, significantly saving both doctor and patient time. This will have a big impact on medical specialists, who spend more than 70 per cent of their time travelling from one location to another for complex operations.

Optus Completes 5G Data Call Using 2300MHz Spectrum

Australian mobile network operator (MNO) Optus claims to have successfully established an end-to-end 5G data call using its spectrum in the 2300MHz band, in what it has claims is a world first. Outlining details of the achievement in a press release, Optus said it had completed the test call in Sydney, working with technology partner Ericsson. On the back of the test the MNO was keen to highlight that, as it holds frequencies in both the 2300MHz and 3500MHz bands, it expects to be able to build 'a true dual-band 5G network which will ultimately provide customers with even more capacity and more coverage on 5G than a single band 3500MHz 5G today'. Commenting on the matter, Dennis Wong, Optus' Managing Director Networks, was cited as saying: 'There is strong industry interest in the use of the 2300MHz band for 5G and as the only telecommunications operator in Australia to currently have access to this band in metro capital cities, it's great to be leading the way with testing and trialing this for future 5G deployment.' Meanwhile, while the executive noted that Optus is aiming to deploy 2300MHz spectrum for 5G 'some time during 2020', he added that the company is 'actively pushing forward' with the rollout of 5G services using 3500MHz spectrum. To that end, Optus confirmed that it now has more than 300 live 5G sites across Sydney, Brisbane, Perth, Melbourne, Adelaide, Canberra and other 'key locations' in NSW, Victoria and Queensland.

Sunrise Expands 5G Footprint to Over 300 Markets

Swiss telco Sunrise says it now has 5G networks live in 309 towns and cities, which is almost double the coverage provided by the next best provider. Having opened a limited trial 5G service in April this year, Sunrise went on to carry out a full commercial launch in September, covering 262 towns and cities. It is using 3.5GHz spectrum to provide connectivity at peak speeds of up to 2Gbps, it says. The firm adds that it has so far avoided using 700MHz and 2600MHz spectrum as compatible handsets are not yet widely available and the speeds offered in these bands do not differ significantly from those provided via advanced 4G networks.

Telekom Malaysia Inks 5G MoU with Huawei

Telekom Malaysia and Huawei Technologies have signed a Memorandum of Understanding (MoU) which will see them collaborate on a variety of use cases ahead of the launch of commercial 5G services in Malaysia. Under the terms of the MoU, the two parties will seek to collaborate in a number of areas, including: the deployment of fixed wireless access (FWA) technology; vehicle-to-vehicle/vehicle-to-infrastructure (V2X) solutions; and the study of Smart Cities. The telco notes that they will also explore future cooperation opportunities relating to the deployment of a fully-fledged 5G end-to-end system.

China Mobile to Build 6,000 5G Base Stations in Tianjin by 2020

North China's Tianjin Municipality will have around 6,000 5G base stations built by China Mobile, a major telecommunications operator, by the end of 2020, the company's Tianjin branch said. So far, the Tianjin branch of China Mobile has built more than 2,000 5G base stations in the city, covering many key areas such as the Sino-Singapore Tianjin Eco-City. The figure is expected to reach 3,000 by year-end. In early June, China granted 5G licenses for commercial use, marking the beginning of a new era in the country's telecommunications industry. According to the China Academy of Information and Communications Technology, 5G technology is expected to create more than 8 million jobs by 2030.

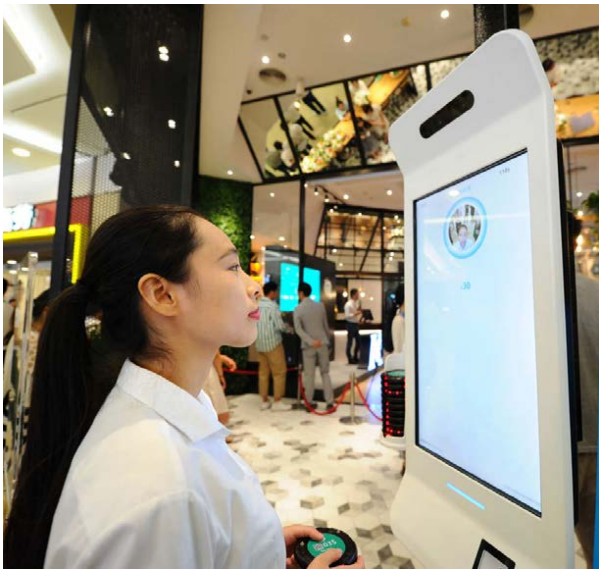
Algar Stages New 5G Trial with Nokia

Brazilian regional operator Algar Telecom has embarked on a new 3.5GHz 5G trial with long-term vendor partner Nokia – following tests with Huawei this summer. The current trial is taking place at the telco's headquarters in Minas Gerais, with additional support provided by the Faculty of Computing (FACOM) at the Universidade Federal de Uberlandia (UFU). It is understood that the new tests are exploring fixed-wireless access (FWA) 5G solutions. As previously reported by TeleGeography's CommsUpdate, in August this year Algar staged a 5G trial in association with Huawei and the UFU. The tests – which achieved download speeds of up to 1Gbps – utilized 3.5GHz spectrum, after the issuance of a trial license by the National Telecommunications Agency (Agencia Nacional de Telecomunicacoes, Anatel).

"Smart Base of the Future" is First in Military to Use 5G

Advanced networking technology will be the backbone of the armed forces, but the rollout won't happen overnight. By mid-2020, Tyndall Air Force Base in the Florida panhandle will have a unique distinction: It will carry 5G service. It's a happy distinction for a base known more for catastrophe of late. The base suffered significant structural damage in Hurricane Michael in 2018, when the Category 5 storm battered it with 160-MPH winds. In the wake of the devastation, the Air Force is rebuilding Tyndall as a model of a modern, connected base. Helping in the effort is AT&T, which has been on a publicity blitz of late around the ongoing rollout of its 5G network. The base will feature networking capabilities powered by AT&T 5G to support augmented and virtual reality, IoT, and a broad array of innovative technologies that may soon become a fundamental part of military operations. Initial services under the agreement with AT&T will include mobility, cloud access, unified communications, voice, broadband, Wi-Fi expansion, and an array of connected devices. AT&T's networking solution at Tyndall will support network compute and storage as well as network edge capabilities that can more quickly deliver data and applications to users. "The Air Force and AT&T share a vision for the smart base of the future: one that uses modern, commercially available communications capabilities to help our military maintain its globally competitive edge in defending our freedoms," said Xavier Williams, President, AT&T Global Public Sector. "We're proud to work with the Air Force and help fulfill its vision for how technology can power improvements in mission delivery while helping it keep its technological advantage." AT&T has been aggressive in its rollout of 5G. Two years ago the telecom brought 5G to 12 cities across the U.S., where customers were granted access to Netgear Nighthawk 5G hotspots. The company plans to have 5G access in 30 states via its hotspot rollout by the end of 2019. Concurrent to its rollout of 5G hotspots, AT&T has gotten into some hot wire over rebranding certain 4G phones with a misleading 5GE label. Sprint sued AT&T over the move, and other carriers have charged AT&T with misleading consumers. The Tyndall rollout makes a nice publicity counterpart, and the base should benefit from enhanced networking speeds thanks AT&T's 5G network.

China Begins Facial Recognition for SIM Registration



Chinese regulations on the collection of biometric data during user registrations came into force, alongside other rules authorities claim will tackle fraud and prevent illegal SIM card resale. Under the law, announced by the country's Ministry of Industry and Information Technology (MIIT) in September, the country's three operators must scan the faces of users during the registration process. From the public version of notice it is unclear if existing customers of China Mobile, China Unicom and China Telecom will eventually also need to provide biometric verification data. Between the country's operators, they had 1.6 billion mobile subscribers at the end of Q3, GSMA Intelligence estimated. In its notice, the MIIT said the rules would "strengthen the management of real name registration of telephone users to safeguard the legitimate rights and interests of citizens in cyberspace" and "lay a solid foundation for the construction of a network integrity system". Operators were given until 1 December to implement "portrait comparison" technology using AI or similar innovations to verify users. Under other rules laid out as part of the initiative, operators must amend their terms of service to clarify the illegality of reselling SIMs. Companies are also required to carry out a publicity campaign to address this issue.

Telekom Launches 5G in Hamburg

Telekom Deutschland, the domestic fixed and mobile unit of Deutsche Telekom (DT), has switched on its 5G network in Hamburg. A total of 18 5G antennas are currently in operation in the city, supporting maximum download speeds of 1Gbps, with the number set to rise to more than 40 in the next few weeks. The expansion to Hamburg brings the total number of Telekom 5G cities to six, following earlier launches in Berlin, Bonn, Darmstadt, Munich and Cologne. By the end of 2020 the total number of 5G antennas is set to rise to more than 1,500 across more than 20 cities.

SETAR and Nokia Bringing 5G to Aruba

SETAR – the telecoms group on the Caribbean island of Aruba – has expanded an existing partnership with Nokia by selecting the Finnish vendor to implement an end-to-end 5G network transformation, aiming for island-wide 5G connectivity within two years. A press release says that under a phased approach, Nokia will upgrade RAN access and modernize elements of the core and data management systems, thereby future-proofing SETAR's infrastructure and enabling new business services in segments such as hospitality, healthcare and gaming.

The network evolution project consists of:

- enhancing network architecture with Centralized RAN and AirScale Cloud Controllers to raise capacity while managing network resources more efficiently
- utilizing carrier aggregation, 256QAM and 4×4 MIMO to enable three-to-four times higher downlink speeds
- upgrading to 5G in initial selected sites using Massive MIMO technology with 64 antennas to enable new broadband use cases like 5G fixed-wireless access, Augmented/Virtual Reality, Tourism 4.0 and Smart Cities
- deploying dual/triple-band AirScale remote radio heads (RRHs) to reduce site space requirements by more than 60%
- introducing a shared data layer increasing efficiency of subscription and authentication services by a factor of three
- installing a virtualized Evolved Packet Core (vEPC) for a three-fold increase in efficiency of mobility and gateway functions.

SETAR's managing director Roland Croes said: 'Through our partnership to bring 5G to the island, we will ensure Aruba has the highest quality of services and maintains itself as a desirable place to live for our 110,000 residents and a top destination for two million tourists a year.'

China Enters the 6G Fray with Government-Backed Initiative

State media in China said that government ministries and research bodies had met to 'kick off' work on 6G. The report appeared in the Science and Technology Daily, which is published by China's Ministry of Science and Technology. China's three mobile operators launched 5G services on 3 November. Two organizations will be set up in China to propel the R&D. The 6G R&D Working Group will have government representatives from different departments, and will be responsible for the promotion and deployment of R&D. The Experts Group is to include 37 scientists and technology experts from academia, research institutes, and businesses. It will be responsible for setting the research agenda for 6G, evaluating the tech and advising on government policies. Work is already underway in Finland on 6G, although 5G is only in the very early stages of deployment in most countries, and 5G standards are not yet complete. Finnish activity is centered on the University of Oulu, and the 6G Wireless Summit 2020 is set to take place in March in Lapland. The 6G Flagship research program published what it claimed is the world's first 6G white paper in September, saying this "opens the floor for defining the 2030 wireless era". To coincide with MWC2019 in February in Barcelona, the US President Donald Trump made global headlines tweeting that he

wanted 6G technology in the US as soon as possible, urging US firms to step up their efforts or get left behind. China had originally said it would launch the 5G mobile internet access early next year but accelerated its plans as Sino-US trade dispute heated up. Now China has upped the ante again.

Beeline Kazakhstan Claims 3Gbps 5G Pilot Speed

Beeline Kazakhstan – part of the VEON group – reported on its website that it has achieved a peak data speed of 3Gbps on its 5G pilot network in Shymkent, consisting of three base stations and core equipment supplied by Nokia. The 5G pilot in the country's third largest city will run until the end of 2019, and the cellco says it will draw conclusions based on the pilot's results regarding the necessary investments in technology for developing 5G, and will evaluate the readiness of its networks for widespread 5G adoption. Beeline's ongoing preparations for 5G include a large-scale network modernization project launched in the first half of 2019, involving a complete analysis of coverage for optimal deployment of new base stations to provide high speed mobile internet in cities without 'blank spots'.

ARTICLE

Emerging 5G IoT Use Cases

Rohan Dhamija
Partner, Head – Middle East & South Asia, Analysys Mason

Jacopo Pichelli
Manager, Analysys Mason

Shashwat Mishra
Consultant, Analysys Mason

> *eMBB and FWA will be amongst the first use cases to be adopted (already offered in multiple countries), followed by use cases that are enhanced by 5G, but can also work on older technologies (smart grid, wearables, drones, etc.)*

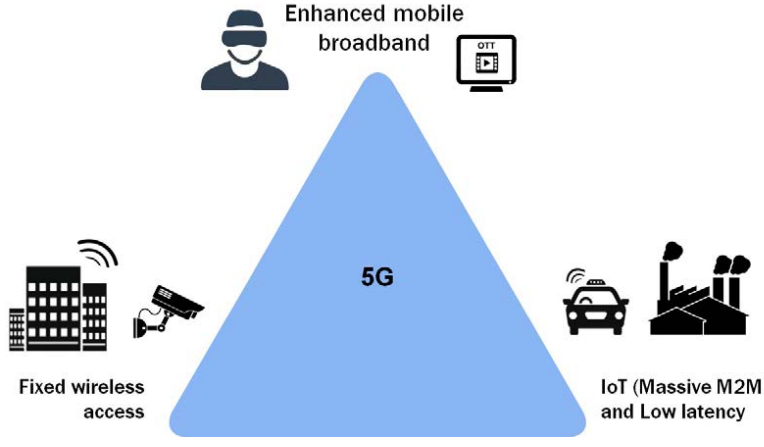
5G, the fifth generation of wireless technologies, will be a critical enabler of digital transformation worldwide. Unlike previous technologies, 5G's impact is expected to stretch far beyond just the telecoms industry and its users. It will transform societies and economies by providing continual and convenient access to mobile and fixed broadband services to its consumers and by nurturing the development of new use cases like augmented reality (AR), virtual reality (VR), autonomous vehicles and smart manufacturing for consumers and enterprises alike.

There are several characteristics of 5G networks that enable them to cover such a wide variety of use cases. For instance, high throughput (minimum 100Mbit/s as per ITU's IMT-2020 standards) drives use cases such as VR for 4K/8K streaming. Low latency (1ms) is critical for use cases like autonomous vehicles and remote surgery. High connection density (1 million connections per km2) will help drive use cases such as smart meters. Finally, network slicing capabilities will help operators create private networks with high degrees of customization with very little integration effort (compared to dedicated physical networks).

1. Key use cases of 5G

The wide variety of use cases that 5G supports can broadly be classified into the following three categories –

- **eMBB** (enhanced mobile broadband): extension to existing 4G broadband services which provides much higher throughputs and lower latencies
  – in a recent engagement in a GCC country, Analysys Mason forecasted 5G share of all mobile connections to reach 25-30% by 2023 and account for 10-15% of the



entire ICT market

- **FWA** (fixed wireless access): provision of ultra-high-speed fixed broadband services, especially to suburban and rural dwellings with low access to fibre solutions
  – 5G FWA is expected to account for more than 20% of all fixed broadband connections by 2023 in a leading GCC country
- **IoT** (internet of things): an amalgamation of mMTC (massive machine type communication) and URLLC (ultra-reliable low-latency communication) use cases enabled by the high connection density, high throughput and low latency provided by 5G networks
  – the number of IoT connections on 5G in MENA (Middle East and North Africa region) is expected to be ~3 million by 2028 with a higher revenue per connection compared to other technologies

Commercial deployments of eMBB and 5G FWA have started rolling out globally, with countries like Saudi Arabia and UAE leading the GCC region in terms of deployments. With both these use cases being extensions of similar use cases under previous cellular technologies (MBB and LTE FWA), the next section focuses on emerging 5G IoT use cases.

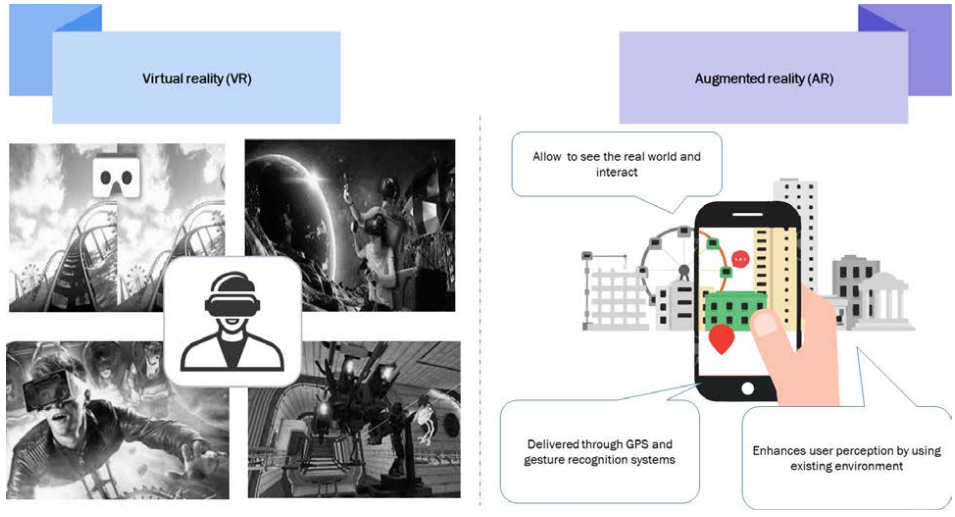
2. Emerging 5G IoT use cases

The technical capabilities specified for 5G (e.g. high throughput, low latency, positioning accuracy, devices per km2) allow for both an enhancement of current IoT use cases as well as enables creation of new ones. All industry segments are currently undergoing digitalization of their internal processes, operations and service delivery to improve productivity, enhance customer experience and address new market segments. 5G plays an important role in this transformation, not only to serve as a standardized technical connectivity protocol but also to collect and distribute operational and IoT generated data across the ecosystem.

The most ubiquitous and transformative 5G IoT use cases that have seen numerous trials globally include Augmented and Virtual Reality (AR/VR), smart driving, smart manufacturing and smart health.

2.1 Augmented Reality (AR) / Virtual Reality (VR)

VR provides an engaging user experience by creating a virtual world or simulating the real world. It makes use of sensors built into a headset to provide interactivity with the virtual world. AR is based on the real world; however, it provides a more comprehensive perception of it by overlaying additional data. Uses of these technologies include at-home virtual tourism, immersive shopping, video streaming and interactive gaming. 5G will enable AR and VR by providing high bandwidth for data heavy uses (virtual tourism and video streaming) and low latency for interactive solutions (interactive shopping and gaming).



Analysys Mason in a recent engagement forecasted the market size for AR/VR video-on-demand and gaming in a GCC country to grow at a CAGR of 35-40% between 2020 and 2028 and account for 12-18% of the overall 5G IoT market in the country by 2028.

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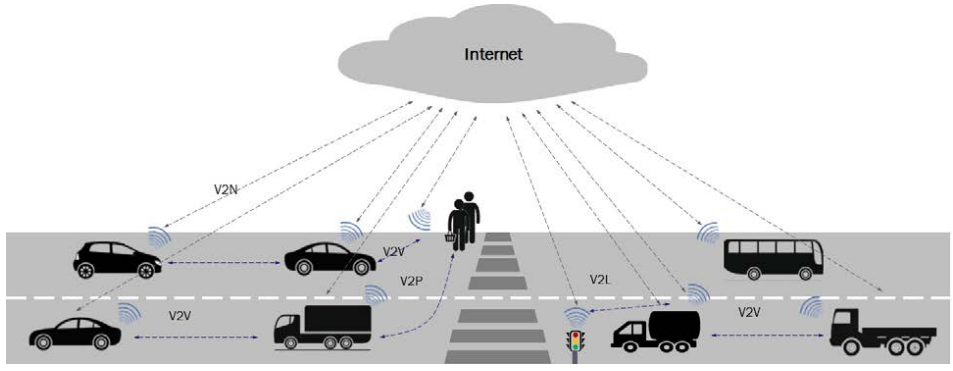
The research and development wing of the British Broadcasting Company (BBC R&D) conduct an elaborate AR and VR trial in which a historical reconstruction of a real location was aligned with, and superimposed upon, the same location in the real world. The trial used a 60GHz 5G mesh network and achieved a round-trip latency of 200ms.

2.2 Smart driving

Smart driving involves vehicles that leverage sophisticated technology to guide themselves without human intervention. These automobiles will require sophisticated



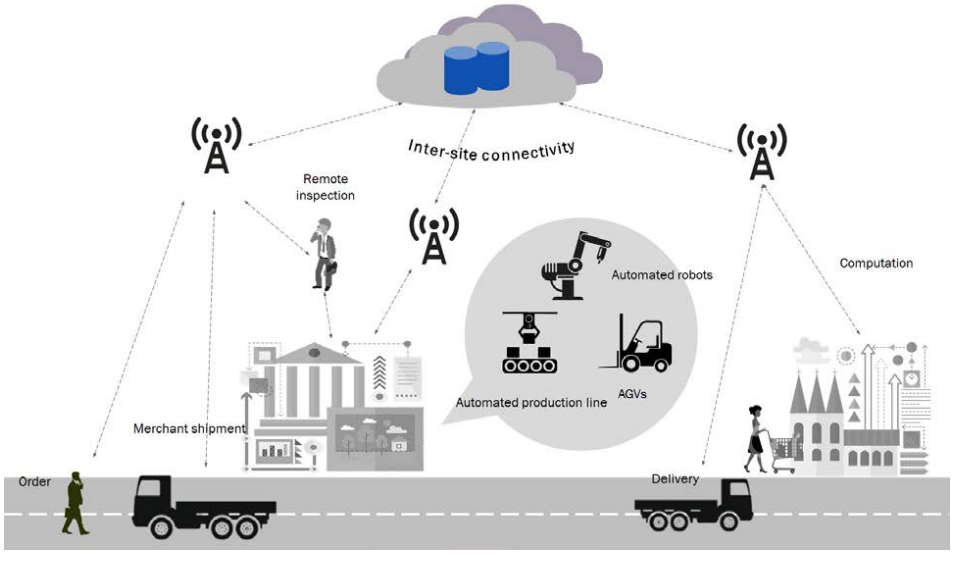
wireless telecoms capability in order to communicate with one another, with local traffic control systems, with manufacturers and with third-party service providers. 5G functionalities like network slicing and edge computing will be crucial to ensuring that all the data captured by sensors on vehicles and/or via 5G connections between vehicles and networks can be aggregated and managed reliably in real time.

Analysys Mason forecasted the market size for autonomous vehicles (only connectivity revenues) in a GCC country to grow more than 20-fold between 2023 and 2028 and account for 15-20% of the overall 5G IoT market in the country by 2028.

Telefónica conducted its first 5G demonstration in 2018 which included an autonomous vehicle as well as in-vehicle entertainment. The demonstration used an EasyMile EZ10 autonomous minibus on a 5G network using the 3.5GHz band. In-vehicle entertainment included virtual office, tourism points of interest and streaming entertainment. Several similar tests have been conducted in GCC, with UAE in particular being at the forefront of adoption. The Navya Autonom Shuttle in Masdar City, Abu Dhabi can transport 12 people at a top speed of 25km/hr. Similarly, demonstrations on the Jaguar iPace and a Mercedes have been conducted in Dubai and on the Dubai-Abu Dhabi route.

2.3 Smart manufacturing

Smart manufacturing integrates computing, networking and physical processes to improve the ways in which manufacturing businesses are run. The manufacturing industry increasingly requires flexible production methods to meet demand from a diverse and demanding customer base. 5G can transform the manufacturing processes by making them more modular and flexible through information dissemination among a wide variety of connected things (such as equipment, control systems and products). This can include process optimization, automated robots, remote operations through digital twins, etc.

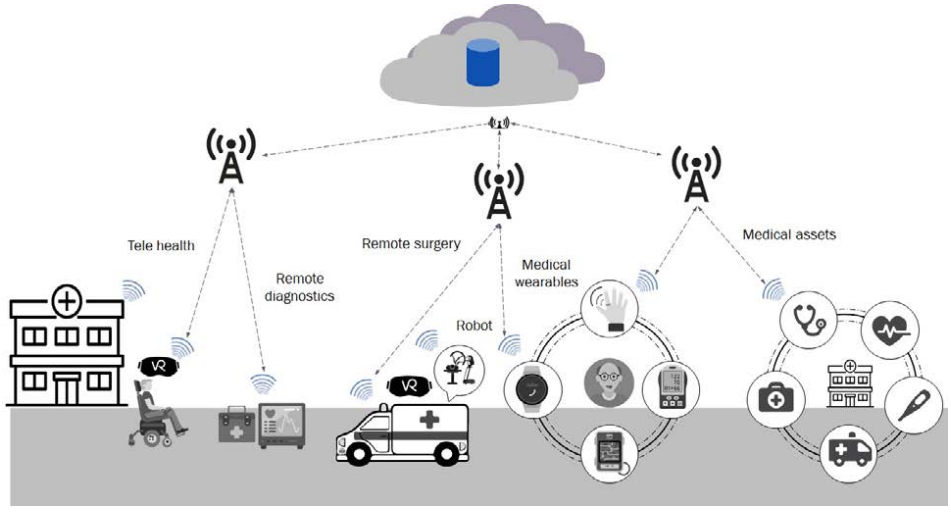


The market size for connected manufacturing (production line automation and automated guided vehicles) in a GCC country is forecasted to grow at a CAGR of 40-45% between 2023 and 2028.

Ericsson's 5G-enabled Nanjing smart factory in China is the first operational smart factory in the world. The factory uses over 1,000 cellular IoT connections and is expected to breakeven in less than two years largely driven by process optimization gains through production line automation and significant reduction in maintenance costs (50% reduction). Ericsson also has plans to set-up its first smart factory in USA in 2020.

2.4 Smart health

Wider adoption of wearables, increased decentralization and ageing populations



> *The market size for remote patient monitoring in the MENA region is forecasted to grow at a CAGR of 10-15% between 2023 and 2028 and account for 12-14% of the overall IoT market in MENA by 2028. 5G is expected to capture 20% of the market.*

have led to a significant demand for increasing efficiencies in the healthcare industry along with new digital solutions. Smart health leverages technology that leads to enhanced diagnostic tools, more efficient treatment for patients, and devices that improve the quality of life for consumers. Applications include remote diagnosis and surgery, asset management,

assisted living and wearables. 5G becomes extremely crucial for URLLC use cases within smart health such as remote surgery which can only work on extremely low latency.

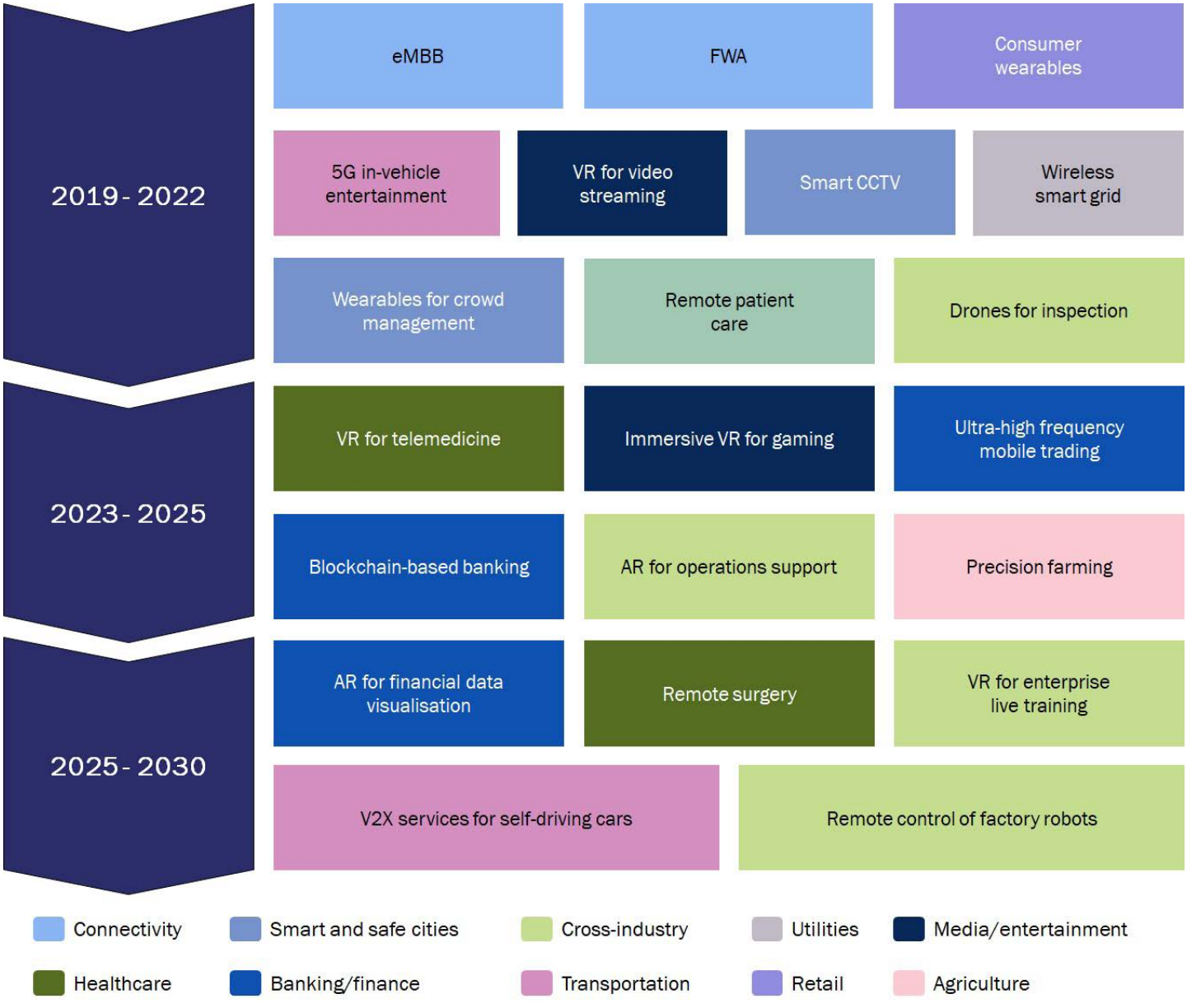
The market size for remote patient monitoring in the MENA region is forecasted to grow at a CAGR of 10-15% between 2023 and 2028 and account for 12-14% of the overall IoT market in MENA by 2028. 5G is expected to capture 20% of the market.

China's PLA General Hospital (PLAGH) collaborated with China Mobile and Huawei to perform the first-ever 5G remote brain surgery. The surgery was conducted in about three hours and the patient was located 3,000km away from the surgeon. Post the operation, the doctor mentioned, "The 5G network has solved problems like video lag and remote-control delay experienced under the 4G network, ensuring a nearly real-time operation".

3. Adoption timeline for GCC

Operators may struggle to identify the 5G use cases that may be relevant to them in the short, medium and long term. When selecting use cases to focus on, operators need to consider a range of factors such as their existing relationships, current service offerings to industry segments, the investment requirements, and the revenue opportunities presented by each use case. Considering the dominant industry sectors in the GCC, timing of availability of technologies (e.g. URLLC use cases require 5G standalone core which is not expected to be deployed before 2022) and operator relationships with customer segments, the figure below provides a potential adoption timeline for 5G use cases in the GCC.

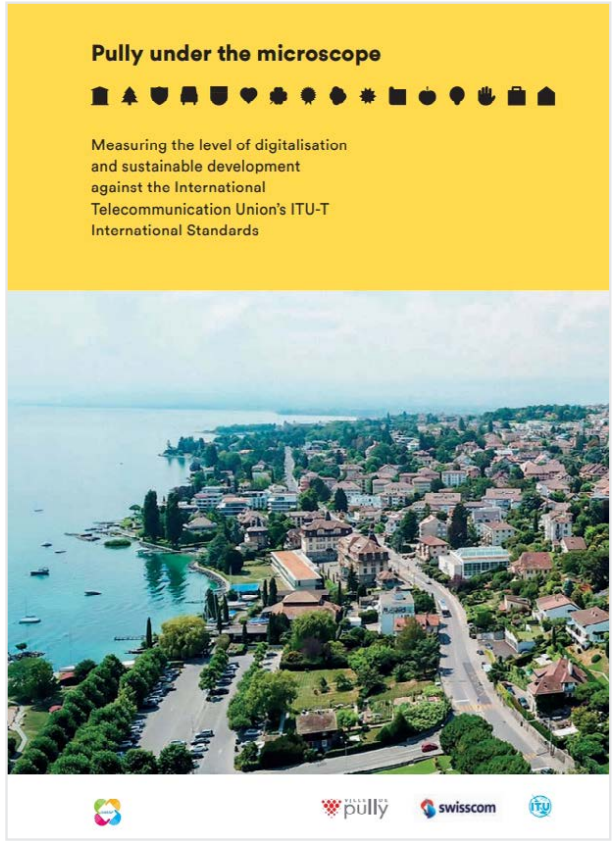
eMBB and FWA will be amongst the first use cases to be adopted (already offered in multiple countries), followed by use cases that are enhanced by 5G, but can also work on older technologies (smart grid, wearables, drones, etc.). Mission critical use cases will primarily be adopted once 5G standalone deployments begin and include URLLC use cases such as remote surgery, ultra-high frequency mobile trading and autonomous vehicles.



REGULATORY NEWS

New ITU Case Study Shines Spotlight on a 'Smart City' Journey

A new ITU case study offers an evaluation of the Key Performance Indicators for Smart Sustainable Cities developed by the United for Smart Sustainable Cities Initiative (U4SSC), an initiative supported 16 United Nations bodies. U4SSC develops practical tools to support cities' application of digital technologies to become smarter and more sustainable, with the aim of achieving SDG 11: "Make cities and human settlements inclusive, safe, resilient and sustainable". Pully, a Swiss municipality home to some 18 000 residents, has reported its experience applying the U4SSC Key Performance Indicators to help meet the objectives of its 'smart city' strategy. Human, friendly, efficient and practical – these are the values at the core of Pully's strategy. Practical innovation is Pully's priority, as it sees technology as a means to strengthen relationships between citizens and help them lead simpler, happier lives. "I would like to commend Pully for its will to share its experience with other cities around the world," said ITU Secretary-General Houlin Zhao. "This Pully case study follows similar case studies of Dubai, Singapore and Moscow, offering a strong reminder that no two cities are the same. Learning from diverse experiences will be essential to the achievement of the smart city vision." The case study – "Pully under the microscope" – was developed in collaboration by the City of Pully, Swisscom and ITU. The case study reports Pully's self-evaluation of its urban operations, contributing to an international effort to refine the U4SSC Key Performance Indicators based on cities' experiences with their implementation. "This case study is the culmination of the huge task of collecting a whole range of data from the city's various areas of action," says the Mayor of Pully, Gil Reichen. "But I would like to emphasize in particular the remarkable summarization and formatting of the report, which was done in order to make it as accessible as possible to the greatest number of people." The collaboration encouraged by U4SSC has led more than 100 cities worldwide to evaluate their efficiency and sustainability using the U4SSC Key Performance Indicators. The indicators enable city planners to assess how information and communication technologies (ICTs) have improved economic, environmental and social aspects of their cities, according to the parameters set out by the 2030 Agenda for Sustainable Development. The body of empirical knowledge being amassed by U4SSC offers valuable support to the international standardization work of ITU-T Study Group 20 (Internet of Things and Smart Cities and Communities). ITU-T Study Group 20 develops international standards for Internet of Things (IoT) technologies and applications. One of its top priorities is to leverage IoT technologies to address urban development challenges. The U4SSC Key Performance Indicators are based on the ITU international standard, ITU Y.4903/L.1603 "Key Performance Indicators for Smart Sustainable Cities to assess the achievement of Sustainable Development Goals".



Ofcom Consults on New Regulations for Short Range Wireless Devices

Ofcom UK published proposals for new regulations regarding the use of certain short range wireless devices. Short range devices include baby monitors, keyless entry cards, alarms and some Wi-Fi systems, which all rely on spectrum. We are consulting on making new regulations regarding the frequencies and technical requirements for using these devices in the 874 to 876 and 915 to 921 MHz spectrum bands. This implements a European Commission decision to harmonize these bands for short range devices. We are also consulting on revoking an existing license exemption for railway level-crossing radar sensor systems. These systems are used by Network Rail to monitor railway intersections and detect obstacles that may cause damage to moving trains. We are proposing to introduce a national license for these systems, which will allow them to be used in more locations across the rail network.

FCC Drives 5.9 GHz Proposal for C-V2X, Wi-Fi Use Forward

The Federal Communications Commission (FCC) voted unanimously to advance a proposal that would reallocate large portions of the 5.9 GHz band, dedicating spectrum to both unlicensed and C-V2X technologies. For two decades, 75 MHz of the 5.9 GHz band has been designated to dedicated short range communications (DSRC), but the agency is looking to revise rules, noting progress on DSRC has been stalled for many years. The Notice of Proposed Rulemaking (NPRM) would make the lower 45 MHz (5.85-5.895 GHz) available for unlicensed use, which Chairman Ajit Pai said will "fully realize Wi-Fi's potential." Digital refunds bring the chance to lower costs, eliminate your administrative burden, and even drive customer winback. The Wirecard Refunds Report reveals how to transform refunds from an afterthought to a competitive advantage. Under the NPRM, the upper 30 MHz (5.895-5.925) of the 5.9 GHz band would be kept exclusive for transportation and vehicle safety, notably with 20 MHz of that (5.905-5.925) dedicated specifically for newer Cellular Vehicle to Everything (C-V2X) technologies that have been championed by the likes of Qualcomm. The agency will seek comment on whether to allocate the remaining upper 10 MHz to C-V2X or leave it for DSRC. The FCC said slow traction on DSRC prompted the need for changes and that under current commission rules no spectrum is allocated for C-V2X. Commissioner Jessica Rosenworcel was strongly in favor of the proposal and said technologies for communication between vehicles have moved beyond DSCR, noting only a few thousand vehicles have DSRC on board, compared to more than 250 million cars on the road. Changes to the 5.9 GHz band have faced opposition from some, including the U.S. Department of Transportation, which wanted the entire 75 MHz to remain exclusive for transportation safety. Pai said the proposal balances both unlicensed wireless innovation and auto safety technology. In terms of the lower 45 MHz, Commissioner Brendan Carr noted the 5.9 GHz portion open for Wi-Fi could be combined with similar adjacent spectrum in the 5 GHz band, together enabling the first contiguous 160 MHz channel for unlicensed devices. He also pointed to 5G and the need for more unlicensed spectrum. "To stimulate the services, devices, and ultimately the networks that make 5G meaningful to everyday Americans, we must have a 5G ecosystem that works everywhere Americans are," Carr said. "5G services must work just as well at home and in the car, at a coffee shop or in a park. And that means we will need a lot of unlicensed spectrum to help power 5G devices." Rosenworcel noted that 70% of 5G traffic is expected to be offloaded onto Wi-Fi, and said the proposal will help development of next-generation gigabit Wi-Fi. Movement on the 5.9 GHz band is seen as a win for the Wi-Fi industry, auto-makers like Ford, and others, with many, including cable operators Charter and Comcast, applauding the move. "The strong bipartisan support for this item speaks volumes about the importance of this proceeding. The Commission's compromise proposal is a major step toward delivering next-generation broadband connectivity and strengthening the foundation for 5G, while clearing the path for modern automotive-safety technologies," said Tony Werner, president, TPX – Technology, Product, Xperience of Comcast Cable, in a statement. Ford, which has been one of the biggest proponents of C-V2X over DSRC, previously touted changes to 5.9 GHz, saying: "Without this proceeding, C-V2X cannot be deployed." Qualcomm has been working on C-V2X with Ford, and Dean Brenner, Qualcomm's SVP of Spectrum Strategy & Technology Policy, also cheered the move. "Qualcomm is very pleased that the FCC approved moving forward with the proposal to allocate the upper 20 MHz of 5.9 GHz for C-V2X, as the 5G Auto Association proposed last year," said Brenner in a statement. "This visionary FCC proposal will enable us to bring the tremendous, unmatched safety benefits from C-V2X to U.S. drivers, passengers, and pedestrians. We will continue to work with the FCC and all other stakeholders to get C-V2X on the air as quickly and broadly as possible." WifiForward in a statement called the vote "win-win" for both broadband innovation and safety communications. "Wi-Fi already carries the majority of all internet traffic, and this NPRM helps ensure that enough spectrum is available as Wi-Fi carries even more traffic during the 5G rollout," said WifiForward in a statement. The Wi-Fi Alliance said it was an important step toward addressing the growing need for unlicensed spectrum for Wi-Fi use, adding: "We look forward to reviewing this 5.9 GHz Band proposal in detail, and continuing to support the Commission in this and other initiatives that will deliver necessary mid-band spectrum to preserve Wi-Fi connectivity for millions of Americans." Michael Calabrese, director of the Wireless Future Project at New America's Open Technology Institute, in a statement said that expanding unlicensed use is essential part of a robust 5G ecosystem. "Wi-Fi already generates hundreds of billions of dollars for the U.S. economy each year as it's become the primary way that consumers and business access data on mobile devices," said Calabrese. "High-capacity Wi-Fi is also increasingly essential to schools, libraries and other community anchor institutions." At its December 12 open meeting, the FCC also voted unanimously to designate 988 as the three-digit number for national suicide prevention and mental health crisis hotline, echoing the familiar 911 number that's known for emergencies. The agency also proposed changes to the 3.1-3.55 GHz band, as what it called a first step in making spectrum in the band available for advanced commercial services, including 5G.

TRAI Considers Call for Minimum Pricing

India's telecoms regulator initiated a public consultation to explore tariff revisions, seeking views on setting a price floor for voice and data in what would be the first move by the government to impose a minimum price in any industry. The move by the Telecom Regulatory Authority of India (TRAI), which issued a consultation paper on the topic of tariffs, comes after the three major operators raised prices earlier this month following a Supreme Court ruling over the definition of adjusted gross revenue. In a statement, TRAI said the Cellular Operators Association of India asked it to set a floor price in early December. The regulator said it had given operators the "freedom and flexibility to design their tariff offerings", explaining most economists advice against price controls "as it leads to economic inefficiencies, consumer harm, market distortions and reduced innovation". It noted, however, the fast pace of technological change requires huge capital investments: "The telecoms sector is the infrastructure provider for many other sectors of the economy. Thus, making sure that the telecoms sector remains healthy and its orderly growth are equally important." Given India's digital ambitions, operators' desire for what they see as more sustainable price levels will likely see strong opposition from the government due to concern hikes would hurt consumers. Vodafone Idea and Bharti Airtel slammed a court decision taken in October, which burdens the industry with INR933 billion ($13.1 billion) in additional license and spectrum usage fees. In early December, Vodafone Idea chairman Kumar Mangalam Birla warned it would shut down if it doesn't get government relief from large fees.

Internet Service Providers Seek 5G License in Bangladesh

The Internet Service Providers Association Bangladesh (ISPAB) is seeking fifth-generation license to provide low-cost service to users as the government plans to introduce the superfast cellular network technology within two years. The association has sent a letter to the Bangladesh Telecommunication Regulatory Commission (BTRC) and asked it to consider their application as a special case and put an option in the licensing guideline for them. "We have shared our proposals with the guideline formulation committee of the commission and requested it to ensure a place for us," MA Hakim, president of the ISPAB, told The Daily Star on Wednesday. 5G is the fifth-generation of mobile internet connectivity. It promises much faster data download and upload speeds, wider coverage and more stable connections. The association also plans to establish a few hundred base stations within their existing network topology. Internet service providers have huge opportunity to play in this industry as 5G is designed to create special benefit to businesses and industries, Hakim said. According to the ISPAB's plan, they wouldn't seek the mobility; rather they will offer the service as a fixed player through broadband connectivity and users also can use it through Wi-Fi. A member of the 5G guideline formulation committee of the commission said they are considering the proposal of the ISPAB as a priority as they are local entrepreneurs. However, the final decision will come from the government. Hakim said 5G would require huge investment and one or two ISPs would not be able to make the investment single-handedly. Members of the ISPAB will form a consortium and plan to run the business across the country. "If we get the license, our 5G business will be viable," Hakim said. If the association is awarded the license, the mass people will get the service easily and at lower cost. They will also ensure the redundancy to critical services and infrastructures as well, according to the association's letter. According to Hakim, the government should fix a special spectrum band at a cheaper price in order to offer low-cost services. "If we get the license, it will create huge business scope for mobile phone operators and there will not be any conflict with them," Hakim said. BTRC Chairman Md. Jahurul Haque said if the technical evaluation committee thinks that ISPABs can run the service efficiently, the commission would have no problem in awarding the license to them. The guideline will be ready by the first quarter of 2020 and the commission will allocate the licenses to mobile phone operators by the fourth quarter, said a senior official of the regulator and also a member of the committee. According to the draft guideline, the BTRC plans to roll out 5G service by 2021 and cover the entire country (up to upazila level, growth centers and railway stations) by 2026.The BTRC team is considering to introduce 5G in 2.6 and 3.5 Gigahertz band spectrums. In July last year, the government tested 5G, becoming the first country to do so in South Asia. Haque said in the 5G era, machines would communicate with machines and people would be behind them. The use of artificial intelligence (AI) has already started in Bangladesh and 5G will help run AI, Internet of Things and robotics easily to boost productivity. The government introduced 4G in 2018 and 3G in 2013. Currently, there are about six crore 3G users and about two and half crore 4G users in the country. The ISPAB has applied for a nationwide telecommunication transmission network license to provide fiber optic cable connection to telecom operators. The BTRC has assessed the proposal.

ITU Marks 70 Years of Television Standards Work

World Television Day, marked globally on 21 November, recognizes the medium as a major source of news, information, education and entertainment. As television broadcasting increases its footprint globally, streaming onto multiple portable devices, TV has become an integral part of life, accounting for 80 per cent of all consumer Internet traffic. ITU, since it first released technical standards for television 70 years ago in 1949, has developed the globally harmonized standards that have progressively enhanced television viewing experience in terms of both visual and audio quality. From early standards for colour TV to developing parameters for 4:3 and widescreen 16:9 aspect ratio television, ITU has championed the switch to digital TV broadcasting and High Definition Television (HDTV), enabling more services, better picture quality and improved coverage owing to an increase in transmitted bandwidth capacity. Building further on the superior colour fidelity of ITU's Ultra-High Definition Television (UHDTV), ITU introduced High Dynamic Range Television (HDR-TV) bringing increased realism to images. As 5G services complying with ITU's IMT-2020 spectrum allocations and standards (currently being addressed by the ITU World Radiocommunication Conference in Sharm El-Sheikh, Egypt) are progressively rolled out over the coming years, the convergence of traditional broadcasting and Internet services could lead to the further merging of media content, data, and applications using broadband networks delivered over a combination of terrestrial, satellite and Internet platforms. These "Global Platforms" may one day facilitate delivery of content to end-users on a wide range of devices and receiving platforms, using both broadcasting and non-broadcasting technologies. ITU and United Nations Television (UNTV) recently interviewed David Wood of the European Broadcasting Union (EBU) for insights into new trends and directions on the future of TV broadcasting. "Television plays a crucial role in connecting the world to information and knowledge while providing an unsurpassed channel for mass entertainment," said ITU Secretary-General Houlin Zhao. "World TV Day brings attention to ITU's exemplary work in producing the standards that are driving future trends in broadcasting and Internet services that will bring an increasingly immersive experience to viewers around the world." "More than ever, television today provides information, news and entertainment to people wherever they may be," said Mr Mario Maniewicz, Director of the ITU Radiocommunication Bureau. "World TV Day focuses on the work of ITU over the last 70 years in developing new standards and systems for broadcasting, bringing them in line with the latest cutting edge technologies designed to make high quality television coverage available in affordable ways to people in the remotest areas of the world." In 2012, ITU received the Emmy Award from the US National Academy of Television Arts & Sciences for the "Standardization of Loudness Metering for Use in Broadcast Audio" to balance the loudness within and between broadcast programs. ITU's standards for video coding in collaboration with ISO and IEC also received two Primetime Emmy Awards from the Academy of Television Arts & Sciences, the first in 2008 for ITU H.264 | MPEG-4 Advanced Video Coding (AVC) and the second in 2017 for High Efficiency Video Coding (HEVC, published as ITU H.265 | ISO/IEC 23008-2). The Versatile Video Coding (VVC) project, on course for completion by mid-2020, will provide a significant improvement in compression performance over HEVC. The recently concluded ITU World Radiocommunication Assembly (22-25 October 2019) called for a roadmap on broadcasting concerning audio visual quality assessment and accessibility, audio and video coding, integrated broadcast-broadband, multimedia, and other emerging technologies and applications. The Assembly also sought to promote accessibility for persons with disabilities and specific needs. Subtitles and audio channels describing action in the image, assist the visually impaired while the ability to separate foreground and background sound allows audio to be more intelligible to those with hearing disabilities. ITU has assisted a number of developing countries in transitioning from analogue broadcasting to far more efficient digital broadcasting, enabling people in remotest areas to take advantage of the benefits from digital broadcast technology. The ITU World Radiocommunication Conference in Sharm El-Sheikh, currently in session from 28 October until 22 November, is addressing requirements for some of the leading edge technological innovations. These include identifying additional frequency bands for International Mobile Telecommunications (IMT), further enabling the rollout of IMT-2020 networks, as well as for High-Altitude Platform Stations (HAPS) – aircraft positioned in the stratosphere for very-long-duration flights used for telecommunications, new non-geostationary satellite systems composed of multiple, multi-satellite constellations, and earth stations in motion (ESIM) communicating from aircraft, maritime vessels and land vehicles with satellites in the geostationary orbit (GSO) using Ka bands.

FCC Looks to Dedicate 5.9 GHz for Wi-Fi, C-V2X Use

In a somewhat controversial move at odds with the wishes of the U.S. Department of Transportation, FCC Chairman Ajit Pai on Wednesday proposed dedicating respective portions of the 5.9 GHz band for unlicensed device use and C-V2X technologies. Since 1999, the 75 megahertz of spectrum in the 5.9 GHz band has been allocated exclusively for Dedicated Short-Range Communications (DSRC) systems for transportation safety and vehicle communications, but Pai said (PDF) Wednesday that the technology, slow moving to evolve and not widely deployed, is best described as "promise unfulfilled." Specifically, the Notice of Proposed Rulemaking would repurpose the lower 45 megahertz (5.85-5.895 GHz) for unlicensed operations such as Wi-Fi, which Pai said is ideally suited to meet exploding Wi-Fi demands because of its location next to 5.725-5.850 GHz band that's already allocated for unlicensed use. The NPRM would also revise rules for the upper 20 MHz portion (5.905-5.925 GHz) of the 5.9 GHz band to authorize Cellular Vehicle to Everything (C-V2X) technologies that are supported by the automobile industry. For the remaining 10 MHz, the FCC would seek comment on whether to retain the current designation for DSRC systems or allocate it to C-V2X technologies. In May the FCC decided to take a fresh look at the 5.9 GHz band, but the new proposal is a departure from the agency's efforts and testing to evaluate possible sharing between unlicensed devices and DSRC systems on the same spectrum. "Preliminary testing of a sharing regime showed some promise, but further testing would be needed to carry out a complex sharing regime, and more testing would mean this valuable spectrum would likely lie fallow for several years," said Pai during remarks at the National Union Building.

The U.S. Department of Transportation, however, still believes the full 75 MHz of the 5.9 GHz band needs to remain dedicated for vehicle safety communications. A DoT spokesperson provided the following statement with regard to Pai's new proposal: "The Department of Transportation has clearly stated in testimony and correspondence that the 75 MHz allocated in the 5.9 GHz, what we call the "Safety Band," must be preserved for transportation safety purposes. The Department's multimodal guidance document, Preparing for the Future of Transportation: Automated Vehicles 3.0 (AV 3.0) clearly foresees the need for protecting this spectrum allocation to enable the future of safe, highly automated surface transportation. This continues to be the Department's position on the 5.9 GHz band. We look forward to working with the FCC, the National Telecommunications and Information Administration (NTIA), and over 30 Federal partner agencies to deploy solutions that enable breakthrough safety on America's roadways." Companies like Qualcomm have been developing C-V2X technologies and supported earlier waiver requests by the 5G Automotive Association (5GAA), as did Nokia and Samsung, for permission to deploy the technology in the upper portions of the band currently designated to DSRC. Dean Brenner, senior vice president of spectrum strategy and technology at Qualcomm praised the latest move on 5.9 GHz. "Qualcomm is very pleased that FCC Chairman Pai is proposing to allocate the upper 20 MHz of 5.9 GHz for C-V2X, as the 5G Auto Association proposed last year," said Brenner in a statement. "This visionary FCC proposal will enable us to bring the tremendous, unmatched safety benefits from C-V2X to US drivers, passengers, and pedestrians. We look forward to working with the FCC and all other stakeholders to get C-V2X on the air as quickly and broadly as possible." The FCC is hoping the new proposal will balance desires of public agencies like the DoT with industry interests such as automotive companies supporting C-V2X technologies including Ford, Audi, BMW, Daimler and Tesla. It should be noted that C-V2X is not compatible with DSRC, according to Pai, who said he's chosen to change course and prioritize C-V2X instead in the hopes "that this move will unlock new vehicle safety services, using less spectrum and on a much faster timeline than we have seen or realistically could see with a DSRC-focused policy."

Portuguese Cellcos Intensify Dense Air Spectrum Complaints

The long-running dispute over sought-after 5G-suitable frequencies in Portugal continues to rumble on, with Vodafone Portugal and Nos registering legal complaints about the National Communications Authority (Autoridade Nacional de Comunicacoes, ANACOM) and its position regarding spectrum held by small cell wholesale provider Dense Air Portugal. Helena Feria, Vodafone Portugal's Director of Legal and Regulatory Affairs, told local media outlets: 'Dense Air is not in the market. It has no revenues and no business, and that is more than enough reason for ANACOM to remove the spectrum.' PT Portugal (MEO) officials, meanwhile, have called for resignations over the regulator's delay in staging a 5G auction. As previously reported by TeleGeography's CommsUpdate, in October 2019 ANACOM approved a draft decision relating to the reconfiguration and relocation of the 3.4GHz-3.8GHz spectrum held by Dense Air. The watchdog said that the change 'will contribute to the overall spectral efficiency of the 5G national market' adding that Dense Air had acknowledged that the change did not make its commercial operation unfeasible. The 15-year concessions currently held by Dense Air Portugal run from August 2010 until August 2025 and were previously held by Broadband Portugal, which is understood to have its roots in WiMAX licensees Bravesensor and ZAPPWIMAX.

New ITU Data Reveal Growing Internet Uptake but a Widening Digital Gender Divide

New data released by ITU reveal that in most countries worldwide women are still trailing men in benefiting from the transformational power of digital technologies. Measuring digital development: Facts and figures 2019, the first publication in ITU's new Measuring digital development series, estimates that over half the total global female population (52 per cent) is still not using the Internet, compared to 42 per cent of all men. Overall, the proportion of all women using the Internet globally is 48 per cent, against 58 per cent of all men. More men than women use the Internet in every region of the world except the Americas, which has near-parity. ITU data show that while the digital gender gap has been shrinking in the Commonwealth of Independent States and Europe, it is growing in Africa*, the Arab States and the Asia-Pacific region. It is widest in developing countries, especially Least Developed Countries. "ITU's Measuring digital development reports are a powerful tool to better understand connectivity issues, including the growing digital gender divide, at a time when over half of the world's population is using the Internet," said Houlin Zhao, ITU Secretary General. "ITU statistics help policy-makers and regulators make informed policy decisions to connect the unconnected and track progress at the global level."

Mobile networks – and the mobile phone gender gap

ITU data show that 97 per cent of the world population now lives within reach of a mobile cellular signal and 93 per cent within reach of a 3G (or higher) network. In the Americas, the Asia-Pacific region and Europe, over 95 per cent of the population is covered by a 3G or higher mobile broadband network. In the Arab States the figure stands at 91 per cent; the Commonwealth of Independent States, 88 per cent; and Africa, 79 per cent. Of the 85 countries that provided data on mobile phone ownership, 61 have a higher proportion of men with mobile phones than women. Of the 24 remaining countries where there is gender parity in mobile phone ownership, or where more women have mobile phones than men, Chile has the highest digital gender gap in favor of women at 12 per cent. ITU data confirm a correlation between the mobile phone ownership gender gap and the Internet gender gap: countries where the mobile phone ownership gender gap is large also have a high number of women not using the Internet. Given that mobile phones are the most-often used means of accessing the Internet, addressing the issue of women's mobile phone ownership could help reduce the Internet gender divide.

3.6 billion People still offline

ITU data confirm that Internet use continues to grow globally, with 4.1 billion people now using the Internet, or 53.6% of the global population. However, an estimated 3.6 billion people remain offline, with the majority of the unconnected living in the Least Developed Countries where an average of just two out of every ten people are online. "Connecting the 3.6 billion people still offline to the power of digital technologies must become one of our most urgent development priorities," said Doreen Bogdan-Martin, Director of ITU's Telecommunication Development Bureau. "Multi-stakeholder collaboration will be key to making universal and meaningful connectivity a reality for all. It will require targeted efforts to lower the cost of broadband and innovative policies to finance network rollout to unconnected populations." Internet use in developed countries is nearing saturation levels, with close to 87 per cent of individuals online. Europe is the region with the highest Internet use (82.5 per cent), while Africa is the region with the lowest (28.2 per cent). By the end of 2019,

ITU estimates that 57 per cent of households globally will have Internet access at home. However, the number of households with a computer at home is only expected to rise by about one percentage point - to 49.7 per cent - between 2018 and 2019. Slowing growth in domestic computer ownership is accounted for by the fact that in many countries computers are no longer needed for home Internet access, with people simply connecting over smart phones.

Barriers to Internet use

Affordability and lack of digital skills remain some of the key barriers to the uptake and effective use of the Internet, especially in the world's Least Developed Countries. In 40 out of 84 countries for which data are available, less than half the population has basic computer skills, such as copying a file or sending an e-mail with an attachment. Although more data are needed, initial findings indicate a strong and pressing need for governments to focus on measures to develop digital skills, particularly in the developing world. "Even where connectivity exists, we need to be more creative in addressing critical issues like affordability of service, cost of handsets, and lack of digital skills and literacy to enable more people – and especially women – to participate and flourish in the digital economy," says Ms. Bogdan-Martin.

EU Countries Fail to Agree on Privacy Rules Governing WhatsApp, Skype

EU efforts to create a level playing field between telecoms operators and Facebook's WhatsApp and Microsoft unit Skype stalled on Friday (22 November) after member countries failed to agree on the scope of proposed rules. The European Commission kicked off the process two years ago with its proposal for an ePrivacy regulation which would ensure that tech companies offering online messaging and email services would be subjected to the same tough rules as telecoms providers. Disagreements between EU countries on complex issues such as rules for cookies tracking users' online activities, provisions on detecting and deleting child pornography and consent requirements however have stymied the process. EU countries need to come up with a stance before they start talks to thrash out a common position with the Commission and European Parliament. EU ambassadors meeting in Brussels on Friday again reached an impasse, EU officials said. Tech companies and some EU countries have criticized the ePrivacy proposal for being too restrictive, putting them at loggerheads with privacy activists who back the plan. "By first watering down the text and now halting the ePrivacy Regulation, the (European) Council takes a stance to protect the interests of online tracking advertisers and to ensure the dominance of big tech," said Diego Naranjo at digital civil rights group European Digital Rights (EDRi). It is not clear what the next step will be. Croatia, which takes over the EU Presidency January 1, may seek to resume the negotiations.

Operators Call for European Digital Plan

The chief executives of the largest operator groups in the European Union called for a consistent digital industrial policy alongside measures to reduce the cost of deploying fixed and mobile networks. A statement published by the European Telecommunications Network Operators' Association (ETNO) and signed by the executives, outlined four focus areas to ensure optimal use of digital communications networks to drive industrial and societal change. The executives called for a strategy backed by politicians, industrial leaders and other organizations within the economic bloc. Measures proposed include a united industrial policy to help the region's businesses compete on the global stage; measures enabling "European innovation" in data for IoT and AI; rules to lower the cost of deploing network infrastructure; and moves to address fragmentation in the telecommunications market. The group said its aims would help meet wider goals outlined by new European Commission president Ursula von der Leyen in a speech outlining the priorities for her premiership last week (27 November). She formally took the role on 1 December. CEOs backing the document include Timotheus Hottges (Deutsche Telekom); Nick Read (Vodafone Group); Stephane Richard (Orange); Jose Maria Alvarez Pallete (Telefonica); and Sigve Brekke (Telenor).

FCC Mulls Use of 3.1GHz-3.55GHz, 5.9GHz Bands

The US Federal Communications Commission (FCC) has revealed that it is exploring potential use cases for spectrum in the 3.1GHz-3.55GHz and 5.9GHz bands. Setting out the regulator's position regarding the 3.1GHz-3.55GHz band, FCC Chairman Ajit Pai commented: 'Today's proposal would enable continued use of the spectrum by the Department of Defense, while creating a glidepath for this critical mid-band spectrum to be freed up for 5G. Clearing the upper 250MHz of the band of existing non-federal operations would build upon the Commission's ongoing work to enable commercial use of spectrum in nearby bands, including the 3.55GHz-3.7GHz band and the 3.7GHz-4.2GHz band, commonly called the C-band. Together, these three bands would make a massive amount of prime mid-band spectrum – as much as 680MHz – available for new fixed and mobile wireless services.' Regarding the 5.9GHz band, meanwhile, Pai noted: 'Exactly 20 years ago, the Commission allocated 75MHz of spectrum in the 5.9GHz band for a technology called Dedicated Short-Range Communications, or DSRC. DSRC was designed to facilitate motor vehicle-related communications. But unfortunately, it's never been widely deployed … We're proposing to designate the lower 45MHz of the 5.9GHz band exclusively for unlicensed uses like Wi-Fi … Another part of our proposal advances the cause of automotive safety. Specifically, we're proposing to reserve the remaining 30MHz of spectrum in the 5.9GHz band exclusively for transportation-related communications technologies [notably Cellular Vehicle to Everything, or C-V2X].'

ARTICLE

The Role of 5G in Enabling Smart Cities

> *Smart cities will typically have a large number of installed sensors and devices with a high density. And 5G will deliver the mass connectivity to enable the deployment of millions of these devices, such as sensors required for a smart city to collate crucial data from different utility systems as well as support the connection density and capacity density required.*

Pradeep Bhardwaj
Senior Strategy Director and Head of Industry Standards
Syniverse

Syniverse

It seems that 5G rollout gets bigger and faster each day. This once-in-a-decade upgrade will leap ahead of current wireless technology, 4G, by enabling mobile internet speeds that will pave the way for a new generation of highly reliable, real-time, automated services like the internet of things and smart cities.

But there continue to be a number of questions and unknowns about how 5G will actually work. As a 5G specialist who's been right in the thick of the development of this new technology standard, I get asked a lot of the same questions about the new services that 5G will bring, and how everyone from mobile operators, to nontechnology companies, to consumers will begin to make use of 5G. In this article, I'd like to share a few of these answers as they specifically relate to smart cities.

How do you see 5G changing the way that smart cities evolve?
Smart cities have already started to become a reality to some extent, because when we say "smart," we mean data-driven, interconnected and intelligent. It implies collection of data from installed sensors, analysis of a vast amount of data, simulation of data in virtual environments, and then application of the results into real-world assets to optimize performance of these assets. The more data we have to analyze, the more accurate our insight is, and the better our ability is to make our cities run more efficiently. Although we've started to make our cities smart by implementing, for example, automated traffic systems to improve traffic flow, or cameras and analytics to increase efficiency, it's the arrival of 5G that will allow us to take these to the next level. 5G will become the unifying technology fabric that enables connectivity for these sensor devices.

Smart cities will typically have a large number of installed sensors and devices with a high density. And 5G will deliver the mass connectivity to enable the deployment of millions of these devices, such as sensors required for a smart city to collate crucial data from different utility systems as well as support the connection density and capacity density required. Moreover, the IoT sensor devices in a smart city environment will have many diverse requirements in terms of throughput, latency, reliability and mobility. 5G will provide faster, more reliable, and lower-latency networking connectivity required for many advanced use cases for IoT, especially in the URLLC and massive IoT categories. Ultimately, this next-generation technology standard will serve as the basis for effective deployment of small-cell networks that can power an extensively interconnected wireless infrastructure needed for a smart city.

> *5G will provide faster, more reliable, and lower-latency networking connectivity required for many advanced use cases for IoT, especially in the URLLC and massive IoT categories.*

How will 5G change a city's cybersecurity positioning?

Implementing high-speed, low-latency 5G networks will add a new layer of connectivity, but also a new layer of complexity, because it will increase the numbers of devices that will need to be connected and communicate with each other. When critical assets and infrastructure services deployed in smart cities rely on 5G networks, they must be safeguarded under all situations at all costs – the stakes couldn't be higher. While 5G technology is secured by design and has several enhanced mechanisms and capabilities for security, these must be carefully managed, especially in a hybrid environment. With the adoption of 5G technology by a multitude of industries, the attack surface increases multifold, despite that fact that 5G is much more secure, and the risks are much higher as a result.

> *While 5G technology is secured by design and has several enhanced mechanisms and capabilities for security, these must be carefully managed, especially in a hybrid environment*

Whether it's a smart city that uses connected cameras and intelligent sensors to improve traffic flows, or smart homes that proactively alert owners of impending problems, every new connected device adds to the number of entries in a network that can easily turn into a cybersecurity threat if not managed properly. These threats have different origins, from more advanced attacks from educated cybercriminals, to more simple cases of human error. Generally, today's rising cyberattack incidents are strongly connected to the public internet's open access. A vast amount of highly sensitive data is channeled through weak networks and clouds that were not designed to protect data from such sophisticated threats. That's why there is a growing need for private networks that are isolated from the public internet and can identify and manage elements and assets in their environments in a secure way.

What are some challenges of large-scale 5G implementation for smart cities?

The 5G opportunity brings serious challenges that mobile operators need to prepare for now, such as ensuring interoperability across earlier generations of networks as well as across multiple networks of roaming partners. Ultimately, disparate network technologies will have to be able to work together to power continuous connectivity between the IoT and other connected devices. There's also the regulation side. This includes things like how 5G will affect roaming across borders, especially in Europe, which will need to be discussed and clearly defined in the service-level agreements between providers and customers. This must also be applied to the liability regarding any problem that might arise with the implementation of this new technology in a 4G world. One of the significant challenges for the IoT industry is the heterogeneity and fragmentation of connectivity landscape, and this has hampered the IoT vision significantly. There is a strong expectation that 5G will mitigate this.

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> *One of the significant challenges for the IoT industry is the heterogeneity and fragmentation of connectivity landscape, and this has hampered the IoT vision significantly. There is a strong expectation that 5G will mitigate this.*

A SNAPSHOT OF REGULATORY ACTIVITIES IN SAMENA REGION

Bahrain

The Telecommunications Regulatory Authority (TRA) has launched the Cyber Safety Award, which aims to encourage community and educational institutions in the Kingdom of Bahrain to create awareness in the field of cyber safety. The award is launched in an event held in TRA's headquarters and is attended by representatives from various schools in Bahrain. During the event, TRA discussed the results of the study it recently conducted under the SafeSurf initiative in cooperation with Dr. Nancy Willard, an expert on cyberbullying challenges and threats. It was found that youths using the Internet for more than three hours a day leads to the possible emergence of negative or dangerous behaviors and exposure to cyber bullying, causing them psychological disorder and behavioral changes such as depression and a sense of helplessness as well as absence from school and physical violence in some . "The Cyber Safety Award is presented by SafeSurf to allow young people and adults in the Kingdom of Bahrain to create innovative awareness content in the field of cyber safety." Says TRA's Director of Consumer Affairs and Media Sh. Abdullah bin Humood Al Khalifa. "We launched this award to enact TRA's responsibility to spread awareness among the community, shedding light on the varied risks of the Internet such as cyber bullying, fraud and identity theft and many others that impacts the social, psychological and educational aspect of life." "TRA has the responsibility to promote awareness among the community and help individuals recognize and avoid the dangers of the Internet, especially those resulting from the use of social media, in addition to giving solutions to overcome and resist them." Sh. Abdulla added. The Cyber Safety Award aims to encourage students to achieve a safe cyber culture in order to raise more awareness about its impact on daily life, as well as to open the creative field for the promising talents of the Bahraini young generation and involve them in spreading awareness among the community. TRA invites those interested in participating in The Award to create a short film (no more than 120 seconds) highlighting the impact of excessive use of social media on young people and their social life. More information on the award can be found on www.safesurf.bh.

(December 22, 2019) tra.org.bh

The Information and eGovernment Authority's (iGA) Wireless Licensing, Frequency and Monitoring Directorate has provided and managed 195 radio frequencies within various bands as part of its annual support to the FIA World Endurance Championship (WEC) BAPCO 8 Hours of Bahrain race, held on 13th and 14th December at Bahrain International Circuit (BIC). iGA Deputy Chief Executive, Operations and Governance, Shaikh Salman bin Mohammed Al Khalifa said that a team of technicians, fully equipped with monitoring devices, was present at BIC to offer the required radiocommunication technical support for the sports event. The iGA also posted a mobile monitoring station at the track ahead of and during the race. A total of 195 frequencies across terrestrial and satellite wireless systems were dedicated to the event. Two complaints of harmful interference in communication networks were received, monitored, and terminated in record time. Shaikh Salman added that the directorate stands ready to provide the required technical support for international events, reflecting the Kingdom's ability to professionally oversee and organize high profile events. iGA Wireless Licensing, Frequency and Monitoring Director Engineer Hassan Mohamed Hassan said that the Kingdom is one of the most prominent hosts of international car racing events due to the capabilities of its radiocommunication operators and their experience, which stretches back to when races were first held at BIC in 2004, which qualifies them to meet the demands of this race and solve any problem that might arise. The Wireless Licensing, Frequency and Monitoring Directorate manages the radiocommunication systems of several events, most notably the Formula 1 and WEC races, and the Bahrain Air Show. (December 21, 2019) newsofbahrain.com

As Bahrain prepares for the imminent rollout of 5G, The Telecommunications Regulatory Authority (TRA), in collaboration with Ericsson, the GSMA and Huawei held a workshop for service providers, government agencies and business leaders in the Kingdom to explore the potential of 5G. "We took a big leap this year by helping establish BNET as a wholesale entity for the Kingdom's telecom infrastructure." Says Sh. Nasser Bin Mohamed Al Khalifa, Acting General Director of TRA. "This move levels the playing field and sets a gold standard that consumers can expect from all operators. We've laid the groundwork, so that network speed and quality becomes a ubiquitous feature across all licensed service providers, so that the dynamic for competition shifts focus from a basis of infrastructure to one based on innovative services. If fiber optics is the backbone of industry 4.0, then 5G is a catalyst that will allow the full potential of IoT to materialize." Adds Sh. Nasser. 5G is no simple generational leap forward in mobile technology, and the purpose of this workshop is to explore its possibilities and guide everyone towards taking it on. "In addition to supporting the TRA in establishing a comprehensive 5G strategy in Bahrain, we have announced partnerships with leading service providers such as Batelco and Zain to accelerate 5G deployment

in the Kingdom. We feel a tremendous sense of urgency to push forward on 5G and mobilize the ecosystem by collaborating with industry leaders and developers to usher in a new generation of innovation", says Wojciech Bajda, Head of Ericsson Gulf Council Countries. Across the globe, 5G use case studies find their way into every industry sector. From remote patient monitoring and consultation to remote surgery in medicine, in transportation, 5G will be the pillar that autonomous vehicles rely on – a 2017 study from Deloitte estimated that self-driving cars enabled by mobile connectivity could reduce emissions by 40 to 90%, improving travel time by 40% and reducing delays by 20%, whereas in banking, blockchain and fintech combined with 5G will have a surge of economic benefits. "Bahrain is establishing itself as a leader in 5G technology within the region, thanks to the roll-out of two 5G networks in 2019. It is important to capitalise on this early lead, especially as, according to GSMA Intelligence, subscribers within the MENA region are predicted to consume an average of 23GB of mobile data per month by 2023, up from just 2.5GB today," said Michele Zarri, Technical Director of Future Networks, GSMA. "I was delighted to be able to deliver the GSMA's 5G Advanced training course, covering topics such as 'how 5G networks can support users growing appetite for mobile data'. It was also a pleasure to take part in the lively panel discussion on the measures the TRA can take to foster the development of 5G networks and services in Bahrain." Key technologies in 5G performance goals include a high data rate, low latency, and massive machine to machine communications. John Lu Yuedong, CEO of Huawei Bahrain says, "5G development is accelerating at speeds beyond imagination, with roll-out imminent in markets across the Middle East and the world at large. At Huawei, we are continuing to collaborate with the Bahraini government and our local customers to push 5G forward and to realize the full value of the digital economy. Workshops such as this are essential platforms to experience the latest 5G applications and to pioneer innovations in the market." (November 27, 2019) tra.org.bh

The Telecommunications Regulatory Authority (TRA) was announced winner of the GCC's Best Employer Brand Award Category at the 8th Annual Asian Leadership Awards (ALA) in Dubai. Hosted since 2011, ALA distinguishes and honors leaders who have contributed and shaped the Asian economy and are visionaries behind today's outstanding businesses. ALA will showcase learnings from best practices. The Award was presented by Dr. R.L. Bhatia – The Founder of World CSR Day and Project Director World HRD Congress. Commenting on the Award, TRA Director of Finance, IT and HR, Sh. Mohamed Bin Salman Al Khalifa stated that "TRA won this award ahead of esteemed organizations from across the GCC region, based on assessments of key criteria, namely; how well an organization's HR strategy is put into action against its vision, how an organization cultivates competencies with future needs in mind, how it engaged employees and provides benefits, and equal opportunity to women leaders." "This is an honorable achievement for TRA which is continuously committed to these criteria in line with the best practices. Awards such as this, which we win ahead of high caliber organizations, are proof of TRA's progress and success as an organization." Sh. Mohammed added. The GCC's Best Employer Brand Award recognizes The Authority's efforts in using marketing communications effectively in attracting talent, retaining talent, developing talent and in retention policy. The Award key criteria are; translating and combining vision with action in conjunction with HR strategy, building a platform to engage HR strategy with business, cultivating competencies for the future to enable building the organization to-be future-ready, employee benefits and employee engagement, and last but not least is providing equal opportunities to women leaders. (November 23, 2019) tra.org.bh

The Telecommunications Regulatory Authority (TRA) was announced winning "Regulatory Initiative of the Year" in MENA region at CommsMEA's annual Awards ceremony in Dubai. The awards focus on a number of categories encompassing the ICT sector, highlighting the most prominent achievements of the Industry throughout the region. "The significance of the separation project can't be overstated." Says Shaikh Nasser Bin Mohamed Al Khalifa, Acting General Director of TRA. "It is one of the most monumental undertakings the TRA has led since inception, the impact of which will be felt by all parties for generations to come.", He added. The Separation Project, in simple terms, is where Batelco has been split into two separate entities which are independent of each other. The newly formed "B NET" is a wholesale organization managing Bahrain's Broadband infrastructure, and Batelco is one of the existing operators in the Kingdom which lease this infrastructure. This leads to the establishment of a new economic regulatory framework in line with Government's policy directions under the fourth National Telecommunications Plan. "We now have a more even playing field in terms of competition among operators." Says Shaikh Nasser Bin Mohamed, adding "Consumers & businesses will reap the rewards of this new framework, expecting operators to compete based on enhanced services. Broadband quality won't be an issue factoring into your choice as unprecedented speeds are made into a gold standard across the local telecom sector. We're confident that its work will contribute to the Kingdom of Bahrain becoming the strategic investment destination of choice and a regional Centre for information technology and digital communications." No country in the Middle East North Africa region has accomplished this yet, with only seven countries achieving this worldwide. Even so, none have successfully accomplished this task in the two years it took the Kingdom of Bahrain to see it through. Accepting the award, Shaikh Nasser concluded that "This is an affirmation of all the hard work the TRA has done in service to the Kingdom and the people. This is proof that few can achieve much, and when Bahrain sets its mind towards excellence, the world takes notice. This isn't just a win for the TRA, it's a win for consumers, for investors and for government". (November 10, 2019) tra.org.bh

Bangladesh

The total number of Bangladesh's mobile phone subscribers hit over 164 million at the end of October with addition of 7.18 million new users in the first 10 months of this year, statistics of the country's telecom regulator showed Monday. According to data from the Bangladesh Telecommunication Regulatory Commission (BTRC), the number of subscribers in the country reached 164.170 million in October. Bangladesh has now four mobile companies, three of which are foreign-backed cell phone operators. The number of subscribers of the mobile operators, Grameenphone, Robi Axiata, Banglalink and state-run Teletalk stood at 76.067 million, 48.349 million, 35.049 million and 4.706million respectively at the end of October, BTRC data showed. According to the statistics of the country's telecom regulator, the number of Bangladesh's mobile phone subscribers stood at 156.989 million at the end of December 2018.

(December 23, 2019) xinhuanet.com

The telecommunication industry's revenue will grow by 34 percent in the next five years to $5.08 billion from $3.8 billion at present, on the back of expanding user base and wide range of services, said the USAID in a new study. "The sector is quite large in size and has a crucial contribution to achieving the goal of making Bangladesh a middle-income country," said the report of the United States Agency for International Development (USAID) published recently. The industry employs about 7.60 lakh people directly, of which 92.5 percent are unskilled and 7 percent are women, the Comprehensive Private Sector Assessment report said. The job growth rate in the sector will be 9 percent from 2016 to 2020. The USAID Bangladesh has listed 16 emerging sectors in the study which could contribute a lot to the country's economic development, beyond that facilitated by the readymade garment sector. Telecommunication is one of them. "The mobile telecom service in Bangladesh is very promising as the operators are providing standard services with extensive facilities to customers," said M. Farhad, Secretary General of the Association of Mobile Telecom Operators of Bangladesh (AMTOB). The report said the country is undergoing transformation on social and economic fronts. Rapid changes have been observed in the lifestyle of the population. Connectivity has been an integral part of modern-day life, thus accelerating the growth in mobile communication and internet use. The use of social media platforms such as Facebook, WhatsApp, Viber and video-streaming sites like YouTube have become part of everyday life for all classes of people, mostly young and middle-aged groups. The use of social media is growing every day, resulting in more and more consumption of internet data. Steady population growth and increase in purchasing power will continue to drive the telecom sector growth, the report added. In 2016-17, the telecommunications sector accounted for 6.98 percent, or $29.6 billion, of the economy. The contribution of the sector is highly dominated by mobile operators with a direct impact of 58 percent, followed by distributors and retailers (25 percent), infrastructure providers (12 percent), and the handset industry, content applications and other services providers (5 percent). Shahed Alam, chief corporate and regulatory officer of Robi, said the country has made tremendous progress towards implementing the Digital Bangladesh vision by 2021. He said with Robi, mobile operators have created the platform for the digital economy to take off in the country. "As part of that we are already in the process of transforming ourselves into a digital company by diversifying our product and service portfolio through digital innovation. This transformational journey is helping us get integrated with all elements of the country's rich and varied socio-economic fabric." "Therefore, the telecom sector is becoming the key enabler for the country to achieve the targets set in the Sustainable Development Goals." The report found that the total number of smartphone users was 48 million in 2017 and it will go up by threefold to 138 million in 2025. "As the number of smartphones will grow, the mobile broadband connection will grow accordingly." The report said the telecom sector has experienced sluggish growth in the face of rapid digital disruption and an unfavorable regulatory regime. It listed the challenges facing the sector. They include rising use of communication applications which are gradually eating up the core revenue stream; higher corporate tax; higher customer acquisition price; the lowest return; and low investment for network up gradation and maintenance. It recommended supporting internet-based startups that have cross-cutting impacts on industries such as telemedicine and ridesharing as well as introducing IT-enabled working space to support entrepreneurs, freelancers, and crowdsourcing in rural areas. AMTOB's Farhad said though the market is growing rapidly, the industry is suffering a lot due to over-regulation, regulatory unpredictability, and a weak telecom ecosystem. "Super high taxation and the high price of spectrum are also impacting the industry. Given the scenario, it will be very challenging to roll out 5G service and implement Digital Bangladesh endeavour within the stipulated time." "We hope that the government and the regulator will understand the reality and take appropriate actions to overcome the challenges." Alam of Robi said the regulator's traditional command and control mindset is failing to see beyond the immediate concerns of revenue collection. "If this mindset persists, the country will only slow down its progress towards the creation of a full-fledged digital economy." The USAID report called for an initiative, in collaboration with small internet service providers, to provide last-mile services. At the end of fiscal 2017, there were 85 million unique subscribers and it will be 107 million in 2025, making Bangladesh the fifth largest mobile market in the Asia Pacific and the ninth largest market in the world in terms of unique subscribers. Active mobile connections will reach 190 million at the end of 2025 and the number of 4G users will be 41 percent, the USAID report said, referring to the GSMA, a trade body that represents the interests of mobile network operators worldwide. (December 15, 2019) thedailystar.net

Three tower companies in Bangladesh requested waivers from the government on making annual fees, revenue sharing and social obligation fund payments, as they have yet to start operations due to disagreements with mobile operators, local newspaper The Independent reported. Summit Towers, Kirtonkhola Tower Bangladesh and HighTech Consortium were awarded tower-sharing licenses in 2018 and received one-year waivers on paying fees as they deployed their networks. In letters sent to the Bangladesh Telecommunication Regulatory Commission (BTRC), the tower companies asked for the waivers to continue for an additional year while they work out service level agreements with the operators and initiate service. The government forewent payments estimated at BDT150 million ($1.8 million) in annual fees alone from the three companies, the newspaper wrote. BTRC agreed to a 5.5 per cent waiver on the companies' annual fees and revenue sharing, along with a 1 per cent deferral on the social welfare fund contribution. The recommendation needs approval from the Ministry of Posts, Telecommunications and Information Technology. Edotco Bangladesh also was awarded a tower-sharing license in 2018 and is the only one of the four to have launched service.

(December 9, 2019) mobileworldlive.com

The Appellate Division has given GrameenPhone (GP) three months to pay BDT20 billion (USD231 million) of the BDT125.8 billion claimed by the Bangladesh Telecommunication Regulatory Commission (BTRC) as unpaid dues in its 2019 audit of the telecoms firm. A seven-judge full bench issued the directive while disposing of BTRC's application for vacating the High Court's stay on realization of the audit claim. The Appellate Division highlighted that the High Court's earlier stay would stand vacated if GP failed to make the payment in the stipulated period. BTRC lawyer Khandaker Reza-E-Raquib told reporters that the BDT20 billion set by the Appellate Division was not the final settlement over the dues: 'The final settlement over the amount will come from the courts after disposal of the cases.' For its part, GP said that it 'looks forward to the BTRC to immediately comply with the valid injunction order' and not to obstruct the telecom operator from proceeding with its planned network expansion and the offering of new plans and services to end users.

(November 25, 2019) Daily New Age

Bangladesh ended October with 164.17 million mobile phone subscribers, up from 163.41 million in September, according to data from the Bangladesh Telecommunication Regulatory Commission (BTRC). Grameenphone led the a market with 76.06 million mobile customers in October, up from 75.71 million in September, followed by Robi Axiata with 48.34 million, up from 48.19 million the previous month. Banglalink had 35.04 million mobile customers, while Teletalk ended October with 4.70 million mobile customers. The BTRC report also shows that there were 99.56 million internet subscribers in October, up from 98.42 million in September. The fixed-line internet user base slightly increased to 5.738 million in October from 5.737 million in September, and the WiMax subscriber base fell to 38,000 in October from 40,000 in the previous month. Internet subscribers are defined as people who have used the internet at least once in the past 90 days.

(November 18, 2019) telecompaper.com

Mobile phone users will soon be able to call 999 or any other emergency numbers without a mobile SIM card or internet access during natural disasters. Any live mobile network can be used to make the call. A trial run on this by a joint team of the disaster management division, telecom regulator and army officials in the last two days proved to be a success. During the trail, it was found that if a user found their mobile network down or destroyed, they could still immediately contact the authorities using the emergency number. Currently 999 is used for emergency situations. It was developed by the information communication division in 2017 and is being currently run by police. Every mobile phone, both smart and otherwise, have an emergency calling option, which can now be used for free, said a member of the joint team. The government now needs to make a regulation on the "SIM-less" emergency service can be used, he added. "Against this backdrop, mobile operators need to align their network with this system and then users can access these facilities," said Md. Zahik Hossain Khan, senior assistant director of the Bangladesh Telecommunication Regulatory Commission (BTRC). "It's like a normal call. The joint team has tested it by removing their SIM cards and they found response," Khan, also the spokesperson of the BTRC, said. The emergency number can prove very useful in cases of natural disasters, mostly in the coastal belt of the country, where mobile towers are often damaged. If even one mobile network is live, then mobile phone users can use that for the calls, said a senior member of the armed forces division. He said in some developed countries these kind of channels already have been introduced. "We have done our part; now the government needs to formulate a policy for it, which will be a milestone of our resistance against natural disaster." To make this initiative successful, the joint team will bring all mobile operators under a single network and take support from Chinese network vendor Huawei, they said. BTRC officials said mobile operators would be directed to facilitate the emergency services. The trial for the initiative was held in Purbachal, Dhaka and Rangpur. Government and Rural Development Minister Md Tazul Islam and State minister for disaster management and relief Md. Enamur Rahman were present.

(November 2, 2019) thedailystar.net

Egypt

The National Telecommunications Regulatory Authority (NTRA) is in the process of completing commercial licenses for Egyptian satellite "Tiba 1" with the company responsible for its management. Mustafa Abdel-Wahed, Acting Executive President of the Authority, said that it played an advisory role in launching the satellite in cooperation with the International Telecommunication Union (ITU), coordinating with the French side in the technical aspects and determining its orbits. Abdel Wahed explained that the authority is currently discussing with the company responsible for the management and marketing of the satellite commercially owned by the state due to a decision from the Prime Minister- the frequencies of telecommunications and Internet services and licensing prices, as well as the service prices provided to customers. He pointed out that the new satellite will provide great speeds for the Internet, covering all governorates of the country, pointing out that the prices of satellite Internet services are usually higher than the cost of high-speed fiber-optic cables. The Tiba-1 satellite, weighing 5.6 tonnes, was built by Airbus and Thales Alenia Space at a cost of more than €100m. It will remain in space for 15 years and was successfully launched days ago from the French Guiana base in South America. The satellite will provide broadband internet services to individuals and businesses in Egypt and some North African and Nile Basin countries. On the other hand, Abdel Wahed said that the fine imposed on "WE" and "Vodafone" telecommunication companies during the last period aimed at improving the quality of services, pointing out that the imposition of the fine was due to the sudden interruption of the service and not because of the quality of service reports issued by the authority monthly. In addition, NTRA imposed a fine of EGP 10m on Vodafone and EGP 12m on WE for disconnecting their service from customers without notice. The two companies then compensated its customers once they were all located. As for complaints, Abdel Wahed said that the authority receives 5,000 weekly complaints on mobile services on hotline 155, mostly related to the accuracy of bills, of which 98% are resolved. He also revealed that the authority is considering activating the system of selling new mobile chips using the customer's fingerprint inside the stores. It also makes sure to filter the subscribers' databases monthly to reduce the spread of anonymous lines. Abdel Wahed confirmed that he is reviewing the companies' efforts in the audit of the data of line owners, without seeing the data because he is not legally entitled to that. Responding to some companies' objections on the methods of measuring the quality of telecommunications services, he said that the objection of operators to the measurements of the quality reports of the authority is logical, especially since the previous telecommunications licenses did not set the quality of standards accurately until the introduction of the license of 4G services in 2017. In July, the Minister of Communications inaugurated the National Center for Measuring the Quality of Telecommunication Services with investments worth EGP 50m. The German company Rohde & Schwarz was hired to implement quality measurements with the support of its expertise in other countries including Britain, Italy, Bahrain, Saudi Arabia, and Nigeria. He said that 20% of customers from the four mobile companies use 4G technology, noting that the customer will not feel much of a difference in services without launching applications that affect their daily life. "Egypt's position in mobile data services is not bad," he said, stressing that companies have exceeded targets set in the deployment of 4G technology. Regarding the results of the World Radiocommunication Conference, he revealed the coordination between Arab and African countries on issues related to frequencies and prevention of interference with neighboring markets. Most of the controversial issues on the conference agenda were also resolved. On the participation of the authority in the exhibition, Abdel Wahed said that the focus will be on presenting methods of measuring the quality of telecommunications services in 81 regions nationwide by mobile cars, compared to about 40. In addition, they will also work on raising awareness on the crimes stipulated in the Anti-IT Crimes Law No. 175 of 2018 and the mechanisms for making a formal complaint to the body. Regarding the coverage of new cities and highways, he noted that NTRA has recently issued a tender to mobile operators to cover some of Upper Egypt's roads with funding from the authority's Universal Service Fund. He ruled out the idea of increasing the mobile numbering to be 12 digits, stressing that the current numbering is enough for up to a billion mobile lines. As for President Abdel Fattah Al-Sisi's notes at the Africa Investment Forum on the construction of 20,000 mobile towers, he confirmed that it is expected to establish a company specialized in launching mobile towers to apply for a license from the authority to meet that requirement. It is noteworthy that Al-Sisi asked Minister of Communications Amr Talaat to launch 20,000 mobile towers within a year instead of 10 years.

(December 1, 2019) dailynewssegypt.com

Within the framework of NTRA's incessant keenness to enhance the quality of telecom services provided to citizens, and owing to grave failures and breakdowns in the mobile network of WE company that seriously affected the telecom services provided to a segment of the company's customers in a number of areas for several hours on Wednesday 30 October 2019, and as the above-mentioned fact is considered grave breakdowns and violation of the licenses and agreements entered with WE, Mobile Operator; Consequently, the NTRA followed up on the problem with WE, Mobile Operator, which, in turn, submitted a detailed report about the problem, its causes and the measures and actions taken in this regard. Accordingly, NTRA decided to impose a fine of LE 12 million (twelve million Egyptian pounds) on the company, that should be paid within seven days of the date, in implementation of Article No. 18 of the licenses granted to the company concerning the quality of service level. The NTRA has taken into account, on determining the value of the financial penalty, a number of factors, most importantly, the number of subscribers affected by the service interruption, the duration of breakdowns and the number of areas affected. (November 1, 2019) tra.gov.eg

Iran

Iran's President Hassan Rouhani has said the country's National Information Network (NIN) will be expanded to reduce the need for connections to the conventional World Wide Web. Radio Farda quoted Rouhani as saying that 'people will not need foreign [networks] to meet their needs'. The state-run national intranet service provides censored content in an effort to dissuade Iranian's from accessing foreign websites. The government came under fire both domestically and internationally for cutting off internet access during a recent series of violent protests.

(December 11, 2019) commsupdate.com

Iran's ICT sector will become less dependent on imports and more self-reliant by 2021, thanks to the expansion of domestic production units. Industries Minister Reza Rahmani added that within two years, infrastructure for information and communication technology will mostly be localized, curbing an annual capital flight of over USD 10 billion. Rahmani said the import of more than 1,500 communication products has been stopped over the past several years, as they can be produced by local manufacturers using domestic equipment and technology in line with strengthening domestic manufacturers and increasing the share of Iran-made products in the field. He said the role of locally made devices in the field is expected to expand, making the ICT sector independent of foreign sources.

(December 2, 2019) IRIB News

A report from Reuters says that the Iranian government finally began restoring internet access in the country after a five-day shutdown. The block had come in response to protests over a sharp rise in fuel prices, which spread to more than 100 towns and cities last weekend. Almost all fixed and mobile internet access was then restricted, in a move designed to stop protestors sharing videos to garner further support and limit the spread of reports on the unrest. The semi-official news agency Fars said that internet access was being restored in Hormozgan, Kermanshah, Arak, Mashhad, Qom, Tabriz, Hamadan and Bushehr provinces, and parts of Tehran. International internet observatory Netblocks said fixed internet services had been restored to around 10% of the country by late Thursday morning, but mobile internet connections were still not working. Internet providers in Iran include state-backed Telecommunication Company of Iran (TCI) and MTN Irancell, which 49% is owned by South Africa's MTN Group, with the remainder held by Iran Electronic Development Company (IEDC), which itself has links to the Ministry of Defence.

(November 22, 2019) telegeography.com

Iran's state-backed utility company Tavanir is planning to deploy fiber-to-the-home (FTTH) technology which will be offered on a wholesale basis to ISPs. A report from Payvand says that Tavanir has already selected a contractor to carry out the deployment, which is being undertaken alongside an upgrade of its electricity distribution and metering systems. A spokesperson for the utility firm said it expects to install 30,000km of fiber-optic infrastructure across Iran. Tavanir already leases capacity on its fiber backbone network to telcos.

(November 11, 2019) IRNA

Jordan

The Telecommunications Regulatory Authority (TRC) signed a public telecommunications license for SMT Solution after the TRA Board of Commissioners decided last month to approve granting the company the individual license and request the company to implement all related obligations and technical requirements. The agreement was signed by Chairman of the Commission's Board of Commissioners Dr. Ghazi Al-Jabbour and CEO of SMT Solution Sameh Al-Tamimi in the presence of members of the Commission's Commissioners, directors of the Commission's departments, officials of electricity companies operating in Jordan and a number of stakeholders in the company and representatives of various media. During the signing ceremony, Dr. Al-Jabbour pointed out the importance of granting this individual license, which will constitute a qualitative addition in the provision of telecommunication services through the participation of the private sector among them in order to provide high-quality services and advanced technologies. In the creation of appropriate regulatory conditions and environment capable of accommodating such technologies and services. Dr. Al-Jabbour added that by signing this license, the company will establish the necessary partnerships with the electricity companies in order to connect the Internet through the electricity networks to reach the final beneficiary, as these partnerships will provide the delivery of Internet services at the lowest cost, time and effort through networks and power lines, which provides Internet access to remote areas at high speeds using the infrastructure of electricity networks alone, competing with the traditional solutions currently available and at low financial costs, where Jordan aspires to be at the forefront of countries that adopt this technology. For his part, CEO of SMT Solution Sameh Al-Tamimi said that the company is a telecommunications company to provide the Internet with a pioneering idea through electricity networks and works with a special technology and a unique mechanism for the purposes of providing Internet service to all beneficiaries, where the subscriber will use electrical outlets to connect to the network and benefit from high speed Internet services , adding

that the technical means to provide online audio and video and data through electricity networks which will facilitate their access to all sectors and homes at high speed and low cost through the use of common device called (the CPE) your company (the SMT) to pull the signal online from Feb Of electricity. Al-Tamimi added that SMT is looking forward to achieve many visions, including building a modern infrastructure that will support its planned services, whether wired or wireless, improve the quality of services provided to beneficiaries in Jordan, and participate in building the Jordanian economy through the provision of a large number of employment opportunities. A new set of services, socialization and social responsibility. During the signing ceremony of the license agreement was the implementation of a technical experiment to transfer the Internet through electricity networks in the building of the Authority, through the delivery of Internet service at high speeds relied on the points of electricity networks have received the approval and admiration of the audience.

(November 13, 2019) trc.gov.jo

Kuwait

CEO of the Communications and Information Regulatory Technology Authority of Kuwait Eng. Salim Al-Ozainah verified political leadership and government are keen to keep pace with digital transformation in order to build a society based on smart electronic services. This came in a speech on the opening of the seventh e-government forum entitled (modern trends of smart government), which is sponsored by His Highness Sheikh Jaber Al-Mubarak Al-Hamad Al-Sabah, the Prime Minister, and will continue until 14 November. On July 8, 2019, the Cabinet issued its Resolution No. (911) on the formation of a committee to prepare the national plan and information technology policies to review the challenges faced by the government agencies concerned with technology and its challenges. He pointed out that the Forum supports the turning point in the framework of the efforts of the Government of Kuwait to provide smart services in addition to the support and development of young capabilities that will benefit all citizens. For her part, Director General of the Central Agency for Information Technology Haya Al Wadani said in a similar speech, that we live in the world of development and growth and the rapid challenges in the field of technology which requires us to keep pace with change and overcome the challenges. She stated that these challenges require us to develop our capabilities, skills and work procedures to enable us to bring our government services to better levels comparable to developed countries in this field. Al-Wadani pointed to the magnitude of these challenges that require the collaborative efforts of the public and private sectors, praising the cooperation of other government agencies with the Central Agency for Information Technology to enable their services to reach the smart government. She pointed out that the Forum will hold two workshops for government agencies specialized in information technology, one dealing with an integrated automated program to follow up on strategies and performance measurement in institutions and the second to provide practical applications for the use of artificial intelligence technologies.

(November 12, 2019) citra.gov.kw

Minister of Commerce and Industry Khaled Al-Roudhan underlined the importance of benefitting from the Fourth Industrial Revolution and fit into the new generation of globalization. In a speech at the General Conference (GC) of the United Nations Industrial Development Organization (UNIDO) in Abu Dhabi, Al-Roudhan, also Minister of State for Services Affairs said the industrial revolution brought out great developments in the Artificial Intelligence (AI) field, robots, 3D printing and digital services. These developments can boost income rate around the world, achieve sustainable development and protect natural resources, Al-Rodhan added. Meanwhile, he warned against the economic, social, political and cultural dangers of this revolution, noting that there are expectations that over 375 million workers will need to switch to a different job by 2030. Moreover, there are fears that it will lower the income of most individuals in high-income countries and create difficulties in dealing with the impact of climate change. Although industry is vital to improving the lives of people, it poses dangers to environment including pollution and depletion of natural resources, said the Minister. In the same context, Al-Roudhan stressed the importance of the ninth goal in the UN Sustainable Development Goals (SDGs), which focuses on industry and innovation. He added that Kuwait suggests that UNIDO would make knowledge economy, with its main feature being online trade, as the organization's priority. He also mentioned green industries as key to social and economic development, as well as in protecting the environment, natural resources and renewable energy. It also limits gas emission and promote for recycling. Speaking on the fifth goal in the (SDGs) on gender equality, the Minister said Kuwait strongly believes in the vital role of women in achieving sustainable industrial development. Kuwait also believes that enabling women to play a role in achieving social peace and security is a step towards achieving sustainable development, he noted. The Minister called on all countries, companies and businessmen to look into Kuwait's investment opportunities. The country is also providing banking and customs facilitations, as well as developing its commercial documents system, under the Kuwait Direct Investment Promotion Authority (KDIPA) and Kuwait National Fund for Small and Medium Enterprise Development (SMEs). Meanwhile, he hailed the UAE's strategy set in 2017 to prepare for the Fourth Industrial Revolution. Al-Roudhan also welcomed Palestine's first participation in the conference as a UNIDO member-state. He also congratulated the Emirati Minister of Energy and Industry Suhail Al-Mazrouei for being elected to chair the conference. The conference kicked off under the theme "innovation and communication change our future." There are 800 ministers, officials and representatives of 170 countries participating in the event. The meeting discusses policies aiming to achieve the 2030 Agenda for Sustainable Development and the 17 SDGs.

(November 4, 2019) kuna.net.kw

Nepal

The Nepal Telecommunications Authority (NTA) has announced that Ncell, Nepal's second largest mobile network operator (MNO) in terms of subscribers, has won the auction for residual spectrum in the 1800MHz band, after submitting a final bid of NPR58 million (USD503,629). Ncell, which already has rights to 2×11MHz of 1800MHz frequencies, will be allocated an additional 2×9MHz spectrum from the 2 × 16 MHz available, as the NTA's rules limit operators to 2×20MHz in the band. However, the NTA has stated the award will not be finalized until Ncell has paid its outstanding NPR21.1 billion capital gains tax bill. Originally announced in December 2018, the auction was delayed by legal action brought by CG Telecom, which was not eligible to take part under the NTA's terms. In the event only Nepal Telecom (NTC) and Ncell expressed an interest, with NTC reportedly submitting an unsuccessful bid of NPR50.01 billion in the final round of the auction. (December 19, 2019) commsupdate.com

Oman

The Telecommunications Regulatory Authority and the National Training Fund signed a memorandum of cooperation on employment and training Omani nationals. "The Telecommunications Regulatory Authority (TRA), signed a memorandum of cooperation for training programs for employment with the National Training Fund." These steps will improve resource orientation and prepare a group of Omani citizens with high levels of training and skills to be prepared to join the labor market. (December 23, 2019) timesofoman.com

The Sultanate, represented by the Ministry of Technology and Communications participated in the 23rd Session of Arab Telecommunications and Information Council of Ministers in Riyadh. This year's session is held under the theme "An Arab ambition for a Digital Generation." The Omani delegation was headed by Eng. Azza Al Ismaili, Minister of Technology and Communications who was accompanied by a number of officials from the ministry and the Telecommunications Regulatory Authority. The current session's agenda included meeting of the Permanent Arab Committee for Telecommunications and Information during the period from 15-16 December. That meeting was followed by the meeting of members of the executive office on the 17th and the 18th of the same month. The session's agenda also included reviewing the main achievements in regards to the General Arab Postal Strategy 2018-2024, and following-up the implementation of the Regional Development Plan for the Arab Region 2017-2020. In addition, several important topics were discussed such as results of the meetings of the work team of the Permanent Arab Committee for Communications and Information, the Arab Initiative for Internet Governance in the Arab Region and the Arab Digital Capital Initiative.

(December 18, 2019) timesofoman.com

Pakistan

As per the 'Digital Pakistan Vision', launched by Prime Minister, the Ministry of IT and Telecom has released Digital Pakistan Policy in a comprehensive report. Pressing on the importance of this policy, the Ministry quoted a forecast by Gartner Inc. in October 2017 that Worldwide IT spending is projected to total $3.7 trillion in 2018, an increase of 4.3 percent from 2017 estimated spending of $3.5 trillion. Fitting in this world equation, Pakistan stands tall with about 60% of its 200 million population in the 15 to 29 age group, an enormous human and knowledge capital. Pakistan has more than 2000 IT companies and call centers and the number is growing every year. It has more than 300,000 English-speaking IT professionals with expertise in current and emerging IT products and technologies. More than 20,000 IT graduates and engineers are being produced here each year. First section of the four-section policy deals with 'key components'. It places focus on promulgation of necessary policy frameworks, laws and rules to enable creation of a sustainable IT environment. Appropriate data protection laws, it says, will be brought forth for protection of personal data and online privacy for improved transparency and security of sensitive and confidential information. The policy also aims to develop a framework for cloud-based services and its regulation which include data classification mechanism, standards for access, data privacy and transparency, ownership and security to promote the adoption of cloud services for better and agile delivery of services to end users. It says that cooperation be continued with Ministry of Commerce to formulate e-Commerce framework/policy guidelines in consultation with relevant stakeholders in e-commerce. This will include measures such as appropriate regulation, tax rationalization, trade facilitation, Online Dispute Resolution

(ODR), Consumer Protection and Privacy etc. Amendments will be made in laws to accommodate electronic workflows, processes and eApprovals/e-Submissions etc. The policy aims to enhance the current market size of e/m-commerce. According to some estimates, the market carries an enormous growth potential due to exponential growth in broadband subscribers from 3.7 million in 2013 to over 44.3 million in 2017 and increasing. With these growth trends projected to persist in the future, overseas investments will continue to grow in e-commerce. The policy will facilitate promotion of e-commerce by providing and enabling an environment where Payment Service Providers (PSP) and Payment Service Operators (PSO) can operate and establish an effective e-commerce platform and take e-commerce activities in Pakistan to the next level. It is encouraging to note that the policy has focused on youth, women and girls empowerment using IT. Youth and women represent roughly 60% and 49% respectively of the population. Specific ICT for Girls' programs will be initiated for imparting quality trainings in computer skills, including software coding, across the country to reduce inequalities, provide decent work and promote economic growth in line with relevant SDGs. Under the policy, incentives to bolster growth include 100% equity ownership, 100% repatriation of capital/dividends, tax exemption on IT and ITeS export revenues, tax exemptions to startups and subsidized Software Technology Parks. These measures will position Pakistan on the global canvass prominently. It said that enterprise software and IT services continue to exhibit strong growth, with communications services continuing to drive the majority of spending. Software spending is projected to grow 8.5 percent in 2017, and it will grow another 9.4 percent in 2018 to total $387 billion. IT services spending is on pace to grow 4 percent in 2017 to reach $931 billion, and increase 5.3 percent in 2018 to reach $980 billion. This report depicts the potential of ITeS sector and it is time to re-align the government strategies to attract a reasonable chunk out of $980 billion. This will help to create thousands of new jobs in IT sector of Pakistan in line with current government policy to create more and more jobs for youth in digital economy. Ministry of IT and Telecom will recommend the proposals for inclusion in the relevant documents such as Finance Bill and BOI's Special Economic Zone (SEZ) Act etc. after due process. The policy implementation will require consistent monitoring and evaluation of its outcomes. However, an appropriate strategy will also be prepared to align the 'Action Plan' with key priority areas for proper monitoring and evaluation. MoIT will encourage provincial departments and bodies to use this Digital Pakistan Policy as a guideline for their own IT initiatives. Provinces can identify their own unique requirements and implementation frameworks. (December 7, 2019) thenews.com.pk

The government has involved a security agency to conduct a comprehensive cyber-security audit and vulnerability assessment of the foreign developed Sandvine Inc Web Monitoring System (WMS). According to official documents, Pakistan Telecommunication Authority (PTA) directed telecom operators in 2017 to deploy a suitable solution capable of mitigating grey traffic and blocking web content. Based on PTA technical requirements, the telecom operators committee issued RFP in July 2018. Western-made solutions were offered by different vendors, where three vendors who offered Sandvine based equipment (Sandvine Inc, US based company) participated in the proof of concept and passed the criteria. No vendor offering, other than Sandvine participated in POC, maintained the documents. Furthermore, the agreement between telecom operators and the vendor was signed in December 2018. PTA has rejected the perception about limiting the freedom of expression of internet users through the WMS system while terming it incorrect and baseless. Some concerns were raised about possible security vulnerabilities of the foreign-made system. Therefore necessary written guarantees were acquired from the selected vendor and the OEM ensuring that there are no backdoors or cyber-security risks in the system. In addition to written guarantees, it was also decided that necessary measures will be taken for comprehensive cyber-security audit and vulnerability assessment by a joint team of security agency and PTA. According to PTA, other than many western countries, Sandvine equipment is also deployed in many Muslim countries including Pakistan. The Muslim countries where Sandvine is deployed are: Algeria, Bahrain Djibouti, Egypt, Indonesia, Iraq, Kuwait, Lebanon, Libya, Malaysia, Morocco, Pakistan, Qatar, Saudi Arabia Sudan, Tunisia, Turkey and UAE. (November 26, 2019) propakistani.pk

The number of 3G and 4G users in Pakistan reached 73.26 million by end-October compared to 72.12 million by end-September 2019, said Pakistan Telecommunication Authority (PTA). Number of mobile phone users in Pakistan reached 162.98 million by end-October compared to 161.84 million by end-September, which registered an increase of 1.14 million during the period under review. Jazz's total count for 3G users stood at 12.255 million by end-October compared to 12.504 million by end-September, registering a decrease of 0.249 million. Jazz 4G user numbers jumped from 13.008 million by end-September to 13.821 million by end-October. Zong 3G subscribers decreased from 7.965 million by end-September to 7.751 by end-October while the number of 4G users jumped from 13.787 million by end-September to 14.221 million by end-October. The number of 3G users of Telenor network decreased from 8.133 million by end-September to 8.032 million by end-October i.e. registering a decrease of 0.101 million. The number of 4G users jumped from 7.613 million by end-September to 8.052 million by end-October. Ufone 3G users decreased from 6.860 million by end-September to 6.695 million by end-October. The number of 4G users of Ufone increased from 2.249 million by end-September to 2.430 million by end-October. Teledensity for cellular mobile increased from 76.75 to 77.24 percent and broadband subscribers reached 75.30 million by end-October compared to 74.15 million by end-September 2019. The PTA received 7,819 complaints from telecom consumers against the different telecom operators including (cellular operators, PTCL, LDIs, WLL operators and ISPs) as of October 2019. According to the PTA data, Jazz (Mobilink + Warid) leads the chart with 2,694 complaints and Telenor stands at second position as the most complained telecom operator with 1,675 complaints. The PTA said that it was able to get 7,784 complaints resolved i.e. 99.55 percent. The cellular mobile subscribers constitute major part of overall telecom subscriber base; therefore, maximum number of complaints belongs to this segment. Total number of complaints against the CMOs by October stood at 6,245. In terms of the

segregation of complaints on operator basis, a total of 2,694 complaints were received against Jazz which is 43.13% of the total CMO related complaints. Telenor, which has the second largest number of consumers, was also second with 1,675 complaints i.e. 26.82 percent complaints were received against it. Zong stood third with 954 complaints i.e. 15.16 percent of total complaints. Ufone had 929 complaints against its various services which make up 14.87 percent of the total CMO related complaints. The PTA also received 561 complaints against basic telephony where 556 were addressed during October 2019.

(November 19, 2019) brecorder.com

Pakistan's information and communications technology (ICT) sector has surpassed $10 billion mark with more than 74 million broadband users and over 76 percent teledensity. This was stated by Federal Minister for Information Technology and Telecommunication Dr. Khalid Maqbool Siddiqui while addressing at the H3C grand opening ceremony. Siddiqui said that the Ministry of IT and Telecommunication is committed to serve the promise for digitally transforming the country into a knowledge-based economy. He said that Pakistan is making strides forward and in the right direction. This event is yet another example of government's business friendly policies and Ministry of IT & Telecom's facilitative approach for attracting foreign investors in the technology sector, he said. "I must appreciate the management of H3C Company for realizing the potential of Pakistan as an emerging market and hope that it will grow its operation in the country on strategic level," he said. The federal minister said Pakistan possesses immense potential specially in the ICT sector and companies like Huawei, ZTE, Nokia, Ericsson and Cisco have a majority of the global employees acquired from Pakistan which exactly explains the quality and ability of skilled human capital available on competitive basis for companies like H3C to utilize this potential not only for local consumption but also for its international operations. Pakistan's ICT sector has surpassed US $10 billion mark with more than 74 million broadband users and teledensity in excess of 76%, he said. The reason why Pakistan is a more responsive market to technological advancements is the overwhelming numbers of youth having more than 65% of the population between the ages of 15 and 40 and "we want all the stakeholders to play their due part in early digital inclusion and financial inclusion of the people," he said. The federal minister offered best wishes to H3C for its future endeavors in Pakistan and assured that the government of Pakistan will continue to protect and facilitate all legit foreign investments in the country.

(November 13, 2019) brecorder.com

Pakistan Telecommunication Authority (PTA), in collaboration with Rohde & Schwarz Pakistan, organized a two-day training workshop on "Network Performance Scoring (NPS) and 5G Technology" at PTA Headquarters, Islamabad. The workshop was attended by PTA officers and officials. The workshop focused on 5G technology market drivers and key challenges as well as NPS scope and basic implementation. Peter Busch, Marketing Segment Manager and Walter Yoong, Senior Project Manager at Rohde & Schwarz conducted the training. They provided the participants with a greater understanding of frequency challenges, quality of service handling in 5G and usefulness of network management. Speaking on the occasion, Chairman PTA, Maj. General Amir Azeem Bajwa (R) said that this workshop provided valuable insight into new and emerging technologies such as 5G. He also thanked Rohde and Schwarz for conducting the workshop.

(November 8, 2019) propakistani.pk

Saudi Arabia

The Saudi Ministry of Communication and Information and the Egyptian Ministry of Communications and Information Technology signed a memorandum of understanding to boost mutual cooperation in fields of telecommunication and information technology. The signing preceded the activities of the Arab Telecommunication and Information Council of Ministers held in Riyadh, knowing that Saudi Arabia and Egypt are looking forward to committed cooperation and participation in developing emerging technologies innovations. Saudi Arabia's Minister of Communications and Information Technology Abdullah al-Swaha and Egypt's Minister of Communications and Information Technology Amr Talaat signed the MoU, in the presence of a number of officials, leaders, and heads of Arab delegations. Swaha asserted that this MoU falls under the ministry's efforts to cooperate with fraternal countries of high significance in the telecommunication and information technology sector. In a statement on Tuesday, he added that the digital cooperation with the Egyptian side would drive digital innovation in a number of qualitative fields, investment in national cadres, and knowledge transfer. The MoU seeks to promote cooperation in the telecommunication and information technology sector in order to serve the mutual interests of fraternal countries. Based on this, the two parties would build human capacities via collaborating in growing digital capacities for youth. Further, it consolidates innovation and entrepreneurship through committing to empowering entrepreneurs in Saudi Arabia and Egypt when it comes to emerging technologies and required support to magnify economic benefits, activate business accelerators, and organize a Saudi-Egyptian initiative for innovation and entrepreneurship. The memorandum of understanding also includes joining efforts in artificial intelligence, exchanging expertise and best practices in this aspect, discussing means to encourage investment, and cooperating in digital transformation and awareness. (December 21, 2019) albawaba.com

The Communications and Information Technology Commission in Saudi Arabia obliged all telecommunications service providers to use electronic contracts. The commission banned paper

contracts in all its branches and outlets. This obligation will enter into force in 90 days, the commission announced through its official Twitter account. The authority obliged companies to dispense paper contracts and use e-contracts, sign them and verify identity digitally. With this approach, the Saudi commission seeks to enable digital transformation, develop its services, and facilitate transactions between all parties, it referred. It is noteworthy that the telecommunications services in Saudi Arabia are provided by the Saudi Telecom Company (STC), Etihad Etisalat Company (Mobily), the Mobile Telecommunication Company Saudi Arabia (Zain KSA) and Etihad Atheeb Telecommunication Company (GO). (December 17, 2019) english.mubasher.info

Dr. Ahmed Al-Thenayyan, Deputy Minister for Technology and Digital Capacities Development at the Ministry of Communications and Information Technology, stressed the importance of emerging technologies' role in accelerating the current and unprecedented transformation in the Kingdom of Saudi Arabia, and achieving a higher contribution to GDP driven by the potential of these technologies for enabling entrepreneurship and innovation. This came during his keynote speech at the opening of Saudi Emerging Technologies Forum, held in Riyadh, in the presence of prominent local and global leaders and decision makers in the field of technology. Dr. Al-Thenayyan pointed out that the Ministry has developed numerous programs and initiatives geared toward investing in national talent, doubling the size of technology market, stimulating digital entrepreneurship and inspiring innovation and creativity using emerging technologies. He also noted the partnership with the private sector in stimulating adoption of emerging intentions through establishing joint specialized digital innovation labs to produce advanced solutions in order to address existing challenges by innovative digital ways. Al-Thenayyan stated that the Saudi technology development strategy is focused on creating an ecosystem attractive to investment in emerging technologies such as Internet of Things, Artificial Intelligence, robotics, blockchain, Virtual Reality and Augmented Reality, which have significant role in supporting digital transformation in several sectors such as industry, energy, health, finance and government. He said that the existence of major oil and petrochemical companies such as Aramco and SABIC, in addition to the new Giga projects of NEOM and Red Sea, together with the demand volume offer a very important opportunity to rebrand the Kingdom as a regional and global hub for innovative digital solutions and use cases based on emerging technologies in the fields of energy and petrochemicals. The Ministry is working to attract promising investments in the emerging technologies sector and provide the conditions for relevant business growth and localization in the region. Through several factors, including but not limited to the development of policies and legislation stimulating investment and potential and digital infrastructure. In conclusion, he touched on the ICT Strategy 2023, endorsed recently by the Council of Ministers, which included priorities aimed at developing the Kingdom's digital capacities and investing them in an optimal way in driving the growth of future projects with a view to achieving the Kingdom's Vision 2030, and raising the efficiency of the public and private sectors by enabling digital transformation to make the Kingdom one of the world's leading countries in ICT. Digital transformation to become the Kingdom of the world's leading countries in the field of communications and information technology. (November 11, 2019) mcit.gov.sa

Sri Lanka

Bharti Airtel Lanka (Airtel Lanka) announced that it has been awarded a 5MHz block of spectrum in the 900MHz band by the Telecommunications Regulatory Commission of Sri Lanka (TRCSL). The cellco said the allocation was made on an 'administrative basis' related to pre-published criteria that stipulates that 'in order to create a level playing field for all four mobile operators, every operator shall have equal amount of spectrum at all possible times in such economical bands. Therefore, during evaluation of applications the prominence will be given to minimize unequal distribution of radio frequency spectrum (if any) within the above band.' The criteria further mentioned that the 'evaluation will be based on to guarantee interference free spectrum'. The award will result in wider coverage, providing Airtel users with enhanced voice and data experience. 'This is the first step in a bold strategy from Airtel which aims to leapfrog current benchmarks in order to provide an unbeatable user experience,' said Airtel Lanka Managing Director/ CEO Jinesh Hegde, adding that the company has already begun using the newly allocated frequency after paying the required fee (which was not disclosed). (November 15, 2019) telegeography.com

Turkey

The Information and Communication Technologies Authority ("ICTA") presented for public consultation the draft amendments to the legislation on authorization in the electronic communications sector on December 5, 2019. The amendments introduce new regulations on several topics, including application conditions for authorization, authorization periods and fees, competency controls, rights and obligations of operators, and authorization cancellation procedures for operators failing to provide electronic communication services. The ICTA plans to introduce amendments to the Regulation on Authorization in the

Electronic Communications Sector on several matters, such as expanding the scope of conditions for authorization applications; the calculation of authorization fees and payment of fees for right to use; information and documents that authorized operators will regularly share with the ICTA; and authorization cancellation process for operators failing to provide electronic communication services. In accordance with the proposed changes, the ICTA also published two draft application forms regarding the authorization of operators, the notification form and application form for the right to use. In addition, pursuant to the Draft Regulation on Authorization Periods and Competency Controls, the ICTA is planning to introduce new regulations regarding the calculation of authorization and authorization renewal periods, as well as the competency control periods. (December 17, 2019) mondaq.com

United Arab Emirates

The UAE, represented by the General Authority for Regulating the Telecommunications Sector, participated in the 23rd session of the Council of Arab Ministers of Communications and Information hosted by the Saudi capital Riyadh on December 17-18, under the theme "An Arab ambition for a Digital Generation", in the presence of a number of telecommunications and information ministers from Arab countries. The UAE delegation was headed by H.E. Hamad Obaid Al Mansouri, TRA Director General, and included a number of TRA managers and staff. The meeting discussed the future of joint Arab action in ICT, its global developments and implications for the Arab world in the domains of economy, health, education and others. The meeting also discussed the proposal of the joint Arab Digital Declaration "Building a prosperous and sustainable Arab digital society", which reflects the wish of Arab countries to work on building a prosperous, sustainable and harmonious Arab digital society where individuals can grow towards development; a society in which individuals, communities and nations can unlock their full potential to advance their sustainable development and improve their quality of life, based on the purposes and principles of the Arab League Charter. In his speech during the meeting, H.E. Hamad Obaid Al Mansouri stressed that the importance of such event stems from the importance of the ICT sector, as every development witnessed in the world has become correlated to how advanced the telecommunications infrastructure is, adding: "I hope that the Arab Digital Declaration, in letter and spirit, will be the title of a new Arab era, an era in which potentials of Arab youth will be unleashed from the ocean to the Gulf, and in which their creative ideas will sprout to contribute to making a bright sustainable digital future." He added: "We have 100 million youth in the Arab world aged between 15 to 29. These men and women have immense potential. Either we leave them exposed to darkness and obscurantism, or we take their hands into enlightenment and development by investing their energy in moving forward and making the future. This announcement is the junction between the two paths. If we are to succeed in making it part of our children's thinking and interests, we will have made the right choice, and this is what we all wish for." The Arab Digital Declaration included five common Arab principles for building a prosperous and sustainable Arab digital society, with the first principle ensuring a digital economy as a new way to promote community growth and stability. Overcoming any obstacle to maximize benefits of such economy. In addition to reflecting on the Fourth Industrial Revolution (4IR), being the greatest economic multiplier, and the largest social equivalent. As for the second principle, it provides for reliance on youth as a drive for progress and construction in the digital world, as they are the means to tackle future challenges and the cyberspace, and the key to transforming the Arab digital world into an icon of the world. The third principle stated the importance of Arab data as a fundamental factor for digital development and future leadership, and as a key enabler for the 4IR and digital economy. The fourth principle of the Declaration stipulates activating innovation, since it is the best way to realize aspirations. Striving to support innovators, creators and leaders by providing a nurturing environment to encourage innovation and entrepreneurship in all sectors. Lastly, the fifth principle mentions the importance of the union of Arab forces, as military blocs and groupings are of utmost necessity. Concerted efforts and stances are required to make the Arab region a regional and global power in the digital world. (December 21, 2019) tra.gov.ae

Government and private entities signed a number of MoUs to implement and activate the UAE Pass, during a forum organized by the Telecommunications Regulatory Authority (TRA), in partnership with the Abu Dhabi Digital Authority (ADDA) and Smart Dubai. The signed agreements aim to activate the mechanisms of the UAE Pass App, and exchange data between the parties participating in this initiative, which enhances the UAE digital transformation. It also aims to make the UAE Pass one of the important pillars of the integrated and interconnected government that provides joint services to the public in cooperation with the private sector. In this regard, H.E. Hamad Obaid Al Mansoori, TRA Director General, congratulated the participating entities for the implementation of UAE Pass, considering it as a milestone in the process of digital government. H.E. Al Mansoori said: "This project reflects the directives of the wise leadership towards building a sustainable digital future, and providing easy, fast and interactive government services that achieve customer happiness. The UAE Pass project embodied the principle of partnership between the public and private sectors, and here we see well-established businesses participating in the journey of digital development, realizing a necessity that we in the UAE apprehend more than others, namely that cooperation between all sectors leads to digital society. A productive and sustainable digital society is like a shadowing tree, its trunk is the home from which we derive strength and determination, and its leafy branches are the entities that give life and spread their shadows to all." During the event, TRA signed

joint cooperation agreements regarding UAE Pass with the e-governments in the country (Sharjah e-Government Department, Ajman Digital Government, The Electronic Government Authority – Ras Al Khaimah, Fujairah e-Government, and Umm Al Quawain Smart Government). Smart Dubai also signed a number of MoUs with a number of UAE banks, semi-government companies, and exchange firms. The event included a detailed presentation on the most important stages that UAE Pass has gone through and its most important achievements since its launch, highlighting the great work of government and private entities in this initiative in order to achieve its success. The event concluded with honoring the strategic partners, including the Prime Minister's Office, Federal Authority for Identity and Citizenship, Ministry of Justice, Central Bank of the United Arab Emirates, Dubai Electronic Security Center, Abu Dhabi Digital Authority, Smart Dubai, Sharjah e-Government Department, Ajman Digital Government, Electronic Government Authority – Ras Al Khaimah, Fujairah E-Government, and Umm Al Quawain Smart Government. The UAE Pass is the first digital national identity for all citizens, residents and visitors. It allows users to access the services of local and federal government entities, and other service providers. UAE Pass also provides easy solutions to access services via smartphones without the need for a password or username, as well as the ability to digitally sign documents, and verify their authenticity without the need to visit service centers. UAE Pass also includes a digital wallet (Vault) that is used to exchange and submit the customers' digital documents for completing their transactions quickly and without the need to provide paper documents. It also includes a digital signature service that ensures the reliability and flow of transactions in a safe and integrated environment between different entities. (December 17, 2019) africazine.com

The General Authority for Regulating the Telecommunications Sector (TRA) organized a practical workshop on future foresight and innovation, participated by TRA management and employees in line with the directives of our wise leadership to promote a spirit of innovation and future shaping among UAE citizens and build national capacities in prospecting the future. The five-day workshop comes in implementation of TRA's Innovation Strategy, which aims to instil and foster the innovation culture in the corporate work environment, and empower TRA's employees in shaping the future. On this workshop, Mr. Mohammed Al Ketbi, TRA's Executive Director of Innovation, said: "We in the UAE look to the future with open minds, seek to foresee what developments will bring, and do not hesitate to prepare for the future with the necessary projects. What we are witnessing today in the UAE is what many countries in the world strive to achieve in the future, and what we aim to do in the near future is what others see as impossible. We have learned from our wise leadership that the future is for entrepreneurs and the dashing, and that the future does not wait but is made. In this sense, we strived to develop our plans and strategies for future shaping and innovation, enabling us to excel in one of the fastest growing sectors. Today at the TRA, we focus on looking to the future, anticipating its requirements and implementing them through innovative plans that are devised and set into motion by our trained and highly qualified national cadres." Al Ketbi emphasized that the Future Shaping and Innovation Workshop was organized and conducted to address the needs of the telecommunications sector, adding: "We have sensed the enthusiasm of TRA's staff participating in this workshop through their ideas, plans and projects aimed at developing the corporate work environment and boosting productivity. The positive results we have produced in this workshop are fully consistent with our goals from the Innovation Strategy, and we will continue in the coming days to implement more initiatives and workshops in this regard." The Workshop included several stages, the first of which started with defining the challenges facing the TRA in fulfilling its entrusted responsibilities efficiently, while the second stage was to find unprecedented innovative solutions by ways and methods not previously used. The Workshop resulted in a set of innovative ideas to be considered by a TRA-determined competent committee, with the best ideas to be selected and developed to become actionable, and later implemented by a team consisting of the best idea owners. The TRA makes all efforts in building future cadres to lead the ICT sector, by adopting strategies and methods that qualify UAE leaders for the post-oil phase, which will radically change the landscape of the economic, educational and social sectors. The human cadres will be capable of dealing with the demands of the next phase, such as artificial intelligence, e-commerce, new media, and others. (December 14, 2019) tra.gov.ae

During the UAE 5G conference, the Telecommunications Regulatory Authority, TRA, and Huawei released the TRA and Huawei '5G and IoT Joint OpenLab' in Dubai, aimed at boosting 5G and the Internet of Things, IoT, services throughout the UAE, promoting innovation and collaboration across markets with the intention of creating an open ecosystem that will further ICT development across the country. The TRA and Huawei 5G and IoT Joint OpenLab will mainly focus on the enterprise market, including Artificial Intelligence solutions, fixed wireless access, CCTV, campus private line, and more. Consumer services such as cloud gaming/VR will also be a focus of the OpenLab. Hamad Obaid Al Mansoori, TRA Director-General, said, "We welcome this TRA-Huawei joint initiative, as part of the authority's openness to partner with the private sector based on the fact that the burdens of the new digital age are greater than a single sector; therefore, all sectors must work together to develop the digital community." He added, "We at the TRA, as we launch the 5G & IoT OpenLab in Dubai in partnership with Huawei, assure that we will spare no effort to mobilize all energies and work hand in hand with the government, academic and private companies to serve the community, spread awareness, build competencies, establish joint projects and implement future plans, to contribute to achieving the higher national goals, especially the UAE vision 2021, and beyond, in implementation of our wise leadership's directives to work together to create a sustainable and happy future for the society." Wang Su, Vice President of Huawei Middle East Marketing, said, "5G and IoT OpenLab will be an important innovative cross-industry platform for operators, third parties and vertical industries in the UAE. It will help all those accessing the latest 5G and IoT technology, understanding application scenarios, developing innovative services and aggregating the 5G & IoT ecosystem for the local market. "Through the OpenLab platform, Huawei will work with customers and partners around

the world to develop the best possible industry-specific solutions, enrich local ICT industry ecosystems, address challenges and future demands in line with the requirements of local markets, and keep driving customers to go digital." The UAE 5G Conference, organized by the TRA, with the participation of prominent officials and experts in this field, aims to discuss the reality, prospects, challenges and opportunities related to 5G.

(December 9, 2019) wam.ae

The UAE's Telecommunications Regulatory Authority (TRA) is working on Cybersecurity policy for a cloud-based future, according to Eng. Abdulrahman Almarzouqi, Director of Cybersecurity TRA. "Everything will be moving to the cloud, and so the security of the cloud is very important," said Almarzouqi, speaking at the Gartner Security & Risk Management Summit in Dubai. Almarzouqi said that the TRA is working on a comprehensive policy for cloud security, including for public and private use. Organizations are likely to implement their cloud strategies gradually, and Almarzouqi said private companies could classify their data and begin migrating to the cloud by moving their least critical data first. As they gain in cloud confidence, they could then move more of their data to the cloud. Almarzouqi also confirmed that the TRA is looking at the cybersecurity aspects of other fast developing technologies including IoT, AI and Big Data. The TRA is actively working with other organizations including international bodies such as the International Telecommunications Union to ensure that its policies are in line with international standards and practices. In terms of preventing cyberbreaches, Almarzouqi said that user awareness is a key priority. Social engineering is 'the number-1 way' that cybercriminals penetrate user information and assets. Awareness of the need to have multi-factor authentication and strong passwords is vital to preventing cyberattacks, according to Almarzouqi. Middle East and North Africa (MENA) enterprise information security and risk management spending will total US$1.7 billion in 2020, an increase of 10.7% from 2019, according to a recent forecast by Gartner, Inc. "The double-digit growth is a reflection of how organizations in MENA region are coming up to speed with their global counterparts in adopting information security and risk management solutions," said Sam Olyaei, Research Director at Gartner. "More importantly, an evolving threat landscape and the advent of Digital Transformation is forcing local security and risk leaders to re-evaluate their spending priorities."

(November 16, 2019) intelligentcio.com

The UAE concluded its participation in the World Radiocommunication Conference 2019, WRC-19, held in Sharm El Sheikh, with the participation of 165 Member States, thus contributing significantly in highlighting the role of the Arab Spectrum Management Group, ASMG, and presenting many working papers and opinions on all the topics of the agenda. The UAE also made many proposals that helped bridge opinions between the participating countries and reach solutions that achieve satisfactory results for the UAE in particular and the Arab region in general. The UAE participated with a high-level delegation including the Telecommunications Regulatory Authority, TRA, the Armed Forces, the Ministry of Interior and the UAE service providers. Tariq Al Awadhi, Executive Director Spectrum Affairs and the Head of the ASMG, said, "The success of the UAE's participation in the conference is the result of early preparations, which started immediately after the WRC-15, where a national team was assigned to prepare for the WRC-19. The team was chaired by the TRA and included all relevant government entities, as well as operators, manufacturers and suppliers, to benefit from their expertise in achieving the interests of the country and shaping the future of spectrum management." WRC-19 addressed the requirements of leading technological innovations that can play a pivotal role in the digital economy in the future, including allocating additional frequency bands for IMT, enabling the implementation of IMT networks (5G), Earth Stations in Motion that facilitate communication from aircraft, ships and land vehicles with satellites in the geostationary-satellite orbit, etc. During the conference, several important decisions were taken, including the approval of additional spectrum allocations for IMT 2020 (5G technology). At the WRC-19, Al Awadhi was appointed Vice-Chairman of the Conference as the Head of the ASMG. The TRA also received numerous leadership positions for the next session.

(December4, 2019) wam.ae

REGULATORY ACTIVITIES BEYOND THE SAMENA REGION

Angola

Applications for pre-qualification in Angola's public tender for the assignment of a fourth Unified Global license – permitting mobile and fixed voice/data plus TV services – are due by 22 January 2020 after the deadline was extended for a second time. The telecoms regulator, Angolan Institute of Communications (INACOM), said in its announcement published in state newspaper Jornal de Angola on Monday that the extension was made to 'provide greater flexibility for the presentation of applications'. The government launched the tender on 30 September 2019, initially giving interested parties until 8 November to submit applications, before extending the deadline to 8 December, with a Ministry of Finance source claiming the initial extension was requested by prospective international bidders. In a second phase, qualified candidates will submit their full technical and financial proposals within 60 days for consideration by an evaluation committee. The government is looking to introduce further competition to existing mobile operators Unitel and Movicel, and fixed operator Angola Telecom (AT) which holds the third Unified Global license and is in the process of deploying its own cellular network, whilst Angorascom (associated with Egyptian tycoon Naguib Sawiris) was last month handed permission to partner AT in developing mobile services, with a launch expected by February 2021. A previous license award – to local start-up Telstar – was annulled by Angola's President Joao Lourenco in April 2019 citing 'non-compliance with the terms of the procedure'.(December 11, 2109) commsupdate.com

The Chairman of the Angolan Institute of Communications (INACOM), Leonel Augusto, has confirmed that from the first quarter of 2020 interested parties may apply for new 'Multi-Service' operating licenses, which can cover various services potentially including fixed telephony, fixed internet, cable/satellite TV or mobile voice/data (dependent on availability of spectrum and other resources). As reported by media, prospective licensees can apply via the government's Public Electronic Services Portal. Multi-Service licensing is separate from Angola's in-progress tender for a fourth 'Unified Global' license permitting mobile and fixed voice/internet plus TV services – applications for which are due by 22 January 2020, as previously reported. Mr Augusto also stated this week that the Ministry of Telecommunications & Information Technologies will disclose the Unified Global applicants immediately after the deadline. The existing Unified Global licensees are cellcos Unitel and Movicel, alongside Angola Telecom which is in the process of deploying mobile infrastructure and developing mobile services with new partner company Angorascom. The INACOM chairman also announced on Tuesday (17 December 2019) that Angola has reached 14 million mobile network users, seven million of which use mobile internet, Mercado reported. According to TeleGeography's GlobalComms Database, the top-level mobile figure was estimated at 13.77 million at end-September 2019, up from 13.29 million reported by INACOM at end-2018, whilst the mobile internet (2.5G, 3G and 4G) total rose from 5.82 million at end-2018. With the current national mobile penetration rate not quite reaching 50%, however, Mr. Augusto declared that the sector needed continual new investment to serve more of the population.

(December 20, 2109) Jornal de Angola

Australia

Action is being taken against eleven telecoms providers for failing to comply with consumer protection rules, the Australian Communications and Media Authority (ACMA) has announced. In a press release regarding the matter, the regulator specifically noted that M2 Commander has been issued with a formal warning for transferring a consumer's service from another telco without their consent. It said this transfer followed an unsolicited phone call to the consumer from an M2 Commander sales agent. According to ACMA Chairperson Nerida O'Loughlin, the breaches fall under the Telecommunications Consumer Protections (TCP) Code, and the executive was cited as saying: 'The case of transferring a consumer's service without their consent is particularly troubling … At no point did the consumer consent to having their service transferred. This transfer should simply not have occurred.' Meanwhile, in separate investigations a further ten telcos were found to have breached the TCP Code by failing to lodge annual compliance statements with independent monitoring group, Communications Compliance. The operators were named as: CNS Group Australia, Exetel, Novel Telecom, Real Sim, Red Broadband, Simply NBN, Telco4U, Trikon, Uniti Wireless and Voiteck. With the ACMA having now officially directed these providers to submit annual compliance

statements to show they are meeting their obligations, they risk facing further action such as fines or court proceedings should they fail to do so. Since July 2018, the ACMA has issued 14 directions and seven formal warnings to telcos for failing to comply with the TCP Code, and following the latest developments Ms. O'Loughlin said: 'We take breaches of the TCP Code very seriously. When telcos are failing their own customers it is not good enough … These actions serve as a message to the wider industry that the ACMA will pursue failures to comply with consumer protection rules.' (November 7, 2019) telegeography.com

Existing price and non-price terms for seven declared, or regulated, fixed line wholesale services are to be maintained until 30 June 2024, the Australian Competition and Consumer Commission (ACCC) has announced. In a press release regarding the matter, the ACCC listed the seven declared services – predominantly supplied by Telstra – as being: the unconditioned local loop service (ULLS), line sharing service (LSS), wholesale line rental (WLR), local carriage service (LCS), fixed originating and terminating access services (FOAS and FTAS), and wholesale ADSL. It has been suggested that the ACCC's decision will effectively mean that wholesale prices for non-NBN fixed line services will reduce in real terms over the next five years. This decision is expected to be the last to be made by the ACCC in relation to most of these fixed line services, as with the National Broadband Network rollout expected to be completed in June 2020, the migration of most customers from Telstra's legacy networks to the new infrastructure is expected to be mostly done by 2022. The ACCC's decision will come into effect on 15 November 2019 and follows a fixed line service Final Access Determination public inquiry conducted by the regulator. Commenting on the matter, ACCC Chair Rod Sims said: 'Our decision will provide real price reductions and certainty for the industry in relation to voice and broadband services which are still being provided through Telstra's copper network and other legacy infrastructure … Maintaining the current prices and other terms of access will give the industry some certainty and stability as the NBN migration continues.'

(November 1, 2019) telegeography.com

Austria

The Regulatory Authority for Broadcasting and Telecoms (RTR) has published the conditions for the country's 'second 5G auction', which is scheduled to take place in spring 2020. The regulator is looking to award licenses for spectrum in the 700MHz, 1500MHz and 2100MHz frequency bands. Following two public consultations on the auction conditions, the RTR says it has re-examined the potential costs incurred by operators for a nationwide supply of services and has decided to lower the minimum bid by EUR55 million (USD61 million), to EUR239.3 million, while also increasing the duration of the licenses from 20 to around 25 years. Interested parties have until April 2020 to prepare for the auction. The auction will be divided into two phases: the first will see frequencies in the 700MHz (six blocks) and 2100MHz (twelve blocks) bands allocated, with eight blocks of 1500MHz spectrum set to be awarded in the second stage. In terms of coverage obligations, 700MHz license winners will be obliged to supply 900 underserved communities. In addition, a 'bonus system' has been developed whereby operators will be able to gain a reduction in the spectrum price if they agree to cover additional underserved areas.

(December 12, 2109) commsupdate.com

Belgium

The Belgian Digital Agenda and Telecoms Minister, Philippe De Backer, hopes a proposal to place the proceeds of the country's 5G spectrum auction in a blocked account will enable a sale to go ahead before the end of 2020, reports Datanews. The auction has been delayed by a disagreement with the country's regional governments over how the anticipated EUR680 million (USD745.2 million) raised by the sale should be distributed. The minister told a recent press conference that the solution would enable the Consultation Committee – the consultative body comprising the country's various governments – to discuss the issue early next year, with a view to staging an auction before the end of 2020. 'At that point, we can spend as long as needed arguing about how to distribute the proceeds, but in the meantime, the 5G rollout can go ahead', he said. De Backer also suggested the auction proceeds could be used to invest in 5G infrastructure. However, the country's mobile operators are not thought to be keen on this idea, as it could make Belgium more attractive for a fourth competitor.

(December 6, 2109) commsupdate.com

Brazil

The process to sell Brazilian regional telecoms operator Sercomtel will commence in February 2020. An auction for the company's shares will commence on 5 February, with the reserve price for the telco set at BRL130 million (USD32 million). The tender paperwork notes that there is a need to 'restructure the company to provide increased investments, operational management improvements, expansion of customer service infrastructure, an increase in the quality of the services provided and, above all, improved economic-financial performance'. In May 2019 the City Council of Londrina – which holds a 50.88% stake in the telco – voted to privatize Sercomtel after an 18-1 ballot in favor of the proposal. Regional power company Companhia Paranaense de Energia (Copel) holds a 45.00% stake in the operator, with the remaining 4.12% distributed between minority shareholders. In July 2019 minority shareholders Marcelo Kneese and Heber Wedemann, who run Dez de Dezembro Investimentos e Participacoes, withdrew a BRL120 million takeover offer, blaming unresolved issues concerning the telco's complicated corporate structure.

(December 19, 2109) BNAmericas

Bulgaria

A regulatory proposal to reduce frequency fees could see Bulgaria's government begin issuing 5G-ready spectrum in the second quarter of 2020. Ivan Dimitrov, the head of Bulgaria's Communication Regulation Commission (CRC), confirmed that frequencies in the 700MHz and 3600MHz bands would be made available. The regulator – with the backing of the transport ministry - has proposed cutting fees by 30%-50% to expedite 5G deployment. The Council of Ministers will vote on the proposal, with pricing to be decided depending on whether it is adopted. Dimitrov commented: "The idea is to find the proper balance – to pay enough for the frequencies but also have enough funds left to invest in the necessary infrastructure for 5G." Bulgaria's three operators - A1, Telenor and Vivacom – have stated that they will likely cooperate in order to split the hefty investment costs for 5G, which could total as much as BGN800 million (USD453 million) across the next three to four years. Vivacom CEO Atanas Dobrev noted that 5G equipment at present costs around four times as much as 4G and 3G network kit. All of the operators have begun 5G trials in the country.

(November 24, 2019) developingtelecoms.com

Cambodia

Cambodian mobile operator Smart Axiata has said it is ready to roll out 5G services but is waiting for permission from the Ministry of Posts and Telecommunications Cambodia (MPTC) before it can do so. The operator's CEO Thomas Hundt told that talks are underway with the Ministry with a view to securing the necessary approvals for 5G-suitable spectrum. In July Smart Axiata conducted a live 5G trial in the capital Phnom Penh using a mobile device from Chinese equipment vendor Huawei. The firm said that when commercial rollout begins in the next few years, 5G coverage will initially be centered on 'hotspots' in major cities.

(November 14, 2019) The Khmer Times

Canada

The Competition Bureau has published a submission to the Canadian Radio-television and Telecommunications Commission (CRTC's) mobile market review, in which it says consumers could save substantially on their wireless bills if major national cellcos Bell, Rogers and Telus were faced with more competition from regional carriers like Freedom Mobile and Videotron, as well as MVNOs. The Bureau found that Bell, Rogers and Telus are able to charge higher prices in most of Canada where they possess market power but regional players like Freedom and Videotron are increasingly disrupting the market – with prices up to 35%-40% lower in areas with a 'disruptor' presence. The Bureau recommended that the CRTC pursue a roaming/MVNO policy including mandating Bell, Rogers and Telus to sell temporary access to their wireless networks to regional carriers who intend to invest and further expand their own networks, to spur additional price competition in the short term while avoiding the risk of declining network quality in the long term. (November 26, 2019) telegeography.com

Chile

Chile's Antitrust Tribunal (Tribunal de Defensa de la Libre Competencia, TDLC) has reached a decision regarding new spectrum holding limits, largely supporting the most recent proposals of sector watchdog the Department of Telecommunications (Subsecretaria de Telecomunicaciones, Subtel), for flexible limits. Under the new rules, limits are set by macro-band and are imposed on each territorial zone. The five defined macro bands are: 'Low' – less than 1GHz; 'Middle Low' – 1GHz to 3GHz; 'Middle' 3GHz and 6GHz; 'Middle High' – 6GHz to 24GHz; and 'High' – more than 24GHz. For the Low and Middle Low bands, the TDLC established

maximum holdings of 35% and 30% respectively, whilst the Middle High range was given no limit as it is not currently assigned for mobile communications. For the Middle range, meanwhile, the regulator set out a gradual transition with Subtel initially instructed not to auction adjacent blocks that are less than 40MHz per operator. In the medium term, Subtel must ensure that there are at least four operators using the band with no less than 40MHz of contiguous spectrum apiece and in the long term a limit of 30% will apply, and each provider must have a minimum of 80MHz of contiguous spectrum. Concerning the High band, the TDLC similarly set short, medium and long term requirements for Subtel. To begin with, Subtel must ensure that there are two operators using the band, each with at least 400MHz, increasing to four providers in the medium term. Finally a cap of 25% will be applied, and the watchdog must ensure that there are four providers using the airwaves, each with a minimum of 800MHz contiguous spectrum. The TDLC also notes in its decision that there should be a gradual transition to the new rules, carried out via future spectrum auctions. The new system replaces the previous cap of 60MHz across all bands, which had been set by the Supreme Court back in 2009 but was then ignored by operators and regulators as being insufficient, leading to a legal battle over the allocation of 700MHz spectrum in 2014, which put three of the nation's cellcos over that limit. The courts eventually ruled against the trio of licensees in mid-2018, chastising the authorities for simply ignoring the earlier order rather than taking measures to amend or remove the cap. (December 6, 2019) commsupdate.com

Chilean mobile operators Entel, Claro and Movistar have reportedly informed the Department of Telecommunications (Subsecretaria de Telecomunicaciones, Subtel) that they are willing to return surplus spectrum in the 3.5GHz band, thus bringing to an end a lengthy impasse. Other frequencies will also be relinquished, as the players in question seek to comply with spectrum caps. The Entel will return 20MHz of spectrum in the 3.5GHz via the modification of its existing concession, while its long-distance operating unit Transam Comunicaciones (acquired back in 2010) will return 10MHz in the 900MHz band in the form of 14 regional permits. Claro will also relinquish 20MHz in the 3.5GHz band, while Movistar has agreed to part with 10MHz in the 1900MHz band and a further 10MHz block of regional 3.5GHz spectrum. Subtel has notified the Antitrust Tribunal (Tribunal de Defensa de la Libre Competencia, TDLC) of the outcome. Going forward, all three operators are now obliged to free up the agreed spectrum within a two-year timeframe. (November 1, 2019) La Tercera

China

Nationwide mobile number portability (MNP) services are set to go live in China on 1 December, under regulations published by sector regulator the Ministry of Industry and Information Technology (MIIT). The service will allow mobile subscribers – excluding IoT users – to retain their mobile number when they move to a different service provider. The service will be supervised and managed by the watchdog and the local communications administrations of the provinces, autonomous regions and municipalities directly under the central government, but operators themselves are understood to be responsible for providing the service. Under the new MNP regulations, operators are required to provide users with information regarding the porting service, including conditions and procedures as well as potential risks. The regulations feature a general requirement that providers 'jointly maintain a healthy and orderly market environment,' and stipulates that operators cooperate to ensure service quality is maintained after a number is ported. A number of specific anti-competitive behaviors are also highlighted as forbidden, such as: refusing or blocking a number transfer without justification; creating special tariff plans for MNP users; and conducting marketing that targets users of a named rival provider or, more broadly, 'vilifying other telecommunication business operators'. (November 12, 2019) telegeography.com

Colombia

Undeterred by the lack of interest in its recent attempt to stage a multi-band frequency auction, Colombia's Ministry of Information Technologies and Communications (MinTIC) says it will now run the spectrum sale on 20 December. Relaunching the process, ICT Minister Sylvia Constain commented: 'This is an auction that is not looking to maximize financial income, but to maximize social welfare. The resolution presented today has very clear objectives to connect Colombians, especially those who are in the most remote and disadvantaged places.' the first attempt had been scheduled to take place on 12 December, but stalled after only market leader Claro registered to participate. It was suggested that Tigo and Movistar were reluctant to enter the fray because of the lack of published reserve prices. Would-be bidders must now register their interest by 2 December. The spectrum auction is slated to include 2×45MHz blocks of 700MHz spectrum (703MHz-748MHz/758MHz-803MHz) split into four 2×10MHz blocks and one 2×5MHz portion; plus a 2×2.5MHz 1900MHz block and eight 10MHz blocks in the 2500MHz band. (November 29, 2019) telegeography.com

Croatia

The Croatian Competition Agency (Agencija za zastitu trzisnog natjecanja, AZTN) has opened a Phase II investigation into the sale of Tele2 Croatia to United Group. Sweden's Tele2 Group, which announced plans to sell its Croatian unit at the end of May, says the EUR220 million (USD242 million) deal should be completed in the first half of next year, subject to regulatory clearance. United Group has a number of telecoms and media operations across southeast Europe, while Tele2 is the smallest of Croatia's three mobile network operators (MNOs), with around 19% of all subscribers. (November 26, 2019) telegeography.com

Cuba

The state-owned telecoms operator Empresa de Telecomunicaciones de Cuba (ETECSA) has announced that its mobile subscriber base has reached six million. The milestone follows the opening up of 3G services to Cuban citizens twelve months ago and the launch of 4G for pre-paid customers in October. ETECSA had a total of 5.37 million wireless subscribers at the end of 2018. (December 19, 2019) commsupdate.com

Cyprus

The government of Cyprus is planning to hold a 5G tender in March 2020, to award the spectrum available in the 700MHz and 3.6GHz bands, the Financial Mirror writes. The OCECPR is aiming to allocate the 5G-suitable spectrum in the 700MHz band by 30 June 2020, while the 3.6GHz spectrum will be allocated by 31 December 2020. (December 20, 2019) commsupdate.com

The leaders of three Cypriot opposition parties – the Democratic Party (Diko), the Progressive Party of Working People (Akel) and the Green Party – have stated that they would not approve a budget of EUR500,000 (USD553,000) earmarked for studies on whether Cyprus Telecommunications Authority (Cyta) should sell shares and forge partnerships, arguing this would be just an indirect way of privatizing the operator. Cyta's board Chairperson Rena Rouvitha Panou told MPs that Cyta's post-tax surplus for 2018 amounted to EUR60.6 million, claiming this was the highest level of profit for the last seven years. Regarding 2019, the executive said that based on indications to date, 'the post-tax surplus is estimated to be significantly higher than budgeted, while an increase in the total revenue of the utility is expected, reversing the trend of decreasing revenue in recent years.' Following the meeting, Committee Chairman and Diko MP Angelos Votsis stated that the improving financial results were 'proof that the company is right to remain as is and continue to offer quality services', adding that his party would not approve the budget for studies on whether the utility should issue shares or make partnerships, as 'this is an indirect way to discuss privatization again.' The privatization of public organizations including Cyta was one of Cyprus' commitments to its Troika of international lenders – the IMF, the EC and the European Central Bank (ECB) – which was met with resistance from the opposition and the company itself. While a new bill outlining the privatization was to be presented to parliament in January 2017, the process has since stalled due to disagreements between the majorities of parties in parliament.

(November 21, 2019) telegeography.com

Czech Republic

The government of Czechia may postpone the planned auction of 5G mobile frequencies from January to mid-2020 in a bid to entice greater participation in the process, minister of industry and trade Karel Havlicek is quoted as saying Tuesday (17 December). With the Czech authorities keen to attract a new national mobile operator to drive competition in a market where the high cost of services have been a perennial complaint of users, CTK news agency quoted Mr. Havlicek as confirming the reason for the delay before the tender takes place for 700MHz and 3500MHz frequencies. 'If it has been debated for several years, then it is not the most important thing whether it will take place in January or May,' Havlicek said, adding that the prospective fourth operator should 'crash' the competitive landscape. As previously reported by TeleGeography's CommsUpdate, in October this year – following a public consultation on the draft terms and conditions of the auction of 5G network frequencies in the 700MHz and 3400MHz–3600MHz (3.5GHz) bands – the Czech Telecommunication Office (CTU) revised its framework dates for conducting the selection process, with the call for tenders postponed from autumn 2019 until the beginning of January 2020. The watchdog is seeking to allocate the frequencies in a bid to bolster competition in the Czech market where high prices have long been criticized by politicians and end users alike. Previously, in June 2019, the CTU published the draft plan of the 5G auction, the terms and conditions of which are based on previously published principles which the regulator documented over the past year in its efforts to maximize the transparency of the

selection process. The regulator notes that, in order to fulfil one of the main objectives of the auction – to deepen competition on the electronic communications market – it is reserving a 2×10MHz block of spectrum at 700MHz for a new operator(s). Further, newcomer(s) will be allowed to compete for another 5MHz, but if none of the new entrants in the first auction round show interest in this reserved block, it will open it up and offer it to all auction participants. However, one domestic operator – Nordic Telecom – argued that the amount of frequency for newcomers should be higher, and also said the amount of time required for covering the country should be shortened to ensure the auction is for serious bidders. Nordic Telecom has more than 100,000 customers, offering high speed wireless internet through its network and is aiming to use the auction to enter the mobile sector. Operators in the 5G auction will have to commit to giving coverage to cities without high speed internet, reaching 95% within three years. Further, transportation corridors and 95% of towns and cities with populations of more than 50,000 should be covered by 2025. Concurrently, in the 3.5GHz band the CTU aims to set 'a new spectral limit for the new operator compared to the existing operators'. Additional Ts&Cs include the rule that any existing operators participating in the 700MHz band auction will assume a national roaming commitment (valid for six years), and what the watchdog terms 'development criteria that ensure that frequencies are handled efficiently'.

(December 18, 2019) commsupdate.com

The Czech Senate has reportedly passed an amendment to the country's telecoms law that should – if signed into law by President Milos Zeman – make it easier for people to switch service provider. The proposed changes, which seek a reduction in the financial penalties levied on users for switching provider and a cut in the time allowed to switch their number, could enter into law from April 2020. With Czechia's incumbent operators understood to be anticipating the changes, it is understood the fine for early termination will be slashed to 5% of the outstanding contract cost (from 20%), while the target for switching provider will be reduced from ten days to just two. Further, people on a fixed line contract will no longer have to pay a penalty after three months of signing up, while to support the change the government is planning to introduce new 'tools' to make it easier for consumers to decide which providers are offering the best deals. The amendment to the law will also usher in sanctions for failure to comply with the European regulation on the price of calls and text messages abroad within the European Union, the report read, noting that an EC report published in 2018 lambasted Czechia for having some of the highest mobile charges anywhere in Europe – with all tariff plans being more than the EU average.

(November 11, 2019) expats.cz

Ecuador

The Ecuadorian government has announced plans to make mobile and internet connectivity more affordable in rural areas of the country, after agreeing a deal with Claro, Movistar and CNT. Speaking at a press event, Telecoms Minister Andres Michelena explained the price of internet access will be reduced by around 55%, to USD11 a month in December and USD9.50 from March 2020. The program aims to ensure internet access is available across 98% of the country's territory by increasing 4G network coverage and deploying 1,450 free Wi-Fi hotspots. The telcos plan to introduce mobile phone plans costing as little as USD1 a month and pre-paid internet packages priced from USD5 for a 3MB data allowance. They will also work together to build shared mobile sites in areas with no internet access in order to provide cheaper connectivity. The government hopes the plan, which is subject to approval of its draft budget, will enable an additional 127,000 households to access the internet.

(November 29, 2019) El Telegrafo

The Minister for Telecommunications & Information Society, Andres Michelena Ayala, has confirmed that the sale of spectrum in the 700MHz, 1700MHz, 2.5GHz and 3.GHz frequency bands will not take place before 2020. The government had originally intended to allocate 700MHz and 2.5GHz spectrum in November 2019 in an effort to increase 4G coverage from 50% to 80% by 2021, in line with the 'Ecuador Digital' strategy unveiled in May. The minister highlighted that Ecuador is second only to Costa Rica in Latin America in terms of available spectrum, and that next year's allocation would increase the amount in use from 26% to 68%. The government hopes the additional frequencies will enable 5G services to be launched commercially by 2022. (November 19, 2019) TeleSemana

El Salvador

The Electricity and Telecommunications Superintendency (Superintendencia General de Electricidad y Telecom, SIGET) has announced the results of the long-delayed auction of 120MHz of mobile spectrum in the 1700MHz/2100MHz (AWS and Extended AWS) bands. Divided into twelve lots of 2×5MHz, the frequencies on offer include 90MHz in the 1710MHz-1755MHz/2110MHz-2155MHz (AWS) range and a further 30MHz in the 1755MHz-1770MHz/2155MHz-2170MHz (Extended AWS) band. Two incumbent mobile operators secured spectrum in the process, with Telemovil (Tigo) acquiring five blocks

of 2×5MHz and CTE Telecom Personal (Claro) walking away with four, while SIGET has retained the remaining three blocks for future allocation. Each block of 2×5MHz had a reserve price of USD6.25 million. SIGET is also set to auction off 20MHz of mobile spectrum in the 1900MHz (PCS) band later this week. Divided into two lots of 2×5MHz, the frequencies on offer include 10MHz in the 1850MHz-1855MHz/1930MHz-1935MHz range, and a further 10MHz in the 1855MHz-1860MHz/1935MHz-1940MHz band. Each block of 2×5MHz has a reserve price of USD6.25 million.

(December 9, 2019) commsupdate.com

The Electricity and Telecommunications Superintendency (SIGET) has announced it will hold the long-delayed auction of 120MHz of mobile spectrum in the 1700MHz/2100MHz (AWS and Extended AWS) band. Divided into twelve lots of 2×5MHz, the frequencies on offer include 90MHz in the 1710MHz-1755MHz/2110MHz-2155MHz (AWS) range and a further 30MHz in the 1755MHz-1770MHz/2155MHz-2170MHz (Extended AWS) band. Each block of 2×5MHz has a reserve price of USD6.25 million. The regulator has invited interested parties to submit applications by the end of 27 November, with the auction set to take place on 5 December. Previously, SIGET had earmarked a further 20MHz of spectrum in the 1850MHz-1860MHz/1930MHz-1940MHz band for allocation alongside the AWS frequencies, but no announcement has been made on when this might now take place.

(November 8, 2019) telegeography.com

Ethiopia

Safaricom of Kenya has confirmed that it will register a bid for one of the two new licenses being tendered by the Ethiopian Communications Authority (ECA). The Kenyan market leader will be supported in its bid by its indirect shareholder, Vodacom Group of South Africa. Reuters quotes Safaricom's interim CEO Michael Joseph as suggesting that the cost of the license could reach as much as USD1 billion, when the cost of spectrum is factored in. Ethiopia plans to award two telecoms licenses to international telecoms operators by April 2020. According to Brook Taye, senior advisor to the Ministry of Finance, a total of 22 companies have shown an interest in the new concessions to date. Mr. Taye told the Addis Fortune: 'We'll shortlist eight to nine companies and will send a request for proposals for these companies in one month.' This aspect of the process is expected to take place before 30 November.

(November 4, 2019) telegeography.com

France

The French government has launched a procedure for the assignment of 5G frequency authorizations, following approval of the specifications proposed by telecoms regulator Arcep and the financial conditions for the concessions. The government has set the price of the 50MHz blocks of 3.4GHz-3.8GHz spectrum at EUR350 million (USD386 million), while the additional blocks of 10MHz will cost EUR70 million. Junior Economy Minister Agnes Pannier-Runacher said that the government and Arcep have designed a mechanism to sell 50MHz basic blocks at a fixed price to telecom operators, though the concessions come with strict obligations to deploy 5G networks across the French territory: 'These 5G coverage commitments are much more ambitious than in other European countries and will in future constitute a strong element of our country's competitiveness.' Arcep meanwhile said in a separate statement that it plans to sell 310MHz of spectrum; operators will be given 15 years to pay for the four 50MHz blocks on offer, while the additional 10MHz ranges will be payable over four years.

(December 18, 2019) commsupdate.com

According to France's Minister, the country's 5G spectrum will be sold for a massive floor price of $2.4 billion (2.17 billion euros). A recent statement by France's Minister indicates that the country's 5G spectrum is up for sale, with a massive floor price. The initial price will be 2.17 billion euros, which is around $2.4 billion. The amount comes as quite a surprise since earlier reports from the country's telecoms regulator priced 5G significantly below this amount. The regulator, known as Arcep, previously decided that the spectrum's initial price should be at around EUR 1.5 billion. However, according to Arcep's President, Sebastien Soriano, the country's Economy Ministry has the final word on the 5G spectrum's floor price. According to Agnès Pannier-Runacher, the Junior Economy Minister, the proposed price seems more than reasonable. The ministry has provided its recommendation, and now it is up to the government to 'assume its responsibilities and decide. The sale of the 5G spectrum was expected for a long time, and the announcement finally came last Thursday. The announcement comes after months of negotiations between France's authorities and its four major telecoms (Orange, Altice Europe's SFR, Iliad, and Bouygues Telecoms) regarding the methods of 5G's deployment. Telecoms and the government also had trouble reaching an agreement regarding the auction and the minimum price for the spectrum, according to unnamed sources. The authorities were seemingly focusing on finding the balance between

raising enough money, but they also did not wish to put a major financial burden on the operators. This indicates that their goal was and is to launch the new technology as quickly as possible. There is no doubt that the 5G spectrum is an expensive technology, as proven by Italy and Germany already. These countries raised around 6.5 billion euros each. The amounts seen in their auctions were extremely surprising to French telecoms, which caused further concerns.

(November 27, 2019) news.beincrypto.com

Arcep has adopted its decision on the terms and conditions for the allocation of 5G-suitable frequency authorizations in the 3.4GHz-3.8GHz band in metropolitan France and forwarded it to the government. The authority stated that the adopted terms and conditions had been adjusted to take into account feedback from its public consultation (July-September 2019), with Arcep now planning to award blocks of 50MHz each (60MHz previously) on the recommendation of the government. The frequencies will be allocated for a period of 15 years and the duration could be extended by five years. The authority said in a press release: 'It is now up to the government to set the financial conditions for this call for applications, in particular the reserve price(s), and to launch the frequency allocation procedure. Arcep will be extremely vigilant of the level chosen for this reserve price, which will have to be submitted to it for opinion. In this respect, it is necessary to distinguish between the reserve price and estimated valuation of the band. Arcep stands ready to conduct the frequency assignment procedure, so that the first 5G commercial services can open during the year 2020.' The specifications include a set of obligations for all winners of 5G spectrum, which include the launch of 5G services in at least two cities by the operator before the end of 2020, and obligations to support the deployment of 5G equipment in the 3.4GHz-3.8GHz band as follows: 3,000 sites by 2022, 8,000 (2024) and 10,500 (2025). Arcep also provides for a mechanism to ensure that non-urban areas will also benefit from these deployments. Thus, 25% of the 3.4GHz-3.8GHz band sites in 2024 and 2025 will have to be deployed in areas outside the main agglomerations. By 2022, at least 75% of the sites must have a bit rate of at least 240Mbps, which will be gradually extended to all sites by 2030. Operators will also be required to activate network slicing by 2023 at the latest.

(November 22, 2019) telegeography.com

Disagreements between France's communications regulator and its Finance Ministry on pricing and other details of the country's 5G spectrum auction were tipped to hold-up the process until at least March 2020, Reuters reported. Citing un-named sources, the news publication said regulator Arcep and the finance ministry were yet to agree on the amount of spectrum being auctioned and the starting price for lots, delaying the start of the legal process leading to the sale. Its original aim was to begin the auction in January, though this will apparently now be March at the earliest. Arcep opened a public consultation into the process in July with, at the time, the possibility of an Autumn auction being floated. France is already behind other large European countries when it comes to auctioning spectrum for 5G services, with the UK, Spain, Germany and Italy all having completed the process months ago and the first services already live. Operators, however, have been granted licenses for test deployments and authorities have repeatedly stated 2020 as the launch date for commercial services. The country's four operators Orange, SFR, Iliad and Bouygues are all expected to compete for licenses.

(November 19, 2019) mobileworldlive.com

French telecom authority Arcep published its latest dashboard on the transition to IPv6 in France, showing that industry players are not moving fast enough to deal with the expected shortage of IPv4 addresses. The regulator is urging operators and the wider internet ecosystem to step up their efforts and accelerate their deployment plans. It has also renewed a call to join a new IPv6 task force, recently created by Arcep in partnership with Internet Society France. Free and Orange have remained well ahead of rivals Bouygues Telecom and SFR in rolling out IPv6 across their fixed networks. At end-June, Free led with 80 percent of customers already active on IPv6, followed by Orange with 68 percent. Bouygues Telecom and SFR continued to trail at a distance with rates of 20 percent and 7 percent respectively. On mobile networks, the roll-out of IPv6 by the main operators has advanced at a much slower pace, with the exception of Bouygues Telecom. The proportion of customers active on IPv6 was close to zero for Orange, Free Mobile and SFR, as of the end of June. Bouygues Telecom made significant progress with customers using Android devices (nearly 80 percent of them already active), but had yet to make a move from IPv6-ready to active use for those with iPhones. (November 18, 2019) telecompaper.com

Germany

German operator 1&1 Drillisch has announced the signing of an agreement with Telefonica Deutschland to lease spectrum for the rollout of its own 5G mobile network. Drillisch Online, a wholly owned subsidiary of 1&1 Drillisch, will lease two frequency blocks of 10MHz each in the 2.6GHz band. The agreement is based on a commitment by Telefonica as part of the EU antitrust approval of its merger with E-Plus in 2014. The two frequency blocks will be available to 1&1 Drillisch until 31 December 2025. The agreement is subject to the

approval of the Federal Network Agency (FNA). At the FNA's auction of 5G spectrum in the 2GHz and 3.6GHz ranges, which ended in June 2019, 1&1 Drillisch acquired a total of two frequency blocks of 10MHz in the 2GHz band and five frequency blocks of 10MHz in the 3.6GHz band. While the 3.6GHz spectrum is already available, the frequencies in the 2GHz band will not be useable until 1 January 2026.

(December 20, 2019) commsupdate.com

Haiti

In an attempt to draw a line under the long-running dispute over the price of 4G licenses in Haiti, President Jovenel Moise has reportedly set the price of the concessions at USD300 million. Mr. Moise said that 'When I arrived as the head of state, I heard that there was a licensee to award. For this licensee, I heard several figures: USD10 million, USD20 million, USD70 million dollars. I asked experts to do a study. Today, licenses of this type cost nearly USD300 million.' Back in November 2018 official National Council of Telecommunications (Conseil National des Telecommunications, Conatel) documentation emerged proposing drastically different prices for concessions for the country's two cellcos, Digicel and Natcom. Much to Digicel's consternation, the regulator had wanted to charge it USD315 million for a 15-year licensee, while Natcom – a 60/40 JV between Viettel Group and the Haitian government – was only liable for a USD120 million licensee fee. TeleGeography notes that Natcom launched a small-scale 4G network in September 2016 (continued operational status unclear) and went on to take receipt of an additional 2×5MHz block of 1700MHz 4G spectrum in August 2018. Digicel has yet to switch on its LTE network, but in a press release in May 2019 – to celebrate the 13th anniversary of its Haitian launch – CEO Maarten Boute noted: 'We are on the cusp of a new and very important investment phase to equip the country with a modern 4G LTE network.'

(December 17, 2019) Le Nouvelliste

Hong Kong

Hong Kong's latest 5G spectrum auction has raised a total of HKD665.1 million (USD84.9 million), with the four incumbent operators all winning frequencies. The Office of the Communications Authority (OFCA) was offering 100MHz of spectrum in the 3.3GHz band following auctions for 3.5GHz and 4.9GHz licenses last month and a 26GHz sale in March. Hutchison 3 and HKT both agreed to pay spectrum utilization fees (SUFs) of HKD199.5 million for 30MHz blocks, while SmarTone and China Mobile Hong Kong (CMHK) offered HKD133.0 million for 20MHz packets. The assignment of the spectrum will take effect next month, with a validity period of 15 years. In the previous auctions, all four firms won 3.5GHz concessions, while only CMHK and HKT bid for 4.9GHz permits. In addition, HKT, CMHK and SmarTone each acquired 400MHz of 26GHz frequencies in March this year; Hutchison 3 declined to take part in the award process, saying that there is sufficient spectrum available for 5G services in the lower bands, while the higher range frequencies are also not suitable for providing indoor coverage.

(November 6, 2019) telegeography.com

Hungary

Hungarian regulator the National Media & Infocommunications Authority (NMHH) has reiterated its decision to exclude DIGI from the bidding process for 5G mobile spectrum, although the announcement on the watchdog's website confirmed that the company may appeal in court. A preliminary ruling in September barred Romanian-backed DIGI for failing to meet bidding requirement whilst naming registered bidders as the country's three leading cellcos, Deutsche Telekom-backed Magyar Telekom, UK-owned Vodafone Hungary and Telenor Hungary, controlled by the Czech-backed PPF fund. The NMHH has declined to elaborate on the reasons for the decision so far. The 5G (700MHz, 2100MHz, 2600MHz and 3600MHz) tender, announced in June, was originally expected to be completed by end-October, but has been delayed. DIGI – part of the Digi Communications group – is well-established in Hungary as the second largest fixed broadband network operator behind Magyar Telekom, and it launched its 3G/4G mobile network in May this year aiming at bundled services with an initial free mobile services model, signing up 72,000 users by end-September. Furthermore, this month DIGI followed the lead of larger rival Vodafone by announcing a 5G base station pilot using existing 3.4GHz-3.8GHz spectrum. The NMHH's latest disclosure said: 'In the second instance, the chairman of the NMHH upheld the results of the formal investigation into the 5G frequency sale after Digi Communications NV appealed against the decision. The company may seek legal redress from the courts.'

(November 29, 2019) telegeography.com

India

Indian Minister of Commerce and Industry Piyush Goyal has warned that the government cannot intervene in matters relating to the Supreme Court's ruling on Adjusted Gross Revenue (AGR). The Economic Times cites the minister as saying that the government cannot take action on the issue 'proactively or suo motu,' adding that the state was nevertheless 'in continuous dialogue' with the industry. The AGR issue is between the Supreme Court and licensee holders, the official went on. As previously reported by TeleGeography's CommsUpdate, the ruling defined AGR – the figure on which India's telecom licensee fees are based – to include revenue from sources unrelated to telecom services. As such, the industry is facing a bill of around INR1.47 trillion (USD20.7 billion), whilst non-telcos that hold licenses are estimated to owe a further INR2.28 trillion. Whilst Mr. Goyal was sympathetic to the telco's situation, he noted that government-backed entities such as railway and gas firms RailTel and GAIL and telco Bharat Sanchar Nigam Limited (BSNL) were also facing substantial bills as a result of the court's decision. For its part, BSNL confirmed this week that it has asked the Department of Telecommunications (DoT) to waive its AGR dues of around INR49.9 billion. The loss-making operator's fees include a license fee of INR21.0 billion and spectrum usage charges (SUC) totaling INR28.9 billion. In a related development, Telecom Minister Ravi Shankar Prasad has criticized statements from Vodafone Group's leadership that the telco may have to withdraw from the market if the government does not provide relief. Vodafone Group is stakeholder in Vodafone Idea, one of the market's largest cellcos and one of the worst affected by the AGR decision. 'I don't appreciate this kind of statement,' the official was quoted as saying, adding: 'We have given all the opening for doing business but no one should dictate terms on us.' Mr Prasad went on to say that the ministry had done its best for the sector by offering operators a longer period to pay for spectrum as well as a two-year moratorium on spectrum payments. (December 17, 2019) commsupdate.com

New regulations covering mobile number portability (MNP) are set to come into force on 16 December, sector watchdog the Telecom Regulatory Authority of India (TRAI) has announced. The measures were introduced in December 2018 but implementation has encountered several delays, as the amendment requires a 'major shift in the mechanism for generating Unique Porting Code[s] (UPCs)' but would result in a faster porting process. Under the new regulations, operators must complete porting requests within the same circle within three days, or five days for inter-circle porting. The regulator noted that MNP will not be available for subscribers from 10 December to 15 December as companies migrate to the new system. (December 4, 2019) telegeography.com

The Indian government has approved a two-year moratorium on spectrum payments, providing relief of around INR420 billion (USD5.9 billion) to the beleaguered industry. The cabinet greenlit the measure to defer collection of spectrum auction fees due from service providers in the 2020-2021 and 2021-2022 fiscal years. Finance Minister Nirmala Sitharaman was quoted as saying that the deferred amounts would need to be equally spread across the remaining instalments, without an increase in the time period for making the payments. Whilst the decision was welcomed by the nation's cellcos, Telecom Minister Ravi Shankar Prasad poured water on hopes that the government might soften its stance on the recent Supreme Court ruling on adjusted gross revenue (AGR), with the official stating that the ministry was not considering waiving the penalties or interest on the dues related to the ruling. (November 21, 2019) The Economic Times

India's Department of Telecommunications (DoT) is reportedly looking to apply the Supreme Court's recent ruling on Adjusted Gross Revenue (AGR) definitions – on which certain license fees are based – to a wider array of firms that hold telecom licenses. The ministry has sought a 'legal opinion on the order's wider ambit,' and would pursue the matter once the applicability of the order has been clarified, noting that: 'some companies likely to have been impacted by the judgment might not even know that the DoT may raise demands and issue notices'. Firms potentially in the firing line include several utility and rail companies such as GAIL, Power Grid Corporation of India, and RailTel, which hold licenses for a range of telecom services. The apex court's decision to define AGR as the total revenue of the licensee, including income from non-telecom activities could lead to the companies incurring massive bills to the DoT, despite their limited involvement in the sector. A second official, meanwhile, noted that several public sector companies could be facing substantial liabilities and as such: 'This could be a case of revenue going from one pocket of the government to another'. The official suggested that an exemptions could be made in these cases. In a related development, meanwhile, mobile providers Bharti Airtel and Vodafone Idea – the two cellcos most affected by the AGR ruling – have announced that they will begin increasing tariffs from 1 December. Neither company revealed the extent to which prices would rise, or over how long. The cellcos have, however, been arguing for 'rationality in pricing' in the mobile sector, claiming that the damaging price war launched in September 2016 and a harsh regulatory environment have undermined the financial health of the industry.
(November 19, 2019) The Economic Times

The Department of Telecommunications (DoT) is reportedly challenging Bharti Airtel's takeover of

Tata Group's consumer mobile operations at the Supreme Court. Airtel completed its acquisition of the consumer mobile businesses of Tata Group's Tata Teleservices Limited (TTSL) and Tata Teleservices (Maharashtra) Limited (TTML) divisions on 1 July 2019 – and integrated the cellco's roughly 15 million mobile subscribers into its user base – following a ruling in its favor by the Telecom Disputes Settlement and Appellate Tribunal (TDSAT). According to the unnamed official, however, the DoT has not taken the merger on record and has instructed the heads of each circle to treat Airtel and Tata Teleservices Limited (TTSL) as separate entities. The source went on to state that the regulator is in the process of challenging the tie-up via two separate 'special leave' petitions before the Supreme Court. (November 11, 2019) Telegraph India

Indonesia

The Ministry of Communication and Information (MCI) in Indonesia, known locally as Kementerian Komunikasi dan Informatika (KemKominfo), is being urged not to extend the 2×30MHz 2300MHz frequency license of fixed-wireless broadband operator Berca Hardayaperkasa (trading as hinet), because broadband wireless access (BWA) is struggling to compete with rival services offered by the country's mobile operators. 'I see a very small possibility that 2.3GHz BWA telecommunications providers will be able to compete with cellular operators with GSM technology. This can be seen from the number of BWA 2.3GHz operators that have died, unable to compete with cellular providers such as Smartfren, which have the same frequency at 2.3GHz. Meanwhile, the development achievements of those that remain are very, very minimal. So [in my opinion] all BWA operators should not be eligible to have their licenses extended,' IndoTelko cites the Secretary General of the Telecommunications Policy and Regulation Center of the Bandung Institute of Technology (BTI), Dr. Mohammad Ridwan Effendi, as saying. The BTI official went on to claim that although Berca is licensed to offer its hinet 4G LTE service in eight zones (covering 21 provinces and 298 cities/municipalities), in the first ten years of operation it has only rolled out coverage to eight cities/municipalities. In Ridwan's opinion, Berca – a unit of Central Cipta Murdaya (CCM) – should realistically have built out its network across 'almost all the zones they won' rights to provide BWA services in by today, and now suggests that as per Article 23 Paragraph (1) of Government Regulation No.53 / 2000, Berca 'should not have been able to maintain its frequency [license] because its development targets have not been fulfilled, so that it is ineffective' and not providing any benefits to the community – as its mandate required. As such, Ridwan believes that the government should act decisively in the management of the country's limited frequency resources and deny Berca's license renewal for use by cellcos wishing to develop their mobile broadband offerings. 'Companies that [fail to] commit to network construction [targets] should not be eligible to have their licenses extended,' he said.

(November 14, 2019) telegeography.com

Ireland

National Broadband Ireland (NBI) has announced the signing of what it called a 'landmark' Public Private Partnership with the Irish government, under which it will deliver the National Broadband Plan (NBP). In a press release confirming the development, NBI said it expects to begin work on the project within eight weeks, with surveying and design teams set to start work in early January 2020 in the first deployment locations; these reportedly include Carrigaline in county Cork, parts of Connemara in west Galway, and several towns in the counties of Kilkenny and Limerick. Ireland's NBP project will involve laying 146,000km of fiber cable to connect 537,000 premises in the rollout area, which is focused on locations where high speed fiber broadband is not currently commercially available. The full deployment across 96% of Ireland's land mass will reportedly take between five and seven years to complete, but approximately 250,000 rural residents will be passed with fiber by the end of the second year of the project. Meanwhile, in year one NBI has said that approximately 300 Broadband Connection Points (BCPs) – digital community hubs that will provide free state-funded Wi-Fi in places like libraries, community centers and schools – will be delivered across all 26 counties to ensure the public will have access to high speed internet access at hubs across various communities. In the wake of the contract signing, NBI has launched a new website where the locations of BCPs can be identified and where the public can register their interest for NBP updates. Additionally, once NBI has integrated the final rollout map into its network design, it has said it will be possible to check whether a premise is in the rollout area using a postcode, with an indicative date of when it will be passed with fiber. NBI's chief executive Peter Hendrick said of the matter: 'Our experienced team with the best and brightest minds in telecoms from Ireland and around the world, has spent almost four years working on all the NBP requirements, delivering detailed network design and build plans. We can't wait to get out on the ground, delivering this essential utility across large tranches of Ireland that currently have no access to reliable high speed broadband. It will be a game-changer.'

(November 19, 2019) telegeography.com

Italy

A group of Italian telcos have won a legal challenge against the extension of licenses held by rival operators in the 3.5GHz band. The Regional Administrative Court (Tribunale Amministrativo Regionale, TAR) of Lazio has accepted the appeal entered by Telecom Italia (TIM), Vodafone and Iliad against the six-year extension of 3.5GHz concessions to 31 December 2029. 3.5GHz licenses held by Aria (part of Fastweb), GO internet, Linkem and Mandarin had been due to expire at end-2023, and in 2018 these firms requested and were granted an extension to the validity of their permits. This move was challenged by TIM, Vodafone and Iliad, however, on the grounds that they had paid considerably more for frequencies in the neighboring 3.6GHz range in the government's October 2018 5G spectrum auction. Mondo Mobile Web reports that the TAR has accepted their appeal, although it adds that its finding does not rule against the extension itself but solely the financial aspect of the renewal.

(November 27, 2019) telegeography.com

Kyrgyzstan

The State Committee for IT & Communications announced on its website that the State Commission on Radio Frequencies has decided to allocate frequencies in test mode for 5G mobile network operations while approving proposed measures for assisting the development of the Internet of Things (IoT), in accordance with the country's 2019-2023 Digital Transformation policy roadmap. The temporary licenses will permit usage of spectrum within the 3300MHz-5000MHz range. (December 17, 2019) commsupdate.com

Liberia

The Liberia Telecommunications Authority (LTA) has reportedly launched a consultation on mandatory SIM card registration with telecoms operators and other stakeholders in the country, which could also include biometric ID provisions. The LTA is keen to stamp down on cybercrime and other illegal activity with the director of the National Identification Registry, Tiah Nagbe, quoted as saying that the country's National Identification Verification Platform, which was announced in May 2019, will be rolled out this week. If implemented, a SIM card registration scheme would require all telecoms service providers to use the national identification card as a prerequisite for issuing mobile numbers to new and (presumably) existing subscribers.

(November 18, 2019) The New Dawn

Luxembourg

The Prime Minister, Xavier Bettel, has promised that 5G-suitable spectrum will be allocated by mid-2020, in line with the European Commission's timetable, reports Paperjam. Speaking at the opening of the Luxembourg 5G Conference, Mr. Bettel also revealed that an extra 50MHz of spectrum in the 3.6GHz band would be added to the 280MHz originally announced during the public consultation. The Prime Minister said the Department of Media, Telecommunications and Digital Policy is currently reviewing 29 projects submitted as part of the government's 5G strategy, adding: '5G is not the technology of the future, it is ready for deployment.'

(December 12, 2019) commsupdate.com

The Netherlands

The Dutch government detailed its financial goals for its first auction of 5G spectrum, but cast doubt on vendor participation by warning those deemed to pose a security risk would be blocked from future network builds. In a statement, the government said it would auction frequencies in the 700MHz, 1400MHz and 2100MHz bands by 30 June 2020, predicting the sales would raise €900 million. The country's three largest operators, KPN, Vodafone Ziggo and T-Mobile Netherlands, are all expected to take part. An auction of mid-band 3.5GHz spectrum will follow in early 2022, as the band is currently being used for satellite communications by Dutch intelligence services. Although not directly naming Huawei, the Dutch government stated if a vendor was suspected to be an espionage risk, operators will be ordered to exclude them. State Secretary for Economic Affairs and Climate Policy Mona Keijzer said the action would "protect networks against unreliable suppliers". Specifically, a vendor will be banned if "suspected that it can misuse or drop out the Dutch telecom infrastructure and services. Or if there is a close connection with or legal control by foreign authorities or third parties such as companies and intelligence services involved in espionage, influencing or sabotage, with this party".

(December 6, 2019) mobileworldlive.com

The government of the Netherlands launched a public consultation on the draft plan for the country's 700MHz/1400MHz/2100MHz 5G spectrum auction scheduled for May 2020. The government aims for at least three 5G licensees, with an individual 40% spectrum

cap, including existing frequency holdings. Proposed minimum license bids total EUR900 million (USD998 million) while the draft rules say 5G license winners must achieve 98% area coverage of all municipalities nationwide. Comments on the draft auction regulations and license conditions will be accepted for six weeks. The 3.5GHz 5G band is expected to be auctioned in early 2022 and available for commercial usage by September that year, although the frequencies in the north of the country must first be relinquished by the intelligence services, which use them for a satellite communication interception station. The government says its proposal to move the station to another European country by mid-2022 is feasible 'in principle'. In related news, the Dutch Ministry of Economic Affairs published a 'general administrative order' on 5 December (see link) following an investigation into 5G network security. The order refers to potential measures to ban 'unreliable suppliers' from critical parts of telecom networks. Full details of such measures are yet to be decided on, however. (December 6, 2019) commsupdate.com

Dutch regulator ACM has asked telecom providers to declare their (relevant) net revenues for 2018. The information must reach the regulator by 31 December. The numbers will be used to calculate how much operators must pay the ACM for its supervision costs. ACM divides providers into two categories based on their revenues. Those making less than EUR 2 million per year do not have to pay a contribution. Those making EUR 2 million or more will be proportionally taxed. (November 27, 2019) telecompaper.com

New Zealand

The New Zealand government has approved plans to allocate short-term rights to 160MHz of unused frequencies in the 3.5GHz band to mobile network operators and the Maori community next year, reports ZDNet. Telecoms minister Kris Faafoi confirmed an auction will be held for the available spectrum from the middle of next year, with the rights running until 31 October 2022, by which time plans for a longer-term allocation of the spectrum will have been finalized. 'Early access to this spectrum will allow the telecommunications industry to move forward in their development and deployment of 5G services now, rather than waiting until long-term rights are switched on in November 2022,' noted the minister. The government confirmed there will be a limit on the amount of spectrum operators can purchase and that it will be subject to minimum use terms. There will also be no guarantee that short-term rights will provide long-term access. Short-term allocation of spectrum will be made to the Maori community, and a support program to build Maori capability in spectrum-related industries will be developed to maximize the benefits of this opportunity. Further details of the short-term allocation will be released early next year.

(December 16, 2019) commsupdate.com

New Zealand's Commerce Commission has released its draft decisions on the design of the new regulatory regime for fiber broadband networks. For Chorus, the regulation takes the form of a revenue cap, which will limit the prices consumers pay for broadband, as well as minimum standards for KPIs such as service availability and network performance. Chorus and the other local fiber companies (Northpower Fiber, Ultrafast Fiber, and Enable Networks) will also be required to publish performance measures, such as profits, quality of service, and expenditure. The Commission has made draft decisions on three key areas since its emerging views were published earlier this year. These include a new way of passing through to consumers the Crown subsidy for ultra-fast fiber broadband (UFB), and higher allowances for risk in the allowed rate of return. The Commission will publish its final decisions on the input methodologies in mid-2020 before setting the revenue cap and minimum quality standards for Chorus and the information disclosure regime for all providers in late 2021. The new regime will apply from the beginning of 2022, by which time most New Zealanders will have access to UFB.

(November 19, 2019) telegeography.com

Nigeria

The government of Nigeria is developing the National Broadband Plan 2020-2025 to increase broadband penetration to around 70% across the country. A new 25-member committee has been set up to formulate the plan, with the support of the UK government. The plan will follow on from the National Broadband Plan 2013-2018, which achieved its aim to increase penetration to 30%. (December 18, 2019) commsupdate.com

The Nigerian Communications Commission (NCC) has stepped in on behalf of Nigeria's telecommunication service providers in a stand-off between the operators and the Minister of Communication Dr Isa Ibrahim Pantami over data fees. Earlier this month, telcos ignored an instruction from the Minister ordering them to decrease the price of data in the country within five days. The Minister had issued a statement claiming that Nigerians were not enjoying internet services because of the high cost of data in the country. Represented by the Association of Licensed Telecommunications Operators of Nigeria (ALTON), the telcos did not decrease their data prices, and they declared the

Minister's order as "dictatorial" and one that had the potential to discourage investment in the country's telecoms industry. ALTON's President Gbenga Adebayo said that the directive was unrealistic and insensitive. He added that Minister Pantami had failed to consider operating costs that are incurred by telcos and that it was unrealistic for the nation's government to expect a cost decrease in data within five days. The NCC has not issued a new directive to operators but informed the Minister of actions it is taking to protect the consumers against practices such as forceful subscriptions and automatic renewals of data and value-added services. At a recent meeting with the Minister, leaders of the NCC outlined the challenges facing local telcos including vandalism, site access denial and fire cuts.

(December 6, 2019) balancingact-africa.com

The Executive Vice Chairman (EVC) of the Nigeria Communications Commission (NCC), Professor Umaru Dambata has assured Nigerians that the Commission was poised to deploy digital broadband communication technology to all the 774 local government areas in the country, to enhance quality of telecommunication services. Dambata made the disclosure on Tuesday at the National Assembly, when he led the management of the NCC to defend the Commission's 2020 budget proposal before the joint Committees on Communications of the Senate and House of Representatives. During his presentation, Prof. Dambata also disclosed that the Commission had developed a strategic fiber optic deployment map that will cover all the geopolitical zones in the country for the smooth operations of the telecom operators to enhance quality of service across board. "We are planning to deploy fiber optic cables in all the geopolitical zones in the country, including Lagos. Lagos has been designated as a zone on its own because of the commercial and strategic importance of Lagos. So Lagos has been made the 7th zone according to the categorization of infrastructure development for the country. "We are making a request through the Minister of Communications and Digital Economy for a consideration for this deployment because it is going to entail a counterpart funding. The project is a Public Private Partnership Project (PPP). Therefore, the commission is poised to seek counterpart funding. "The important thing about this project is that there will be a point of access in every local government area in the country, So, all the 774 local governments will have a point of broadband access of 10 Gigabyte per second capacity", the NCC boss told the committee. Dambata, while speaking on the quality of services of the telecommunication operators in Nigeria, assured the committee that the NCC was alive to its duties in monitoring the service output of the operators to ensure that Nigerians were not shortchanged by the operators. He told the committee that the NCC has an established "key performance indicators" that was the threshold of the service delivery of the service providers and that the commission ensures that the performance indicators were strictly adhered to by the operators. "On the Quality of service, we monitor this mostly; we have information about the quality of service in virtually all parts of the Country, all the states and in all the local governments. And we have key performance indicators; we are able to measure the quality of service that is provided by the telecom operators. Where we find the quality of service poor and below the standard stipulated, we normally insist that measures must be taken to improve the quality of service and we do this every month," Dambata added. He said the Commission would need the support of the National Assembly to ensure the rate of N145 per linear meter of fiber cable is respected and adhered to by all states and local government areas in the country. This, the NCC boss said, will greatly assist the Commission in its quest to deploy more infrastructures.

(November 6, 2019) dailypost.ng

Norway

Norway's National Communications Authority (Nasjonal kommunikasjonsmyndighet, Nkom) has reportedly received an application for spectrum in the 3400MHz-3800MHz band for use on the archipelago of Svalbard. As a result, the regulator has called for any other parties interested in these frequencies to file an application by 24 January 2020. With frequencies in the band in question having already been allocated on the Norwegian mainland until 31 December 2022, Nkom noted that in Svalbard the entire frequency range is available, having been used for, among other things, non-commercial testing of 5G. It is proposing to issue the spectrum to successful bidders at no cost, with any allocations to be valid until 31 December 2022. In addition, the regulator has said that in the event of surplus demand, it may be necessary to set frequency caps on the allocation, while it suggested it may look to take into account the position of spectrum held in the 3400MHz-3800MHz band by existing holders on the mainland during the allocation process.

(December 20, 2019) commsupdate.com

The Norwegian government has presented a bill to parliament which aims to facilitate the development of high speed broadband networks and implement the EU's Broadband Development Directive (although Norway is not part of the EU). The legislation looks to make the deployment of infrastructure faster and cheaper by encouraging cooperation in construction efforts and promoting joint utilization of existing networks. The law

would contribute to the rapid rollout of 5G networks, which require a greater density of base stations, the Ministry of Local Government and Modernization (Kommunal- og moderniseringsdepartementet, KMD) noted in a press release. Digitization Minister Nikolai Astrup, meanwhile, added that the bill would help the government achieve its target of 90% coverage of high speed broadband by the end of 2020. Separately, sector watchdog National Communications Authority (Nasjonal kommunikasjonsmyndighet, Nkom) has been granted funding to establish a central information service to get an overview of existing network infrastructure and planned construction work.

(December 16, 2019) commsupdate.com

Norway's government is planning to give up its right to sell up to 20% of telecoms operator Telenor Group, the Ministry of Trade and Industry said. Reuters writes that the parliament authorized a plan back in 2015 to allow the government to reduce its 54% stake in the group to 34%, with Minister of Trade and Industry Torbjoern Roe Isaksen quoted as saying: 'The authorization has not been utilized and, based on an overall assessment, the government sees no need to extend it … The state's rationale for its ownership of Telenor is to maintain a leading technological and industrial company with head office functions in Norway. The state's goal as an owner is the highest possible return over time.' The government said back in 2015 that having permission to cut its stake in Telenor could make it easier for the company to conduct mergers and acquisitions. As at 30 September 2019 Norway's government is the largest shareholder in Telenor Group, with a 54% stake. The companies listed as major shareholders from beneficial ownership with 1% or more of Telenor Group's total outstanding shares were: Folketrygdefondet (5.0%); BlackRock Institutional Trust Company (1.6%); The Vanguard Group (1.6%); DWS Investment GmbH (1.4%); JPMorgan Asset Management UK (1.1%); and Storebrand Kapitalforvaltning (1.0%).

(November 25, 2019) telegeography.com

Norwegian communications regulator Nkom said it will begin an auction of radio line frequencies on 6 May 2020, and the deadline for bidder registration is 12 March. In preparing for the auction, authorities and operators focused on the low frequency bands, which means the 13 GHz band and those below. Nkom has decided to allocate spectrum in the high 6 GHz and 8 GHz bands under transmission permits, rather than via auction. There will be a 40 percent frequency ceiling for spectrum in the high 6 GHz, 7 GHz and 8 GHz bands, as well as parts of the 13 GHz band. The cap applies between two transmission points. For the low bands that will be included in the auction, which means the 10 GHz band (split into high and low) and the 13 GHz band, there will be a separate frequency cap of 40 percent. There is also an overall ceiling of 40 percent of all spectrum covered by the auction, and this will include the permit holder's existing airwaves.

(November 17, 2019) telecompaper.com

The National Communications Authority (Nkom) has specified what information local fixed line incumbent Telenor Norge must provide for its wholesale customers in areas where it plans to shutter its copper access network. In a press release the regulator noted that, under a decision it made in December 2018 designating Telenor as holding significant market power (SMP) in the broadband market, the telco is required to issue notifications regarding changes to its infrastructure to customers. In line with this, the watchdog said it had sought to clarify exactly what information Telenor sends its wholesale customers. Included among the key bits of information it has said must be communicated are: a timeframe for when wholesale access to copper will cease; information regarding what replacement product Telenor will offer at the wholesale level; the timetable for the introduction of this replacement product; and all technical parameters, and price terms, for the replacement wholesale product. Meanwhile, the Nkom also confirmed that it had been advised by Telenor that it has already sent information regarding its proposed network shutdowns to all of its wholesale customers. With regards to these previously-sent advisory notices, the regulator said it will consider whether these could be considered to have met the requirements it has now formally set out in a separate process. Feedback on the regulator's direction regarding the notification requirements is now being accepted, with it having set a 25 November 2019 deadline for submissions.

(November 13, 2019) telegeography.com

Norwegian telecoms regulator Nkom said it has published new maps showing internet coverage in Norway, enabling local and county administrations as well as providers to see where there is a need to provide new networks or upgrade existing ones. The maps show internet coverage in June 2019. The map is based on Nkom's annual survey among municipal and county councils. Nkom said this survey found that 86 percent of homes in Norway now have access to fast broadband. There are three types of map. One shows residential connectivity for indoor mobile coverage at 20 Mbps, fiber, copper lines, cable TV and fixed radio, but does not show satellite coverage. The second shows the same coverage except for copper landlines. The third shows only fiber and cable-TV connectivity.

(November 9, 2019) telecompaper.com

The National Communications Authority (Nkom) has announced that domestic telecoms service providers Telenor Norge, Telia Norge and ice, which acquired 700MHz licenses at auction in June this year, were officially cleared to use the frequencies from 1 November 2019. In a press release the industry regulator noted

that the move marks 'an important step to facilitate better competition in the mobile market, good mobile coverage along important roads and trains, and early introduction of 5G in Norway'. To date, 700MHz band spectrum had been allocated for digital broadcasting, but the government paid out a total of NOK150 million (USD16.5 million) to free up the resource for mobile communications services. In June 2019 Nkom announced the successful conclusion of the sale of spectrum in the 700MHz and 2100MHz bands, noting that the three incumbent mobile network operators each laid claim to a 2×10MHz block of spectrum in the 700MHz band, while ice also successfully bid for 2×15MHz in the 2100MHz band. The auction raised a total of NOK735.057 million for state coffers, Nkom said, broken down as NOK337.176 million (ice), NOK217.881 million (Telia) and NOK180.000 million (Telenor). Furthermore, Nkom confirmed that it plans to allocate more spectrum to mobile communications in the coming years to accelerate the deployment of 5G services nationwide.

(November 4, 2019) telegeography.com

Poland

The Polish telecoms regulator, the Office of Electronic Communications (Urzad Komunikacji Elektronicznej, UKE), has opened its consultation into its planned auction of four licenses in the 3.4GHz-3.8GHz band. The watchdog is proposing to set a starting price of PLN450 million (USD116 million) for each of the 80MHz concessions, meaning the sale would raise a minimum of PLN1.8 billion. Earlier speculation had put the reserve price at closer to PLN250 million per license. The UKE says it wants to award the four licenses by mid-2020. Under the current proposals, winning bidders will be expected to launch services over at least ten transmitters in one city within six months of the award date, rising to 250 transmitters by end-2023 and 500 transmitters by end-2025. A report from Telko.in notes that these coverage requirements are fairly relaxed considering that a network to cover the capital Warsaw would need around 200 transmitters. With four permits available and four major cellcos in Poland, the main focus of the bidding is likely to be on the geographical range of the licenses. While concessions A (3480MHz-3560MHz) and B (3560MHz-3640MHz) offer full nationwide coverage, licenses C (3640MHz-3720MHz) and D (3720MHz-3800MHz) come with certain geographic restrictions where spectrum has not yet been freed up. (December 10, 2019) commsupdate.com

Poland's Office of Electronic Communications (Urzad Komunikacji Elektronicznej, UKE) is set to publish its proposals for auctioning 5G-capable spectrum in the 3.4GHz-3.8GHz band. A report suggests that a consultation document on the plans could be released by the end of this week, with an auction to take place in the first half of next year. It is thought that the regulator will look to award four blocks of 80MHz each, with the country's incumbent cellcos – Orange, P4/Play, T-Mobile and Polkomtel/Plus – expected to take part. UKE has said that it is aiming to raise a minimum of PLN1 billion (USD258 million) from the sale, with some speculation that this could mean a reserve price of PLN250 million for each license. The Polish government has previously said that it is hoping to easily surpass this minimum target and bring in between PLN4 billion and PLN5 billion from its combined sales of 5G spectrum. (December 4, 2019) telko.in

Poland's Minister of Digitization says the government is expecting to raise between PLN4 billion and PLN5 billion (USD1.0 billion-USD1.3 billion) from its sale of 5G-capable spectrum next year. Marek Zagorski is cited by news agency PAP as saying that the estimates are based on factors including the recent results of 5G auctions in countries such as Germany. Following the auction, which is scheduled for the middle of 2020, operators will be expected to launch a 5G network in at least one large city. Last month the government, state-backed telco Exatel, infrastructure investment fund PFR and the four main mobile network operators – Orange, Polkomtel (Plus), T-Mobile and P4 (Play) – signed an agreement to deploy a joint nationwide network in the 700MHz band via a venture dubbed Polskie 5G. PFR CEO Pawel Borys commented: 'The aim of the joint project is to ensure nationwide availability of 5G services in selected bands, technology security and low service prices thanks to synergies of common infrastructure.' (November 19, 2019) telegeography.com

Polish regulator UKE presented its concept for the distribution of spectrum in the 3.4-3.8 GHz band during the Ericsson Radio Tech Day, reports Telko.in. The watchdog supports dividing the band into four blocks of 80 MHz each. Operators earlier said they believed the blocks should be 100 MHz wide. UKE cannot propose four equivalent bands for participants in a tender for 5G spectrum which is due to be carried out in 2020. Two of the blocks will be significantly restricted by the current use of the 3.4-3.8 GHz band. One regional block in the 3,400-3,480 MHz range, as well as four national blocks, are due to be proposed for the tender. The national blocks are available in the 3,480-3,560 MHz, 3,560-3,640 MHz, 3,640-3,720 MHz and 3,720-3,800 MHz ranges. UKE plans to use the Simultaneous Multiple Round Action model to award the frequencies. Participants will submit offers for bands in which they

are interested in each round and they will be able to switch their bids to other blocks in following rounds. UKE plans to introduce a limit of one single block per individual user. Minimal income from the auction is estimated at PLN 1 billion. (November 11, 2019) telecompaper.com

Three of Poland's biggest private telecom firms have agreed to consider developing 5G networks with two state entities, one of the groups said, signaling the government may have some control over the future network. Poland and other European countries are preparing to launch 5G services offering faster data downloads, but some plans are being complicated by security doubts around Chinese equipment vendor Huawei. Poland's state-owned telecom operator Exatel had earlier advocated forming a consortium of private but also state companies to develop 5G network infrastructure for the 700 MHz band to ensure lower costs and better protection from security threats. The head of state-owned fund PFR said it and Exatel alongwith Orange Polska, T-Mobile Polska and Polkomtel- a unit of Cyfrowy Polsat - on Monday signed an agreement to start establishing a company to build 5G infrastructure. Orange Polska is the Polish arm of France's Orange and T-Mobile Polska is the Polish unit of Germany's Deutsche Telekom. Poland's biggest mobile operator Play Communications did not sign the memorandum of understanding, as the company still needed to get some corporate approvals, Play's IR head told Reuters. "The aim of the joint project is to ensure nationwide availability of 5G services in selected bands, technology security and low service prices thanks to synergies of common infrastructure," PFR CEO Pawel Borys said on Twitter. The 700 MHz band is meant to cover the entire country, unlike other bands that will be available regionally. Poland is yet to decide on the way it will distribute frequencies.

(November 4, 2019) reuters.com

Romania

The Romanian telecom market regulator (ANCOM) announced that auction for radio spectrum needed for the development of 5G services is postponed and will be held in the first half of 2020, not in December 2019 as originally planned. The radiofrequency usage rights to be distributed include bands in 700MHz, 800MHz, 1500MHz, 2600MHz and 3400-3800MHz. In Romania, the first 5G services were commercially launched in November 2019 by Orange on its existing frequency resources. However, for further development of 5G services, vital spectrum needs to be allocated to telecom operators. This delay could initially cause a relatively slow uptake of 5G services in the short-term. Romania's regulator said the delay for the auction is due to the following three main reasons: lack of a set of instruments regarding the network security requirements, need to implement the memorandum signed in August 2019 between Romania and the US on 5G technology security, need for the newly appointed government – which drafts the 2020 budget – to approve the license fees and the calendar for their payment. Additionally, during a consultation for the spectrum auction, the telcos suggested changing the amount of the license fees and the calendar for their payment, as well as the coverage obligations which ANCOM proposed in the Terms of Reference. The comments submitted by telcos during the regulatory consultation that started in July 2019 has led ANCOM to propose amended auction documentation for coverage obligations currently under review. Also, ANCOM announced that the final decisions on the planned levels of payments, which were challenged by operators (currently the value of the spectrum bands to be auctioned is estimated by ANCOM atEUR580m), will be taken directly by the Romanian government.

(November 16, 2019) verdict.co.uk

Romania's telecom market regulator ANCOM will hold the auction for allocating the radio frequency bands dedicated to applications using 5G technologies in the first part of next year, ANCOM President Sorin Grindeanu announced in a public conference. The half-year delay means that Romania's Government can no longer expect to pocket the EUR 500 million (0.25% of GDP) estimated to be derived to the budget from the 5G license auctions this year. This means stronger budget revenues next year, but an extra 0.25% of GDP on top of this year's budget deficit, which already reached 2.62% of GDP in the first nine months. ANCOM said that the auction can no longer be organized this year because the institution hasn't yet received the set of network security measures from the European Commission and the Government has not implemented the Memorandum signed by the Governments of Romania and the US. Moreover, the new Government should draft the budget for the year 2020 and approve the license fees and their payment schedule. Under these conditions, the ANCOM management considers that organizing the auction in full transparency and predictability is not possible.

(November 2, 2019) romania-insider.com

Russia

The Federal Antimonopoly Service (FAS) approved the plan of state-backed national telco Rostelecom to increase its stake in cellco Tele2 Russia from 45% to 100%. Kommersant reported the day before that the government has approved the final scheme of consolidation under which Rostelecom will implement the 100% Tele2 Russia takeover whilst allocating some of its own shares to existing Tele2 shareholders including state-backed bank VTB. The approval conditions include measures ensuring the state retains overall control of Rostelecom for at least four years. (November 13, 2019) Interfax

Slovakia

The Office for Regulation of Electronic Communications & Postal Services (Regulacny Urad, RU) has opened a consultation into the award of 5G-capable spectrum in the 700MHz band, as well as spare frequencies in the 900MHz and 1800MHz ranges. A report says that the 700MHz spectrum will be awarded via competitive auction, with six 2×5MHz blocks being made available. A reserve of EUR15 million (USD16.7 million) has been placed on each block. The auction is expected to take place in the first quarter of next year, with spectrum to be allocated by end-June. The report says that the country's smallest and newest mobile network operator (MNO) SWAN Mobile, which trades as 4ka, will be given no advantage in the 700MHz sale, despite the fact that it currently only holds frequencies in the 1800MHz band, while its three larger rivals own licenses covering the 800MHz, 900MHz, 1800MHz and 2100MHz ranges, while two firms also own 2600MHz spectrum. Frequencies in the 900MHz and 1800MHz bands will be allocated by December 2025. One block of 2×4.2MHz will be offered at 900MHz, with a reserve price of EUR840,000, while three 2×3MHz blocks will be sold at 1800MHz, with a minimum price of EUR550,000 per block. (December 20, 2019) zive.sk

Slovenia

The Agency for Communications Networks & Services (Agencija za komunikacijska omrezja in storitve, AKOS) in Slovenia has said it is being forced to postpone its planned 5G spectrum auction to the second half of 2020 due to a delay in adopting the updated Radio Spectrum Management Strategy. The regulator had hoped to sell frequencies in the 700MHz, 1400MHz, 2100MHz, 2300MHz, 3400MHz and 26GHz bands by 30 June 2020, but now says that auction terms and conditions will be published by that date, with the sale to take place by the end of the year.
(December 10, 2019) commsupdate.com

Somalia

The Ministry of Posts, Telecommunications and Technology (MPTT) has announced that the National ICT Policy and Strategy has been approved by the Cabinet. The five-year policy provides the framework needed to leverage the benefits of ICT to support the social and economic development of the country. It outlines the development and enhancement of ICT across Somalia over the period 2019-2024 and aims to promote transformation, growth, inclusiveness, sustainability, innovation and partnerships in the mainstream economy, while recommending institutional and regulatory frameworks in order to achieve its intended goals. Earlier this year, stakeholders were given until 31 May 2019 to submit feedback on the guidelines, which were formulated with support from the ITU and the World Bank. Commenting on the matter, Minister for Posts, Telecommunications and Technology Abdi Ashur Hassan said: 'We have a communications law, a regulator and an ICT Policy and Strategy … that means the sector now has the legal and policy frameworks that would allow it to develop further and attract more investment.' (December 2, 2019) telegeography.com

South Africa

The Independent Communications Authority of South Africa (ICASA) opened a consultation seeking views on how to boost competition in the nation's mobile market, after a review pointed to barriers involving broadband services. In a call for comments, the regulator said it had discovered evidence relating to market share and retail pricing which pointed to a lack of competition in several areas. ICASA highlighted considerable barriers to entering retail markets because wholesale services were not supplied competitively. "The market for site access in particular is highly concentrated in many municipalities, full-coverage roaming services are only offered by two operators, and only one operator offers MVNO services", the authority noted. "Vodacom is dominant in 104 municipalities by itself, MTN is dominant in 18 by itself, and MTN and Vodacom are both dominant in two municipalities", it said. To address site access concerns, the regulator suggested more detailed guidelines and redrafting of leasing regulations, including a requirement to publish site information online, a time limit for responding to access requests, and regulating when site sharing should be

considered technically and economically feasible. ICASA said this would "preclude the indefinite reserving of space on masts for the incumbent's equipment" and enable smaller operators to deploy infrastructure more quickly. In the roaming market the authority found only MTN and Vodacom to have substantial coverage in many municipalities.

(December 2, 2019) mobileworldlive.com

South Korea

South Korea's Ministry of Science and ICT (MSIT) has revealed it is aiming to make a further 2,640MHz of bandwidth available for use in 5G networks by 2026. Under what has been dubbed the '5G+ Spectrum Plan', the regulator is reportedly looking to almost double the amount of 5G-suitable spectrum in the country, up from the current 2,680MHz that has already been allocated. It is understood that the thinking behind the plan is to ensure that there is enough bandwidth to cater for an expected explosion in traffic over 5G networks, while also allowing for the use of spectrum by new industries that are expected to be 5G-based. As it stands, the MSIT has yet to announce details of exactly what frequencies it will offered, nor has it laid out a timeline for deployment. It has said though, that it will discuss regulations for strategic businesses and the private sector before announcing a finalized plan next month. (November 28, 2019) ZDNet

The telecoms regulator ICASA has published an Information Memorandum setting out the options for licensing high-demand 4G and 5G spectrum in the country, with all interested parties given until 31 January 2020 to submit their comments. ICASA plans to license the 700MHz and 800MHz bands ('digital dividend' frequencies, which are currently occupied by analogue television broadcasters), alongside spectrum in the 2300MHz, 2600MHz and 3500MHz bands. Specifically, ICASA plans to award 60MHz (2×30MHz) in the 700MHz band, 60MHz (2×30MHz) in the 800MHz band, 40MHz in the 2300MHz band, 170MHz in the 2600MHz band and 116MHz in the 3500MHz band. The spectrum will be awarded on a national basis, and the reserve price for each lot will be different (scheduled to be determined by ICASA after consultation with the industry); frequency spectrum caps will also be introduced following the consultation. The options regarding the 700MHz, 800MHz and 2600MHz spectrum on offer are as follows:

Option 1

- Lot A – to be reserved for the new wholesale open-access network (WOAN): 2×25MHz (FDD) in 800MHz band, 2×20MHz (FDD) in 2600MHz band
- Incumbent (assigned): 20MHz (TDD) in 2600MHz band
- Lot B, C and D – industry: 2×10MHz (FDD) in 700MHz band, 2×10MHz (FDD) in 2600MHz band
- Lot E – industry: 2×20MHz (TDD) in 2600MHz band

Option 2

- Lot A – WOAN: 2×20MHz (FDD) in 800MHz band, 1×20MHz (TDD) in 2600MHz band
- Incumbent (assigned): 20MHz (TDD) in 2600MHz band
- Lot B, C and D – industry: 2×10MHz in 700MHz band, 50MHz (TDD) in 2600MHz band
- Possible future assignment – industry: 2×10MHz (FDD) in 800MHz band

Option 3

- Lot A – WOAN: 2×20MHz (FDD) in 800MHz band, 40MHz (TDD) in 2600MHz band
- Lot B, C and D – industry: 2×10MHz in 700MHz band, 40MHz (TDD) in 2600MHz band
- Lot E – industry: 2×10MHz (FDD) in 800MHz band, 10MHz in 2600MHz band
- In-band migration: 20MHz in 2600MHz band (incumbent)

Option 4

- Lot A – WOAN: 2×20MHz (FDD) in 800MHz band, 40MHz (TDD) in 2600MHz band
- Lot B, C and D – industry: 2×10MHz (FDD) in 800MHz band, 40MHz (TDD) in 2600MHz band
- Possible future assignment: 2×10MHz (FDD) in 700MHz band, 10MHz in 2600MHz band
- Option 5
- Lot A – WOAN, 2×10MHz (FDD) in 800MHz band, 2×10MHz (FDD) in 800MHz band, 40MHz (TDD) in 2600MHz band
- Lot B – industry: 2×10MHz (FDD) in 800MHz band, 40MHz (TDD) in 2600MHz band
- Lot C and D – industry: 2×10MHz (FDD) in 700MHz band, 40MHz (TDD) in 2600MHz band
- Lot E – industry: 2×10MHz (FDD) in 800MHz band, 10MHz in 2600MHz band
- In-band migration: 20MHz in 2600MHz band (incumbent)

Regarding the 2300MHz band, ICASA is planning to award 60MHz to the incumbent, with four 10MHz blocks to be offered to other bidders. In the 3500MHz band, 84MHz will be reserved for the incumbent, while eleven 10MHz ranges, one 2MHz slice and one 4MHz block will also be put on sale. Successful bidders will be required to provide data services across the country with an average down/upload speeds of 30Mbps/15Mbps by 2025; provide open access to a minimum of three mobile virtual network operators (MVNOs); and buy a minimum of 30% of national capacity from the WOAN for a period of at least five years. (November 4, 2019) telegeography.com

Sweden

The Swedish Post and Telecom Agency (Post & Telestyrelsen, PTS) has opened up further bands for 5G testing. The regulator says frequencies will be made available at 3.6GHz-3.8GHz, 3.8GHz-4.2GHz, 40.5GHz-43.5GHz, 45.5GHz-47.0GHz, 47.2GHz-48.0GHz and 66GHz-71GHz. Testing is already being carried out using 3.4GHz-3.6GHz and 26.5GHz-27.5GHz spectrum. The regulator says it plans to award 3.4GHz-3.8GHz and 24.25GHz-27.5GHz licenses 'as soon as possible' though a sale has been delayed due to changes being made to the country's Electronic Communications Act (LEK). The PTS also recently opened a consultation into the award of 3.5GHz and 2.3GHz spectrum.

(December 20, 2019) commsupdate.com

The Swedish Post and Telecom Authority (PTS) has announced it will delay the allocation of spectrum in the 3.5 GHz and 2.3 GHz bands due to a security review. The 3.5 GHz and 2.3 GHz bands spectrum bands are two of the most attractive when it comes to rolling out 5G services, blending together a palatable compromise between increased download speeds and coverage. These spectrum auctions have proven to be some of the most interesting, though the delay will be an irritant for the ambitious telcos. Pointing towards new security implications introduced in the country's electronic communications law, which will be implemented on January 1, 2020, the regulator feels it needs more time to continue discussions with police and security agencies. Details are thin on the ground for the moment, though this is hardly going to be viewed as a plus at the telcos who have been demanding more spectrum be released. In June, progress looked to be gathering momentum as PTS announced a public consultation to release spectrum in the 3.5 GHz and 2.3 GHz bands. 15 national blocks of at least 20 MHz in the 3.4 GHz-3.7 GHz band were set to be auctioned, as well as up to eight 10 MHz nationwide licenses at 2.3GHz. The auction was likely to take place in the early part of 2020, though these plans have now been side-lined. Sweden is not in a unique position when it comes to a need to free-up valuable spectrum assets, though that will come as little comfort to those who were gearing-up for an auction in the coming months. Reviews like this create a sense of uncertainty in the minds of the telcos, and uncertainty is the enemy of investment. You only have to look at the UK for evidence of this. Thanks to the creation of the Supply Chain Review, the position of Huawei is still an on-going unknown. This has led the telcos to falter with deployment plans. Unless Sweden want to encounter the same problems, such a security review will have to be completed incredibly quickly. Obligations and conditions will have to be considered and relevant, as the last thing anyone will want is protest from industry, further delaying the critical element of certainty. Many will hope such a security review does not enter the country into the same purgatory which the UK finds itself in with the Supply Chain Review, but it would surprise few if it did.

(November 18, 2019) telecoms.com

The Swedish Post and Telecom Agency (Post & Telestyrelsen, PTS) is consulting with the EC over its draft decision regarding competition in the country's fixed broadband markets. In its proposal the PTS notes that Telia has a special position in Market 3a (local access to network infrastructure). This means that the company is subject to obligations regarding, among other things, terms and prices. With regard to Market 3b (central access to network infrastructure), the regulator finds that the market should continue to be unregulated. The PTS notes that continued regulation of local access is sufficient to ensure effective competition in the consumer markets. Telia is Sweden's dominant fixed broadband provider, accounting for around 32% of all retail connections at the end of June 2019.

(November 11, 2019) telegeography.com

Switzerland

Swiss telecoms watchdog the Federal Office of Communication (Ofcom) has opened consultation on planned revisions of the implementing provisions of the Telecommunications Act. The Act was adopted in March this year, but Ofcom notes that elements of the regulations implementing the new law must be revised. Ofcom notes that the revision centers primarily on the Ordinance of Telecommunications Services, specifically areas covering: registration of telecommunication service providers, international roaming billing procedures, quality measurements, emergency calls and safety communications. Other changes include a complete revision of the Ordinance on Frequency Management and Radio Licenses which will be replaced by an entirely new Ordinance on Radio Frequencies, though Ofcom states that the changes will principally be 'technical adjustments'. Similarly, the Federal Council has proposed updates to the Ordinance on Telecommunications Installations, the Ordinance on Electromagnetic Compatibility and the Ordnance on Telecommunications Fees. The consultation period is due to last until 25 March 2020.

(December 9, 2019) commsupdate.com

Taiwan

The National Communications Commission (NCC) is scheduled to kick off its auction for 5G-suitable spectrum across the 1800MHz (20MHz), 3.5GHz (270MHz) and 28GHz (2,500MHz) bands next week, ahead of which the government has reportedly approved a proposal to make additional frequencies available for 5G trials. Under the plan approved by the Cabinet (5 December), the state will allocate TWD20.5 billion (USD655 million) over the next four years to help create an environment conducive to the development of innovative 5G apps. As per the government's plans, it is understood to have designated spectrum between 4.8GHz and 4.9GHz for new 5G trials, and so far, Chunghwa Telecom, Far EasTone Telecommunications, Taiwan Mobile Company, Asia Pacific Telecom and HTC have all applied for access. Chen Chung-shu, director of the NCC's Department of Frequency and Resources, was, meanwhile, said to have confirmed that the regulator plans to designate additional frequencies for 5G testing in the future. (December 6, 2019) Focus Taiwan

Thailand

The telecoms committee of the National Broadcasting and Telecommunications Commission (NBTC) has proposed the removal of the 700MHz band from the forthcoming 5G auction scheduled for 16 February, thus reducing the number of bands to be sold off to three. The Bangkok Post writes that the resolution will now be forwarded to the NBTC board for approval on 24 December. The frequencies that will be put up for auction in February will comprise the 1800MHz, 2600MHz and 26GHz bands, while the 700MHz band is now expected to be auctioned off separately in the future. The 700MHz airwaves are currently being used by broadcasting network providers, and need to be migrated to the 510MHz-690MHz range, though the transfer of the equipment has fallen behind, with the delay expected to last until November (instead of the original deadline of September). Takorn Tantasith, Secretary-General of the NBTC, was quoted as saying that the committee also passed a resolution regarding payment terms for the 26GHz licenses, agreeing to allow concession winners to postpone the payment of the whole licensing sum until the second year of license award. An unnamed source in the telecoms industry, meanwhile, said that the major telecoms operators are currently discussing whether or not to participate in the 5G spectrum auction. The source said that the multi-band license auction is impractical in terms of 5G platform promotion, with reserve prices for the spectrum set too high. Mr. Takorn confirmed that the three major mobile operators have submitted letters urging the NBTC to only auction the 2600MHz range, with more accommodating conditions for 5G infrastructure promotion; the NBTC was also asked to take into account the financial burdens of 3G and 4G licenses shouldered by operators. Mr. Takorn said that while he personally has no objections to holding a single-band auction, 'such a resolution must be done through the NBTC's management procedure and approved formally by the board.'

(December 19, 2019) commsupdate.com

A series of regulations governing 5G technology adoption and related frameworks are expected to be launched by March next year, says the Thai National Broadcasting and Telecommunications Commission (NBTC). The regulations include the technical standard for networks and terminals for 5G, the numbering and identification of Internet of Things (IoT) devices, security and privacy, data arrangement structure and data interoperability. Korkij Danchaivichit, deputy secretary-general of the NBTC, said the agency has been talking with the private sector to work out the details of the 5G network and terminal standards. An initial regulatory framework is expected in early 2020 before the 5G license auction in February. Last month, the NBTC announced a plan to launch commercial 5G wireless broadband service at Suvarnabhumi and Don Mueang airports by May 2020 as the first sites for ultra-fast wireless internet adoption in Thailand.

(December 16, 2019) en.vietnamplus.vn

Uganda

The Uganda Communications Commission (UCC) has completed its review of the Telecommunications Licensing Framework, which started in April 2019, and has introduced a new licensing regime with several changes including local shareholding requirements for some categories, and licenses for digital financial services and audio-visual content. This new framework is expected to come into force in 2020. Salient features are as follows.

Major licenses under the new framework

National Telecom Operator (NTO) License. This will allow the license holder to establish and provide both infrastructure and services across the entire geographical boundary of Uganda. The license duration will be 15 years. A holder of this license shall be required to issue 20% of its stock on the Uganda Stock Exchange within two years of the grant of the license.

National Public Service Provider (NPSP) License. This will allow the licensee to provide either voice and data services or capacity resale services across Uganda. The licensee will not be allowed to install or otherwise

provide infrastructure services, except if it obtains an appropriate PIP license as well. The license duration will be five years. A holder of this license must be 20% locally owned.

National Public Infrastructure Provider (NPIP) License. This will allow the license holder to establish and provide infrastructure services to licensed national operators, public infrastructure providers, public service providers and private networks in Uganda. Holders of this license will not be allowed to provide services to final consumers, except where the operator also holds a PSP license. The license duration will be 15 years. A holder of this license must be 20% locally owned.

Regional Public Service Provider (RPSP) License. This license will allow the licensee to provide either voice and data services or capacity resale services in a specific region. The licensee will not be allowed to provide services outside of its licensed region. The license duration will be five years.

Regional Public Infrastructure Provider (RPIP) License. This license will allow the holder to provide infrastructure services to licensed public service providers in the authorized license area/ region. Licensed operators that provide both infrastructure and services in three regions will become eligible for an NTO license. The license duration will be 15 years.

Other licenses/ authorizations

Equipment distribution authorization for those who deal strictly in the distribution and sale of telecommunications equipment, including network and customer terminals.

Equipment vending and installation authorization for those who intend to import, vend, install and maintain telecommunications equipment.

Authorization to manufacture telecommunications equipment for those who intend to set up manufacturing/ assembly plants for telecommunications equipment.

Authorization for disposal of communications equipment.

Authorizations for value-added services

Authorization to provide digital financial services. This will cover electronic financial non-banking services, insurance services, mobile money services, mobile electronic payments solutions, mobile based lending services among others.

Authorization to provide aggregation services. This will cover providers of aggregation services including short code holders and other providers that use communications infrastructure to aggregate content.

Digital audio visual content. This will cover entities that create, package and make available digital audio-visual content through telecommunications infrastructure. These are to be distinguished from traditional broadcasters.

Transition

Current license holders have 60 days from 30 October 2019 to apply for licenses under the new framework. The UCC will evaluate the applications and confirm or suggest a different license. Those whose applications for licenses are pending but not yet considered have 30 days to re-apply. New entities can start applying immediately. The new regime is expected to take effect in June 2020. (November 6, 2019) mondaq.com

The government says the country's telecoms operators must list at least 20% of their shares on the local bourse within two years in a move to encourage local ownership. Mr. Ibrahim Bbosa, spokesman for the regulator Uganda Communications Commission (UCC) said that the share listing will be one of the terms contained within new licenses: 'In 60 days we want to have issued new licenses and then two years from then all the players should have listed at least 20% of their shares on the Uganda Stock Exchange (USE).' The foreign-owned operators MTN Uganda and Airtel Uganda control almost 90% of the local mobile market between them. Another condition of the new licenses will be for operators to share fiber backbone infrastructure to avoid the expense of each firm rolling out overlapping networks.

(November 1, 2019) reuter.com

Ukraine

The National Television & Radio Broadcasting Council (NRADA) announced on its website that it has approved a draft Action Plan to free up the 'digital dividend' 790MHz-862MHz (800MHz) and 694MHz-790MHz (700MHz) frequency bands for 4G LTE mobile broadband services by redistributing spectrum used by TV broadcasting. The plan was approved at NRADA's meeting on 12 December in accordance with Presidential Decree No. 497 of 8 July 2019 'On Some Measures to Improve Access to Mobile Internet', and will now be sent to the State Secretariat of Administration for further approval by the Cabinet of Ministers. Under the plan, national digital TV channels will operate in the 470MHz-694MHz range, while the Ukrainian State Centre of Radio Frequencies (UCRF) will allocate additional frequencies for local/regional broadcasting. Preliminary calculations for redevelopment of local and regional TV channels are due from the UCRF in April 2020, NRADA added. (December 17, 2019) commsupdate.com

Telecoms regulator the NCCIR issued Decision No. 529 on 12 November 2019 confirming that it will allocate nationwide 5G-suitable wireless spectrum in the 3400MHz-3600MHz range 'on a competitive or tender basis'. On the same date the watchdog withdrew an operating permit of FreshTel, which previously held frequencies in the band but had its license cancelled

by the NCCIR for failure to utilize the resource. Furthermore, NCCIR Decision No. 528 (12 November) approved 'without comment' the draft plan of Ukraine's Cabinet of Ministers for the implementation of 5G mobile communication systems in 2020, which had been sent to the regulator by the State Service for Special Communication & Information Protection of Ukraine on 25 October. (November 14, 2019) telegeography.com

United Kingdom

Switching broadband is already fairly straightforward, but industry regulators Ofcom have been working tirelessly to make things even easier for consumers. In order to make the telecoms market as fair and uniform as possible, Ofcom is proposing even more regulations to make switching providers easier and to ensure customers always have access to the best broadband services. The majority of UK internet service providers operate on the Openreach network once owned by BT. This shared network means that switching between providers doesn't require an installation process and the entire switch can be handled by whichever provider you're moving to. This includes switches between BT, EE, Plusnet, Sky, TalkTalk and Vodafone. The challenge comes when switching to a provider that doesn't operate on the Openreach network, such as Hyperoptic, City Fiber or Virgin Media, who all have their own cable network. These switches are currently a little more complicated and can result in an overlap or gap in service. But not for much longer. In their statement, Ofcom quoted research which found that 43% of customers who decided not to switch did so because they were worried about arranging two different services to start and end at the right time. What's more, 37% were deterred from switching because they didn't want to speak to two different companies. Ofcom's proposed changes are in line with the new European Electronic Communications Code which calls for EU member states to make switching telecoms providers easier. This would likely mean that new providers would be responsible for managing the switch for all customers, whether they are switching between different networks or not. These new regulations would also require providers to compensate customers if they have an interruption in their service for more than one working day. Ofcom is planning to publish more information about these new requirements early next year, along with details of when they will be going into effect. (December 23, 2019) uswitch.com

The United Kingdom's telecoms regulator Ofcom has said it is aiming to make the process of customers switching between different broadband networks easier in future. While it noted that the process for moving between providers such as BT, Sky and TalkTalk on Openreach's infrastructure is already relatively simple and managed by their new provider, it highlighted the difficulties faced by those subscribers that wish to move to a different network, such as those owned and operated by the likes of CityFibre, Gigaclear, Hyperoptic or Virgin Media. Under the current system, such customers need to contact both their existing and new provider to co-ordinate the switch, and make sure there is no gap between the old service ending and the new one starting. To address this issue, Ofcom is proposing that those broadband providers gaining the new subscriber will be required to lead the switchover, and offer a 'seamless switching experience', regardless of whether the customer is moving across different fixed networks or 'between providers of full fiber broadband services on the same fixed network'. In addition, the regulator has said that any loss of service that might occur during a switch should not exceed one working day, while providers will be required to compensate customers should anything go wrong during the process. Commenting on the matter, Lindsey Fussell, Ofcom's Consumer Group Director, said: 'Switching broadband provider should be quick, simple and hassle-free … Our plans would make it even easier to shop around – putting an end to needless time and effort spent dealing with different broadband companies.' Meanwhile, alongside its plans to make the broadband switching process easier, Ofcom is also consulting on a proposal to introduce a ban on the sale of 'locked' mobile devices. While the regulator noted that O2 UK, Three UK and Sky all currently sell unlocked devices to their customers, it pointed out that the likes of BT, EE, Tesco Mobile and Vodafone UK still sell mobile handsets that cannot be used on other networks, until unlocked. Arguing that this practice 'creates additional hassle and can put someone off from switching altogether', Ofcom has said it intends to ban the sale of locked mobile devices. Ofcom's consultation on both matters, entitled 'Fair treatment and easier switching for broadband and mobile customers', is accepting responses until 3 March 2020. (December 18, 2019) commsupdate.com

British telecoms regulator Ofcom has launched a consultation on proposals for the rules and procedures that universal service providers (USPs) should follow to make a claim for any unfair costs involved in providing a universal service. Its decision follows a June 2019 announcement in which the watchdog confirmed that BT and KCOM had been designated as USPs for the broadband universal service obligation (USO), scheduled to come into force from 20 March 2020. The regulator noted that proposed procedures would apply to the broadband USO, but also to any other universal service obligations. In terms of the proposals, the key elements include the ability for USPs to be able to request that Ofcom reviews its claim

for compensation, as well as a requirement that USPs must submit 'sufficient' information to support any claim. Meanwhile, when carrying out any review Ofcom would be required to determine the existence and level of any net cost, and once determined the regulator would decide whether it would be unfair for the provider in question to bear some or all of that cost. The closing date for feedback on the proposals is 7 January 2020. (November 6, 2019) telegeography.com

UK regulator Ofcom has announced changes to the technical requirements for the use of in-vehicle mobile phone repeaters. The action is designed to improve mobile reception without causing undue interference, and comes after Ofcom introduced regulations to allow the use of specific types of mobile repeaters without a license. These new technical specifications support increases to the maximum system gain permitted for repeaters in vehicles from 21 dB to 36 dB in relevant frequency bands above 1 GHz; increasing maximum gain from 15 dB to 30 dB in frequency bands below 1 GHz; and extending the range of available frequencies for in-vehicle repeaters by adding the 2.6 GHz FDD band to the list of license-exempt frequency bands. The changes have been implemented by amending the Wireless Telegraphy (Mobile Repeater) (Exemption) Regulations 2018, and will come into force from 27 January 2020.(November 5, 2019) telecompaper.com

United States

The US Federal Communications Commission (FCC) has confirmed that its latest sale of 5G-suitable millimeter wave (mmWave) frequencies got underway (10 December). The process comprises spectrum in the upper 37GHz, 39GHz and 47GHz bands. As per FCC documentation, qualified bidders include T-Mobile US, US Cellular and Windstream. In addition, it is understood that mobile giants AT&T and Verizon are both bidding under different names: AT&T appears to be using the FiberTower Spectrum Holdings unit it acquired in February 2018, while Verizon is bidding through Straight Path (also acquired in February 2018). The US territories are also represented, meanwhile, with IT&E (bidding under its previous name PTI Pacifica) and DOCOMO Pacific also registered to take part. Both telcos serve Guam and the Northern Mariana Islands. The Auction 103 represents the third sale of mmWave spectrum in 2019, following Auction 101 (28GHz) and Auction 102 (24GHz). Auction 101 concluded in January this year, generating a total of USD702.6 million, and was dominated by Verizon, which spent USD505.7 million on 1,066 licenses, followed by US Cellular (USD129.4 million for 408 licenses) and T-Mobile US (USD39.3 million for 865 licenses). In contrast, AT&T was the big winner in Auction 102, paying USD982.5 million for 831 of the 2,909 available licenses. Next in line was T-Mobile US (USD803.2 million, 1,346 licenses), followed by US Cellular (USD126.6 million, 282 licenses). (December 11, 2019) commsupdate.com

US Federal Communications Commission (FCC) Chief Ajit Pai detailed plans to establish a $9 billion pot to fund deployments of 5G in rural areas, which would supersede a previous program covering 4G. Under the plan, monies from the country's Universal Service Fund would be available to network operators and allocated through a reverse auction. In a statement, the FCC said the goal was to boost availability of 5G in "hard-to-serve areas with sparse populations and/or rugged terrain". At least $1 billion of the total would be set aside for the agricultural sector, the regulator said. Pai explained the Universal Service Fund "must be forward-looking and support the networks of tomorrow" to ensure rural Americans can access the benefits 5G is expected to deliver, while also meeting the "unique wireless connectivity needs" of the farming community. "We must ensure that 5G narrows rather than widens the digital divide", he commented. The 5G Fund would replace the $4.5 billion Mobility Fund Phase II, which focused on boosting LTE availability, but hit problems relating to operator coverage maps, prompting an investigation into the data they provided. Pai's pledge came as Chinese vendor Huawei commenced a legal challenge to a move to prevent operators using the Universal Service Fund to purchase its infrastructure. (December 5, 2019) mobileworldlive.com

The Federal Communications Commission (FCC) Chairman Ajit Pai has announced that he will direct his agency to auction off the nation's long-awaited 5G spectrum. Details of the auction have yet to be released, however in letters sent to lawmakers Pai noted he wishes to auction 280 megahertz of C-band spectrum for the service. A debate among wireless service providers over the direction the auction will take has begun, with Verizon supporting a private auction as the fastest way to get the 5G spectrum to market. AT&T, however, has voiced concerns, saying in a recent FCC filing that it fears a private auction will become "mired in legal challenges", and could threaten the release of the spectrum to the public altogether. There is also the question of how much of the money raised through the auction will go to the U.S. Government. Republican Sen. John Kennedy and House Energy and Commerce communications subcommittee Chairman Mike Doyle have called for the proceeds to go directly to the U.S. Treasury. Kennedy in particular has held meetings with Pai and given speeches in the Senate voicing concerns regarding a private sale. The news of progress in the release of the 5G spectrum in the U.S. comes less than a week after China successfully flipped the switch on a massive 5G rollout of its own, bringing the service

online for millions of people across 50 cities in the country. Next steps involve the FCC voting on Pai's plan, though further details are unavailable at this time. (November 19, 2019) mobileidworld.com

US Federal Communications (FCC) Commission Chairman Ajit Pai outlined plans to hold a public auction of spectrum between 3.7GHz and 4.2GHz (C-Band), despite concerns a government-run process could delay the arrival of critical mid-band airwaves to market. A total of 280MHz of spectrum from 3.7GHz to 3.98GHz would be on offer, with an additional 200MHz from 4GHz to 4.2GHz preserved for incumbent satellite services. The FCC recently faced political pressure to hold a public auction despite repeated offers from a group of satellite service providers known as the C-Band Alliance (CBA) to hold a private sale as soon as Q1 2020. Senior FCC officials said on a call with journalists CBA was ultimately unable to demonstrate it would be able to conduct a fair and transparent auction, pointing to concerns about price transparency and smaller players' ability to compete in a private sale. The FCC is expected to vote on the proposed plan early next year, with the goal of commencing the sale before the end of 2020, the officials said. However, telecom analysts at LightShed Partners expressed doubts about that timeline, arguing in a research note the decision to hold a public sale is "likely to complicate and materially delay the availability of spectrum that has been globally identified as a primary 5G spectrum band". Specifically, they noted it took a "material amount of time" for the FCC to gain support and develop the auction process for its 2017 sale of 600MHz spectrum, which required it to relocate and compensate incumbent licensees as it would likely have to do in the C-Band.
(November 18, 2019) mobileworldlive.com

The FCC has authorized nearly $13.5 million more in rural broadband funding for two companies that won funding in the Connect America Fund CAF II auction. Just over $1.9 million will go to Hankins Information Technology for deployments in California, with the remainder going to Newmax, which operates as Intermax Networks, for deployments in Idaho and Washington. Companies are authorized to receive funding after the FCC has reviewed and approved their long-form application and after the company has submitted an appropriate letter of credit and bankruptcy code opinion letter. The CAF II auction used a reverse auction to award funding to deploy broadband to certain areas where such service is not available today at speeds of at least 10 Mbps downstream and 1 Mbps upstream. Funding went to the company that committed to deploying service at the lowest level of support, with a weighting system used to favor bids to provide higher-speed or lower-latency service. The areas for which funding were awarded were traditionally served by one of the nation's largest price cap carriers. Those carriers were offered funding to deploy broadband to those areas using a cost model developed by the FCC, but some carriers declined the funding. The areas that were declined were included in the auction, along with what the FCC calls "remote areas" – the costliest to serve areas, which were not part of the offer to the price cap carriers. The FCC has made several previous announcements of CAF II funding authorizations and the majority of the funding has now been authorized. Companies whose funding was announced today have until late 2025 to complete deployments, with several key milestones between now and then. The first milestone occurs three years from now, when funding recipients are required to have reached at least 40% of target locations in a state. (November 14, 2019) telecompetitor.com

The US Federal Communications Commission (FCC) issued formal approval for T-Mobile US and Sprint's proposed merger, confirming it would green light the deal despite opposition from two of its five members. In a statement, Chairman Ajit Pai said the regulator had concluded the deal offered several benefits following a review lasting more than a year. Specifically, the FCC expects the merger to advance US leadership in 5G, help close the broadband gap in rural areas and increase competition. He noted structural remedies put in place by the FCC would address competitive and pricing concerns. The announcement of its formal approval followed a vote last month in which commissioners Jessica Rosenworcel and Geoffrey Starks objected to the deal. In a fresh statement, Rosenworcel again blasted the decision, branding the merger "blatantly anticompetitive" and claiming it will "end a golden age in wireless that helped bring to market lower prices and more innovative services". Rosenworcel and Starks were among a number of politicians and critics which pressed the FCC to delay its vote to give the public time to comment on conditions imposed by the regulator and the Department of Justice in exchange for approval. Sprint and T-Mobile still face a lawsuit from 16 attorney generals aiming to block the deal: a court case is due to begin on 9 December. (November 6, 2019) mobileworldlive.com

Uruguay

Regulatory Unit of Communications Services (Unidad Reguladora de Servicios de Comunicaciones, URSEC) has announced the results of its auction of spectrum in the 1700MHz/2100MHz (AWS), 1800MHz and 2600MHz frequency bands. The process generated a total of USD65.427 million, with Telefonica Moviles del Uruguay (Movistar) leading the bidding, registering total commitments of USD28.015 million. Also successful were state-backed Administracion Nacional de Telecomunicaciones (Antel, USD22.412 million) and America Movil-backed AM Wireless Uruguay (trading as Claro, USD15.0 million). The total breakdown is as

follows:

Claro

1765MHz-1770MHz/2165MHz-2170MHz (USD7.5 M)
1770MHz-1775MHz/2170MHz-2175MHz (USD7.5 M)

Antel

2510MHz-2515MHz/2630MHz-2635MHz (USD5.603 M)
2515MHz-2520MHz/2635MHz-2640MHz (USD5.603 M)
2520MHz-2525MHz/2640MHz-2645MHz (USD5.603 M)
2525MHz-2530MHz/2645MHz-2650MHz (USD5.603 M)
1820MHz-1830MHz (no license fee)
1830MHz-1840MHz (no license fee)

Movistar

2535MHz-2540MHz/2655MHz-2660MHz (USD7.001 M)
2540MHz-2545MHz/2660MHz-2665MHz (USD7.013 M)
2545MHz-2550MHz/2665MHz-2670MHz (USD7.001 M)
2550MHz-2555MHz/2670MHz-2675MHz (USD7.000M)

(December 17, 2019) commsupdate.com

Zimbabwe

The head of the Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) has said that new players would be welcomed into the country's mobile market as this would help to increase competition and drive down costs for end users. A report citing ZBCtv, quotes Gift Machengete as saying: 'We have not reached that point of over-saturation because what we need are more players.' The regulator says it is accepting proposals from local and overseas investors. The country is currently home to one privately owned cellco, market leader Econet Wireless, plus two state-backed firms, NetOne and Telecel. The POTRAZ chief did not specify whether the new players should be mobile network operators (MNOs) or MVNOs. There are currently no MVNOs active in Zimbabwe. In December 2018 POTRAZ spokesperson Baxton Sirewu said that the market could not support a new MNO, with a lack of available spectrum limiting how many players could operate effective networks. Even if a fourth network does not emerge, new investors could still enter the sector, with the government looking for a buyer for NetOne and its fixed line sister company TelOne. TeleGeography's GlobalComms Database notes that Telkom and MTN Group of South Africa have both been linked as potential bidders. (November 7, 2019) The Chronicle

The Postal and Telecommunications Regulatory Authority of Zimbabwe (Potraz) has approved an upward 95.39 percent voice, data and SMS tariff adjustment for both mobile and fixed network operators as previous tariffs were ravaged by inflationary pressures. According to Potraz, in a circular to operators, previous tariffs that were set in August 2019 have been rendered "unsustainable" as the operating environment has further deteriorated due to inflationary pressures. Inflation pressures were elevated in the first half of the year reaching 175,66 percent (year-on-year) and 39,3 percent (month-on-month) in June 2019. While year-on-year figures are no longer being published, the month-on-month inflation has slowed to 17,7 percent as at September 2019. "Accordingly, the authority has found it necessary to review tariff thresholds for telecommunication services by 95,39 percent based on the Telecommunication Price Index (TPI) that was computed in consultation with all operators. "In view of the foregoing, and guided by the Act, all public switched and mobile operators may adjust their tariffs in line with the above thresholds for approval by the Authority," reads Protraz's circular number 4 of 2019. Following the approval, the country's three mobile network operators Econet Wireless, Telecel and NetOne reviewed upwards their voice, data, and SMS tariffs. Econet has increased its voice tariff with 98 percent to $0,963 per minute from $0,486 per minute in August, while data and SMS prices have gone up to $0,1926 per MB and $0,2440 per SMS respectively. Telecel's voice, data and SMS tariffs are now $0,95 per minute for Telecel to Telecel, $0,92 per minute for Telecel to other networks, $0,19 per MB and $0,24 per SMS. NetOne $0,95 per minute for NetOne to NetOne, $0,92 per minute for Netone and other local networks, $0,19 data and SMS are now $0,24. Meanwhile, NetOne's tariffs increased to $0,95 per minute for NetOne to NetOne, $0,92 per minute for NetOne and other local networks, $0,19 data and $0,24 for SMS in compliance with the regulator. NetOne Marketing Communications Executive Director Dr. Eldrette Shereni said the new tariffs were "in compliance with Potraz regulated tariffs as per the circular 4 of 2019." The new tariff comes at a time most businesses are grappling with increased cost of doing business and will also come as a shock to constrained consumers who were already battling with increased cost of living. The cost of energy, both electricity and fuel, has a huge bearing on the operations of telecom operators as it is used to power base stations. Fuel went up by approximately 12 percent on Monday this week while the Zimbabwe Energy Regulatory Authority (Zera) early this month approved a 320 percent electricity tariff increase to 162,16 cents per kilowatt hour (kWh) to help Zesa improve power supply. The country's statistics agency (Zimstat) recently released data showing that the Total Consumption Poverty Line (TCPL) for an average of five persons per household stood at $2 192,00 in September 2019. The poverty datum line (PDL) represents the cost of a given standard of living that must be attained if a person is deemed not to be poor.

(November 1, 2019) The Herald

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