Chipmakers gearing up for 5G
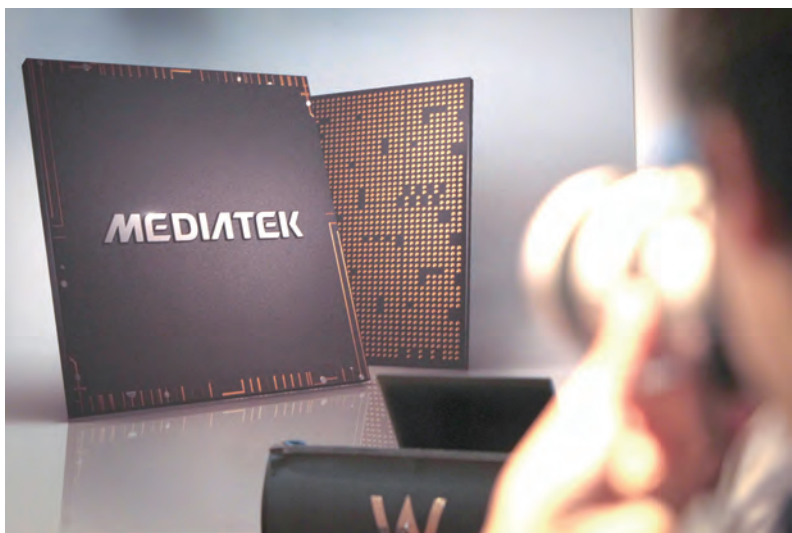
DIGITIMES staff

Major chipmakers Intel, Qualcomm and MediaTek have all unveiled products or plans at the ongoing Computex 2018 aiming to accelerate the arrival of the 5G era.

MediaTek has released its 5G modem chipset solution, the Helio M70, to be fabricated using TSMC's 7nm process incorporating EUV technology, and will kick off official shipments in 2019 in a bid to secure a preemptive presence in the 5G market, according to a company announcement issued June 5.

MediaTek's planned volume production and official shipment for its new-generation modem chips will come at least six months ahead of their original schedule, demonstrating the chip designer's determination to speed up its deployments in 5G communication technologies. This also indicates that the business opportunities for 5G applications are beginning to ferment, industry sources said.

MediaTek CEO Rick Tsai said that his company's R&D teams are actively working to create for consumers the best user experiences associated with 5G and AI. He stressed that by leveraging its broad range of excellent IPs and chipset solutions, MediaTek can help ecosystems and customers roll out the best-performance terminal devices to jointly embrace bright business prospects in the 5G era.

In the deployment of 5G technologies and chipset solutions, MediaTek has earlier contacted Nokia, NTT Docomo, China Mobile and Huawei for technical cooperation and specs negotiation. Now with the rollout of the latest 3GPP Release 15 NSA 5G NR regulations, MediaTek has decided to roll out, ahead of schedule, its Helio M70 modem chip solution boasting a transmission speed of 5Gbps to support global smartphone vendors and telecom operators, according to MeidaTek president Joe Chen

He stressed that MediaTek will not only seek to hit the 5G chip market with a bang in 2019, but will also significantly ramp up its shipments in 2020-2022 to build a solid presence in the market.

Intel is also keen to embrace 5G in pursuit of always-connected PCs. Reiterating the chip giant's commitment to PC in his keynote delivered at Computex, Gregory Bryant, senior vice president and general manager of the Client Computing Group at Intel, disclosed that Sprint has become a partner to sell Intel processor based, 5G-connected PCs in stores around the world. Acer, Asus, Dell, HP, Lenovo and Microsoft are working with Intel to deliver the industry's first 5G-connected notebook and 2-in-1s in 2019, Bryant said.

Boasting a mission to "lead the world to 5G," Qualcomm has also announced at Computex a joint effort with Samsung Electronics to integrate its Snapdragon 850 Mobile Compute Platform, featuring the cutting-edge Snapdragon X20 and Qualcomm AI Engine in a future device.

"Building on the portfolio of always on, always connected PCs established over the past year, we are thrilled to work with Samsung to help offer consumers true mobility combined with the productivity and entertainment features of Windows 10," said Alex Katouzian, senior vice president and general manager, mobile business unit, Qualcomm Technologies, Inc. "To truly expand this category, our work with mobile leaders like Samsung is important to help us deliver the next generation of always on, always connected PCs to consumers."

The Snapdragon 850 Mobile Compute Platform is designed to support many sought-after smartphone features in the PC and to stay connected to LTE or Wi-Fi so users can receive notifications and have their data virtually always synced on the go. The power-efficient architecture is engineered to support up to 30% system-wide increase in performance and up to 3X AI performance over the previous generation, as well as up to 1.2 gigabits per second LTE connectivity speeds and up to 25 hours of continuous usage or multi-day battery life under normal usage conditions, said Qualcomm.

"At Samsung, we understand the unique needs of our consumers and aim to create new innovations to support their 'on-the-go' lifestyle," said Kyungsik Choi, executive vice president and head of strategic marketing office, mobile communications business, Samsung. "This collaboration with Qualcomm Technologies and their Snapdragon 850 Mobile Compute Platform will allow us to provide always on, always connected mobile computing experiences for our customers."

With 10nm leading node efficiency, the Snapdragon 850 Mobile Compute Platform allows for sleeker and more portable, fanless designs for mobile customers, compared to current 14nm solutions. In addition, new and improved features on the Snapdragon 850 Mobile Compute Platform can support on-device experiences for AI, and users can expect camera, voice and battery life enhancements. In addition, advanced graphics and high-quality audio is designed to allow users to maximize their entertainment while viewing or capturing, all while bringing a Windows 10 experience.

Qualcomm said Windows 10 devices powered by the Snapdragon Mobile Compute Platform are expected to be available in retail later this year.

Five eye-catching edge computing implementations showcased at Computex 2018

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Computex 2018, as a benchmark for global B2B professional technology exhibition, highlights six themes - artificial intelligence (AI), 5G communication, blockchain, Internet of Things (IoT), innovations & startups and gaming & VR. Taiwan External Trade Development Council (TAITRA) expects advances of the six major technologies will introduce innovative applications and infuse new energy into Taiwan's economy.

A glimpse at the exhibits at this year's event – which started on June 5 – shows that AI has become an industry-wide focus of new product R&D. Centralized computation architectures can hardly cope with the requirements by growingly diverse AI applications. As such, equipping end devices with sufficient edge computing capabilities is now an important market trend. A wide variety of edge computing implementations are being showcased at Computex 2018, with self-driving cars, drones, robots, VR/AR/MR devices, surveillance cameras particularly grabbing visitors's attention.

Visitors entering TWTC Exhibition Hall 1 will not miss the large-size drone put on display by Industrial Technology Research Institute (ITRI) at Computex. With a wheelbase of 3.75m, ITRI's unique hybrid power drone features a flight duration of 45 minutes when carrying a 30kg payload. Compared to pure battery-powered flying vehicles, ITRI's drone stays in the air longer. According to ITRI, running on both batteries and internal combustion engines, the drone is

ITRI's large-size drone can be applied for long-range missions such as dropping off supplies to disaster areas and inspecting bridges.

easy to maneuver and flies long distance thanks to the combined benefits of the high sensitivity of batteries and the high power output of gasoline.

The high-payload and high-duration drone can be used for long-range missions, such as dropping off supplies to disaster areas, inspecting bridges and cleaning power lines. ITRI emphasizes that using the drone to clean power lines is a perfect example demonstrating its tremendous value. Contaminants on the insulators of an electrical power line can cause an electrical fault and must be periodically cleaned and maintained. ITRI's drone can help a power company carry out such a task. In the case of Taiwan, this can increase the total power output by 1%-2%.

Aside from drones, self-driving cars are also a highlight of edge computing applications. Elitegroup Computer Systems (ESC) is showcasing a 10.1-inch 2DIM in-vehicle computer with a 3-second boot time as required by automakers. With self-driving cars now a confirmed trend, an advanced driver assistance system (ADAS) that processes data sent back from a range of sensors in

real time is essential. In view of this, ESC builds its automotive system with dual ARM processors – Cortex M and Cortex A7, operating system software as well as WLAN and Bluetooth communication. ESC is supplying the product to automakers in Taiwan and China.

ESC also has a mini remote-control self-driving car integrated with the company's ADAS on display at Computex. The ESC ADAS enables blind spot visibility and 360-degree surround view. It can be applied to trucks longer than 20 feet and resolves the blind spot problem for large vehicles with its camera and image processing capability, thereby enhancing road safety.

The service robot moving around at TWTC Exhibition Hall 1 is the smart robot AYUDA developed by SYSCOM Group, a leading system integrator based in Taiwan. AYUDA is also the first police robot that the New Taipei City Police Department is deploying in remote mountain areas to provide local citizens with police administration messages. AYUDA is also being used to provide services at banks and hospitals.

According to SYSCOM Group, AYUDA has a built-in indoor positioning system and therefore can navigate an indoor area using its internal database. It also has face and voice recognition capabilities, allowing it to analyze a visitor's speech and give an appropriate response. To avoid delay in response resulting from back-and-forth communication via network connection, AYUDA on display at Computex operates offline, interacting with visitors using its built-in processor and database. In addition, AYUDA allows a high level of customization to accommodate wide-ranging customer needs in robot appearance, communication protocols and cloud connections.

Virtual reality (VR) has inspired worldwide users with never-before-experienced visual enjoyments. However, those who have used VR glasses feel limited and inconvenienced by the VR glass cable. In response, Silicon Line introduces VR Optical Links featuring high-speed data transfer, high-resolution display, lightweight form factor, ultra-flexibility and long-range transmission to enhance VR user experiences.

Using optical cables, VR Optical Links enable data transfer speeds far surpassing those of traditional copper cables. The advantage of high-speed data transfer is that the transmission range can be up to 10m and it allows the transmission of high-resolution images so the VR effects are more refined and lifelike. Furthermore, as optical cables are 70% lighter than copper cables, VR glass users will feel much less incumbered.

With respect to image

processing, security surveillance has become an important AI application in recent years. VIVOTEK's 360-degree panomorph fisheye camera FE9391-EV with built-in deep learning algorithms can easily detect and identify people and objects in an area and accurately calculate the number of people and the length of time they stay in the area.

VIVOTEK's FE9391-EV is equipped with edge computing capability that allows it to perform front-end image processing and then send the results to the back-end, thereby offloading some work from the cloud platform. This way, the front-end device can respond more quickly.

According to VIVOTEK, the product can be put to use in diverse scenarios. For example, the police can use it for security surveillance in public areas. Retailers can use it to check how long consumers stay in front of a particular shelf and figure out a hot spot to display their merchandise. They can also use it to monitor how long a line is at a checkout lane. When it exceeds a predetermined limit, the system can automatically alert other cashiers to support so retailers will be able to enhance service quality.

Edge computing is rising to become an important trend in recent years. End devices with capabilities to perform real time computation and make smart responses will soon be everywhere in our lives. At Computex 2018, there are multiple products putting edge computing to practical use and they will continue to boom as the industry infuses more technological advances and creativity into their developments.

Comprehensive integrated tests help capture opportunities as 5G accelerates IoT boom

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In recent years, governments and businesses alike have been keen on the development of 5G. However, most operators around the world only just kicked off their 4G services in 2012 (2014 in Taiwan). After only six short years, they have yet to see positive returns on the large sums they invested in their 4G licenses. So why are they rushing to come up with the next generation communication standard? According to Yong-Fen Hsieh, chairwoman of Materials Analysis Technology Inc (MA-tek), 5G communication will enable high-speed transmission that will make possible a great number of applications that existing technologies do not allow. 5G networks will provide high-speed connections to back-end cloud data centers for everything from transportation, healthcare, and pollution control infrastructures to consumer devices. Many countries and companies around the world are aggressively pursuing the development of the next generation communication technology in view of the numerous possibilities it offers.

Take the development history of mobile communication in Taiwan for example. 2G (GSM) began in 1998, 3G (WCDMA) in 2005 and 4G in 2014. Mobile communication standards underwent three major changes over that short, 20-year period, each of which introduced broader bandwidth and faster networks that enabled different data transfer applications. In the 2G era, GSM was focused on voice communication. The availability of various 3G CDMA technologies made sending texts and photos a norm and allowed limited access to the Internet and online videos. Going into 4G, mobile communication officially moved into high gear, paving the way for a myriad of applications for city infrastructure, healthcare, manufacturing and even entertainment. The advent of 5G will expand the smart foundation, allowing wide-range and higher-quality applications. High-frequency and high-speed 5G communication will enable 3D image transmission, face recognition, fingerprint authentication, voice control and real-time video transmission. Couple 5G development with cloud servers and increasingly advanced computational devices and the sky is the limit.

Considering the great IoT opportunities that 5G has to offer, governments around the globe are scrambling to establish new standards in an attempt to gain market dominance. At present, EU has decided to allocate the 694Mhz-790Mhz band to 5G communication, and major telecom operators can expect to receive 5G licenses by June 2019. In the US, the largest wireless communication service provider, Verizon Wireless, is working with Korea-based Samsung to begin 5G deployment and testing in five cities. T-Mobile US Inc also plans to kick off 5G services in 2019 and complete nationwide roll-out by 2020. China's state-led 5G development is based on its Made in China 2025 initiative. They completed the world's largest 5G trial network in March 2017.

In Taiwan, Chunghwa Telecom, the 5G Technology Program Office of the Department of Industrial Technology of the Ministry of Economic Affairs, Industrial Technology Research Institute and the Institute for Information Industry co-founded the Taiwan 5G Alliance. Their goal is to begin testing of a 5G trial network in late 2018 or early 2019 and launch a pre-commercial 5G network by 2020. However, Hsieh comments that the Taiwan high-tech industry specializes in product design and manufacturing. The establishment of standards will largely be determined by market scale and how fast the technology can be developed and widely adopted. Taiwan-based vendors have an advantage in OEM manufacturing. They cannot bet on one standard in a market still split between many standards. They will have to closely monitor market dynamics to stay ahead of the game.

Hsieh also points out that the Taiwan high-tech supply chain can target China as a 5G IoT market. From a system perspective China is strong. It has a large market, and its system integrators have mature technologies and extensive experience. Taiwan-based vendors, on the other hand, have a great deal of experience in the design and production of individual components. They are able to produce premium products and respond promptly to customer needs, so manufacturers in other parts of the world have a hard time competing with them. It will take China some time to foster talent in this field. As such, Taiwan and China complement each other very well. As to using 5G technologies for IoT development, Hsieh thinks there are still challenges to overcome. One of the main challenges will be signal interference. Generally, communication standards used to involve a single protocol, like GSM, CDMA, WLAN or Bluetooth. Electronic devices usually operate on a single communication protocol. It was not common for multiple standards to operate concurrently, so interference was not a serious issue. However, IoT devices often need to use multiple communication protocols for data transmission, so it is typical to integrate several types of communication chip into one device. Furthermore, current IoT devices mostly use low-frequency and low-power-consumption communication standards, which already causes interference problems. The situation will only get worse when 5G protocols are also incorporated.

The industry may be able to overcome the challenge by incorporating test mechanisms. But, with the requirements set by IoT device manufacturers, testing one single communication standard is no longer enough. Test laboratories must provide integrated testing services that validate not only the chips that combine different standards but also the entire fabrication process of chips supporting a single standard to ensure glitch-free operation of IoT devices. Experience and up-to-date testing equipment are essential for labs that aim to provide integrated testing services, said Hsieh. Take MA-tek for example. MA-tek is among the few Taiwan vendors capable of providing standardized commercial services for material structure and fabrication process analyses. MA-tek has acquired state-of-the-art instruments, including high-end tools such as transmission electron microscopes (TEM), scanning electron microscopes (SEM), focused ion beam microscopes (FIB), secondary ion mass spectrometers (SIMS -7f), and, more recently, 3D X-ray microscopes, nano probes and next-generation high-resolution scanning acoustic microscopes (SAT). Coupled with extensive knowledge and experience accumulated through years of serving a wide range of high-tech businesses, MA-tek is able to provide outstanding advice and counseling services.

Hsieh thinks the combination of 5G and IoT will give birth to an abundance of new opportunities, but it is uncharted territory for most equipment and system providers. Hsieh suggests that vendors work with highly-experienced labs to conduct comprehensive tests on equipment and systems.

Yong-Fen Hsieh, chairwoman, Materials Analysis Technology Inc, holds that integrated tests are vital to IoT systems seeking to incorporate 5G technologies.

5G user base is expected to exceed 1.1 billion by 2025, but market unlikely to see boom as fast as that for 4G

Benson Wu,
DIGITIMES Research, Taipei

With the 4G market entering fierce price-cutting competition sooner than expected in recent years, tier-1 telecom operators are growingly aggressive in introducing next-generation communication technologies in an attempt to maintain their market leadership. This is the key reason why many iconic operators are hoping to move up their schedule for 5G commercial operation. However, with maturing 4G technology advances, costly 5G deployment, and profit uncertainty of emerging applications, the 5G service market is unlikely to experience a boom as that seen in 4G upgrades, according to Digitimes Research.

As 4G LTE data services are IP-based, end devices now virtually have no problem with FD/TD-LTE interoperability, and late-comers are stepping up network coverage as well as transmission bandwidth. Users now experience little difference among various 4G LTE mobile services.

However, in the case of 5G, it is not necessary to choose a particular communication standard but the big question is which emerging application markets one should venture into. In other words, there will not be a 5G standard with lower roll-out costs. With the rise of the "X as a Service" business model, the competition among telecom operators in the 5G era will actually hinge on the size of their capital.

Digitimes Research estimates the number of 5G users will reach 1.14 billion by 2025 to account for 13.4% of all mobile service subscribers, and China, the US, Europe, Japan and Korea will have 75% of the world's 5G users. This shows that despite being already in mid-stage development at

Global telecom service users, 2015-2025 (billion)

Global 5G users by region, 2025
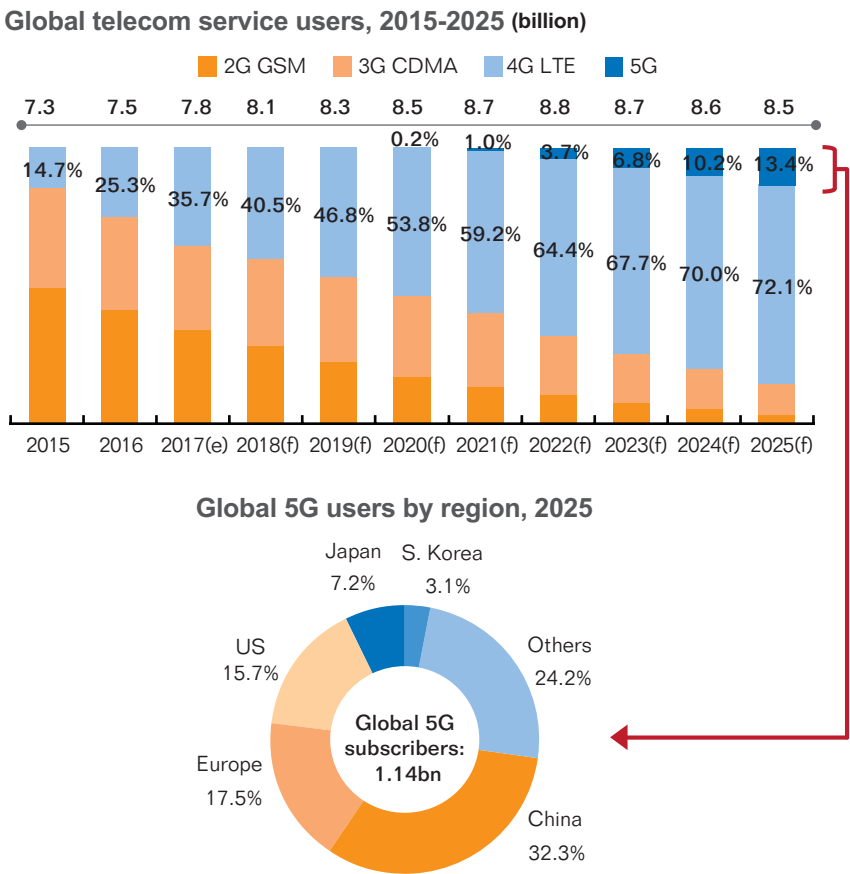
Source: Digitimes Research, April 2018

that time, the 5G market will still be characterized by a high concentration of users in a few regions.

Assuming 5G networks will use 3.5GHz/4.9GHz/26GHz/28GHz 5G frequency bands, Digitimes Research estimates that China telecom operators will have to spend CNY300 billion (US$47.33 billion) to CNY500 billion to complete 5G network roll-out in urban areas. The amount excludes costs for peripheral transmission and core/radio access network upgrades, so the actual capital expenditures will run higher than the estimate and will impose great burden on the operators' profitability.

Digitimes Research thinks that with 4G network investments still being amortized, 5G deployment costs running high, and business models for emerging applications still uncertain, most operators remain conservative with their 5G roll-out plans except for a few large operators in some countries or regions. As it is increasingly common for telecom operators to reduce capital expenditures in an effort to raise profit margins over recent years, this has a direct impact on the scale of the telecom equipment market.

With 4G LTE market still flourishing, 5G user base will unlikely expand at record-breaking speeds

According to Global mobile Suppliers Association (GSA) statistics, total 4G LTE users worldwide reached 2.8 billion as of year-end 2017, increasing by 45% or 860 million

users from 2016, and accounting for a record-setting 35.7% of global mobile service subscribers.

According to Digitimes Research, since the first LTE commercial network went into operation in 2009, it took six years for the LTE user base to reach one billion and another 2.5 years for the number to triple to three billion. The number of LTE users has been growing rapidly mainly because there are more than 800 operators engaging in 4G services around the world and more nationwide 4G mobile services are available today.

As 4G network coverage continues to expand, global mobile service subscribers will keep growing at a moderate rate through 2022. When the coverage becomes complete, some countries will begin to take back 2G frequency bands, forcing 2G/3G users to opt out. As such, the global mobile service user base can expect a negative growth come 2023.

It should be noted that 2G users still accounted for a 41.5% share of total mobile service subscribers in 2016 but the share was surpassed by 4G LTE and 3G users between 2017 and 2018. Global 2G users are expected to drop to 290 million to account for a 3.4% share, and 5G users will hold a 13.4% share, exceeding 3G users and only second to LTE users by 2025.

With the US, China, Japan, Korea and Europe keen on 5G commercial operation, 3rd Generation Partnership Project (3GPP) released Non-StandAlone (NSA) specification in late 2017 and is expected to release StandAlone (SA) 5G networking standards in mid-2018. Some regions will kick off small-scale pre-5G mobile services as early as 2019.

Digitimes Research estimates 13.4% of global mobile service subscribers will connect to 5G networks, totaling 1.14 billion by

2025, of which 32.3% will be in China, 17.5% in Europe and 15.7% in the US. It should be noted that although the top five regions account for a combined share of 75% of the world's 5G users, they only account for 35% of the global population. This shows that despite being in mid-stage development at that time, the 5G communication market will still be characterized by a high concentration of users in a few regions.

Although 5G communication is increasingly attracting market attention, promises significantly faster performance over 4G LTE, and is included in the national development strategies of countries such as the US, Japan, Korea and China, Digitimes Research thinks it's unlikely for 5G users to grow by leaps and bounds within a short period of time as in the case of 4G LTE migration for reasons as follows.

4G networks offer choices of different technologies with long-term development

Looking back to the times of 3G communication, CDMA2000 and TD-SCDMA lacked next-generation technologies to choose from so many 3G operators had no option but to begin early migration to 4G.

Although 5G promises significant improvement over 4G LTE in terms of transmission bandwidth and network latency, 4G has a complete roadmap of later-generation standards including LTE, LTE-Advanced and LTE-Advanced Pro that operators can choose from for reliable and more cost-efficient network upgrade. This also relieves 4G operators from the pressure of having to migrate to 5G within a short period of time.

5G networks require multiple critical technologies

Operators will be able to leverage boosted 5G network performance to expand into new vertical application markets but to achieve this, multiple critical technologies will also be needed, such as Massive MIMO, mmWave, new encoding mechanisms, SON/NFV solutions and edge cloud computing.

As 5G operation requires more advanced communication technologies, 4G operators will have to withstand tremendous pressure on capital expenditures when they upgrade to 5G.

No successful 5G business model

Although it is a common goal for operators to migrate to 5G in the future, there is not only pressure of capital expenditures but also uncertainty as to which upgrade choice to go with, for example, NSA or SA networking.

Furthermore, despite diverse 5G opportunities, no business models have yet been market proven. Most operators thus take a wait-and-see attitude and are more conservative toward full-scale 5G deployment compared to their 4G LTE roll-out plans.

In brief, it is no doubt that 5G communication will be instrumental to a country's future competitiveness but its deployment will also introduce great challenges. Digitimes Research thinks although operators will generally move up their schedule for pre-5G network testing and deployment, with advanced 4G technologies becoming mature, 5G investments running high, and emerging business models still uncertain, 5G roll-out will take longer than 4G LTE and the 5G user base will expand at a slower pace as well.

SECO strengthening presence in fast growing Asian embedded systems market

The embedded systems and industrial PC industries are driven by the invention of various vertical solutions and technologies with different kinds of microcontrollers and since then it has evolved into various forms, from primarily being designed for machine control applications to much broader ranges of fields such as smart medical or robotic systems. In recent years, however, there is a revolution in the domain of industrial Internet of Things (IIoT) and AIoT (the artificial intelligence of Things) embedded systems with the advent of increasingly powerful and more power saving processors. These trends make the embedded systems transform themselves into really complex systems, thus creating newer opportunities and challenges to develop more powerful, energy efficient systems, peripherals and other accessories.

Founded in 1979, SECO is an Italy-based embedded system and leading industrial solution provider with dedicated focus on designing standard solutions up to custom embedded systems fulfilling the needs of customers. The product matrix is ranging from board-level controllers to a complete system. SECO provides the engineering services over the entire design cycle to mass production of embedded solutions. In an interview, Marty Chen, vice president of SECO Asia Pacific, talked about SECO's development in Asia's embedded system market sectors.

Meanwhile, during Computex Taipei 2018, SECO will showcase a full range of products at Nangang Exhibition Hall 1, booth No K0102. The live demonstration will include the solutions of Qseven, COM Express and SMARC product lines to allow visitors to have a good chance to see the advanced solutions provided by a leading European embedded solution vendor.

Having a wide processor range is the key to a successful business for SECO. The new tiers of supporting listings are from NXP i.MX8, Intel Apollo Lake and Coffee Lake, AMD V1000 embedded CPUs. The most popular product series of SECO is the small form factor computer on module (COM), such as Qseven, COM Express and SMARC . It embraces a cross-platform philosophy with the modular design aiming to provide flexibility to switch between different processors with the same form factor standards.

Customers could select the CPU chips from x86 to ARM-cored processor, or change different grades of ARM-cored chips. These COM boards come with SECO's very unique bundle design layout of carrier boards, which gives the freedom to switch CPUs without adjusting any dual inline package switch (DIP switch) or changing jumper settings. The benefits of this design satisfy the versatile applications with intensive computing requirements in various embedded systems, which allows both extreme flexibility and vast scalability. And most of all, system makers save the development time and tackle the cost consideration, meeting dynamic demands of end customers.

During Computex 2018, SECO also showcases at its booth its new UDOO platform, an educational DIY electronics and open-source hardware board. UDOO is now used by tens of thousands of users all over the world, including universities and marquee research groups. This newest creation of UDOO single-board computer board is the fourth generation version combined with an Arduino-compatible platform to support both x86 and ARM cored CPUs. The new feature sets are for sensing and programming the physical world dedicated for developer communities or creators of Kickstarter. The newest UDOO provides an outstanding computational power with 4K resolution display features, which comes in handy for applications like edge computing, computer vsion, virtual reality, augmented reality, client-side 3D rendering and real-time analysis of big data.

One of the most important factors for embedded solution providers is the capability of vertical integration. SECO maintains its own factory operation in Italy. But for entering Asian markets to service fast growing embedded customers, SECO is planning to leverage Taiwan's strengths in the electronics industry and build cooperative projects with Taiwan system makers. It is counting on the SECO flexible and fast time-to-market solutions. Furthermore, Chen highlights that SECO will establish a solution center in Taiwan and recruit more engineers to service Asian customers.

In recent business development of the European market, SECO has successfully introduced various medical solutions covering the computation modules of ultrasound equipment to complete healthcare tablets. For entering Asia, Chen added, the current development will continue towards smart medical solutions. Over the past few years, SECO has been keen on building partnerships with targeted first-tier customers in Japan and South Korea; it will gain the benefits of sales performance in next few months. And it is further expanding its operations to China at a rapid pace, Chen noted.

SECO is participating in Computex 2018. SECO's booth is at K0102.

Marty Chen, vice president of SECO Asia Pacific

Colorful iGame Z370 motherboard is optimal selection for gamers

Colorful stays committed to delivering premium-quality IT products to global users, customized high-performance computer boards and cards for VIP gamers, enhancing user experiences in application environments with visual enjoyment and seamless operation and building powerful application platforms for users. During the company's two decades of development in computer boards and cards, every Colorful iGame engineer has consistently adhered to the design principle of continuing refinement and "GAMER CUSTOMIZATION" brand culture. Colorful's R&D workforce insists on challenging itself and continues to make breakthroughs in materials engineering, aerodynamics and biomimetics, thereby integrating cutting-edge technologies in Colorful products to closely match

Colorful's iGame Z370 motherboard

what today's users really need.

On the basis of its "GAMER CUSTOMIZATION" brand culture, Colorful engaged many DIY gamers in discussions on product design and launched iGame Intel Z370 series earlier in 2018. iGame Z370 Vulcan X comes with three PCI-Ex16 and three PCI-Ex1 slots, all of which support PCI-E3.0. Specifically tailored to suit gamers, iGame Z370 Vulcan X is added with a wire-draw cooling armor, entirely formed using the wire-draw technology with RGB light effects. Its graphics card slots feature multiple enhancements, which reduce the risks of slot or card damage when graphics cards are plugged or unplugged and prevent overheating due to insufficient heat dissipation when multiple graphics cards are installed. Users therefore enjoy access to high-definition and high-frame-rate (FPS) display, which makes iGame Z370 Vulcan X a top choice among a growing number of professional gamers.

To accommodate memory expansion, iGame Z370 Vulcan X offers four dual-channel DDR4 memory slots, with an overclock speed up to 3200MHz. Users can freely make use of customized memory for maximized performance. iGame motherboards are refined with silver plating technology (SPT) to enhance stability and effectively filter ripple and noise in overclock mode. Their silver plating PCBs enable two times better stability and oxidation resistance than copper plating PCBs. Furthermore, to ensure power supply stability, which is also of critical importance, iGame Z370 Vulcan X uses a 14-phase digital power supply and Sanyo patch tantalum capacitors that feature low resistance and low calorific value to easily handle extreme processor loads and guarantee stable power supply.

iGame Z370 Vulcan X supports network performance required by mainstream games today with Killer E2500 network card, which features Advanced Stream Detect, delivering optimized network capability for online gaming and streaming media. It automatically detects and accelerates game network traffic for smoother gaming experiences. Killer E2500's unique automatic traffic optimization gives game and chat applications higher network priority and controls network hardware accordingly so that gaming traffic always gets minimum delay, thereby taking gaming experiences to a whole new level.

iGame Z370 Vulcan X is available for purchase at Colorful's flagship store on JD.com. Visitors are welcome to Colorful and Chaintech's booth M1112 at Computex 2018 for more information.

Biostar announces TB250-BTC D+, native 8-GPU for riser card-free crypto mining

Biostar has announced a pro-level crypto mining motherboard, Biostar TB250-BTC D+ that appeals to anyone looking to maximize and/or scale their mining rigs. The TB250-BTC D+ allows the Intel B250 chipset to reach its full potential as it allows true native 8-graphics card support, which removes the need for riser cards, according to the company. The slim form factor gives larger mining operations the luxury of squeezing more systems into an existing space without the mess.

Riser card-free design

Taking riser cards out of the equation allows users to reduce setup costs (a saving of US$7-$10 per riser card) and lowers the running costs with more reliable hardware and reduced power consumption and thus your electric bill. The Intel B250 chipset enables the TB250-BTC D+ to run up to eight native PCI-e X16 slots, which hits the sweet spot for graphics cards per motherboard cost-performance ratio. Aside from cost savings, it is more reliable and stable without the risk of burnouts and capability issues.

Space saving and easy-to-maintain design

The TB250-BTC D+ motherboard is super slim and fits into a single layer mining chassis often found in larger mining operations. In addition to the riser card-free design, users can build a compact mining system with the full mining power. It can also be used with "external" power supplies (single 12V rail PSU), for easy access to the power supply for convenient maintenance.

Compatible with AMD and/or Nvidia GPU

Users can use AMD Radeon and/or Nvidia GeForce graphics cards on the TB250-BTC D+ motherboard. With graphics cards difficult to come by, miners have the flexibility of building the best cost-performance system at any given time.

Multiple monitor and peripheral support

The motherboard supports multiple monitors and peripherals thanks to the HDMI port that supports KVM switches. Again Biostar makes it easy for scalable mining setups by reducing time and cost of setting up multiple monitors and peripherals. The rear I/O ports includes: 4 x USB 2.0 Port, 1 x HDMI Connector and 1 x GbE LAN Port.

The Biostar TB250-BTC D+ motherboard is designed for pro-level miners that plan to run scalable mining setups that requires reliability, efficiency and can maximize cost-performance.

Biostar TB250-BTC D+ motherboard

Intel Atom x7-E3950 SBC supports extended temperatures

IBASE Technolog, a world leading manufacturer of industrial motherboards and embedded systems, has announced the IB818 3.5-inch SBC that can be powered by the Intel Atom QC x7-E3950, Pentium QC N4200 or Celeron DC N3350 SoC (formerly Apollo Lake) processor, providing significant improvement in both CPU and graphics performance compared with previous generations. With the Intel Atom x7-E3950 SoC, it supports extended temperature of -40 degrees C to 85 degrees C, making it suitable for indoor and outdoor installations.

The IB818 is designed for both industrial and commercial applications including IoT, factory automation, self-service kiosks, and POS systems. It accommodates up to 8GB of SO-DIMM memory and adopts a rich array of I/O interface such as 2 x GbE LAN ports, 4 x USB 3.0, 2 x USB 2.0, 4 x COM and 2 x SATAIII. Flexible expansion is available with 2 x Mini PCI-E slots (full-size & half-size).

The IB818 supports a 12V~24V DC wide-range power input and comes integrated with the Intel Gen9 graphics engine equipped with 18 execution units for high throughput and acceleration. Three simultaneous displays via HDMI 1.4b and dual LVDS display interfaces deliver stunning graphics performance and crystal-clear 4K resolution output, meeting the requirements of both gaming and digital signage customers.

Measuring 102mm by 147mm, the IB818 optionally comes with a heat sink and cable. The product will be displayed at Computex Taipei 2018 at IBASE's booth K0701a, Nangang Exhibition Hall.

IB818 FEATURES:
· Onboard Intel Atom x7-E3950 @ 2.0GHz (i-Temp support)
· Onboard Intel Pentium N4200 @ 2.5GHz or Celeron® N3350 @ 2.4GHz
· 1x DDR3L-1866 SO-DIMM, Max. 8GB
· Supports HDMI 1.4b, dual LVDS(18/24bit)
· 2x Intel I210IT PCI-E Gigabit LAN or I211AT PCI-E Gigabit LAN
· 4x USB 3.0, 2x USB 2.0, 4x COM, 2x SATA III
· 1x Mini PCI-E slot (full-size), 1x Mini PCI-E slot (half-size)
· 12V~24V DC wide-range power input
· Wide-range operating temperature in certain models
· Watchdog timer, Digital I/O, mSATA, EuP/ErP

iBASE
(intel) IoT Solutions Alliance
IB818 3.5" Disk-Size SBC
○ Onboard Intel Atom x7-E3950
○ Supports HDMI 1.4b & Dual LVDS
○ Extended Temperature -40°C to 85°C
○ 12V~24V DC Wide-range Power Input
a Native 8-GPU Crypto Mining Motherboard

The eye of your business and home: Beseye AI Video Analysis Solution

More than 1.3 billion GB of surveillance videos are recorded every day. Yet, only less than 1% of surveillance videos are watched or utilized, and when incidents take place, we often need to go through hours of videos just to find the evidence we need.

This is where Beseye comes in. Beseye AI Video Analysis Solution automatically analyzes and extracts important moments, which not only protects safety, but is also applicable for different commercial application, such as retail store business intelligence, railway safety, long-term care.

Beseye provides innovational Skeleton Print Technology, which through AI deep learning could accurately detect humans and their characteristics.

The main features of Beseye AI Video Analysis Solution include:

AI-based human detection: Beseye extracts the human skeleton's characteristics to distinguish the human from other moving objects, which can be beneficial for home, business and public areas. Imagine how you can get instant notification whenever someone tries to break into your home or shops, and you will no longer need to check the surveillance videos from time to time. Currently this technology is already adopted by Tokyu Techno Railway Systems to avoid railway accidents. Surveillance cameras are installed around railways in Tokyo, then recorded videos are sent to Beseye AI Cloud for total risk evaluation. For example, when someone tries to cross the railway while a train is approaching, Beseye AI Cloud sends alarm to the central control room, train driver and station staff, so they can take appropriate actions.

AI-based facial recognition: By extracting facial characteristics, Beseye can be a great help for both home and business. Beseye recognizes family members and automatically sends real-time alert of a stranger's invasion. Beseye is also an analytics tool for shopper-experience optimization and business operations improvement, enabling real-world analytics such as customer demographic, people counting and sales hot spot, to optimize efficiency.

AI-based posture analysis: By deep analysis of the human skeleton, Beseye AI understands the human posture and behavior. Since 2017, the number of elderly population in Taiwan has exceeded the number of youth population, which calls for optimized elderly care. Currently Beseye teams up with Compal Electronics to provide hospitals and long-term care centers with an elderly care system, with which they can get timely notification when elderly people fall down, helping create a safer environment for the elderly.

AI-based video summary: Since it is impossible for people to check surveillance videos around the clock, Beseye AI rates every detected event, extracts only the most important moments, and at the end of the day provides a summarized footage.

AMI StorTrends data storage solutions strengthen VDI integration and application in Taiwan

Sponsored content

American Megatrends Inc. (AMI), known for developing PC BIOS, leverages its core competence accumulated through long-term devotion in PC and server systems to actively expand from existing BIOS business into management systems and applications for data centers or cloud server rooms composed of servers. The importance of enterprise storage applications and management is growing with rapid developments in cloud services, big data analytics, and artificial intelligence giving rise to exponential increases in the amount of digital data generated by businesses.

With its Taiwan office in operation for 33 years, AMI made an early start in the development of data storage technologies. Its RAID controller MegaRAID has been market proven. Now AMI provides high-reliability and high-performance storage servers and systems including complete lines of SAN and NAS products under the brand StorTrends. These products are also enthusiastically embraced by customers in North America and India for applications across education, energy, banking, government and healthcare sectors.

Frank Liu, senior associate manager, AMI Taiwan, emphasized that aside from BIOS, AMI has been marketing StorTrends products to North America for many years, securing market presence in the region. StorTrends products are now entering the Taiwan market, offering a very competitive product portfolio and cost advantages especially suited to storage needs by small and medium enterprises with more than 300 employees. AMI hopes to make a fresh start with the marketing of the StorTrends brand in Taiwan.

AMI Taiwan is a medium-size operation with a work force of 600 employees and 85% of them are R&D engineers. This represents a critical

Frank Liu, senior associate manager, AMI Taiwan

advantage enabling AMI StorTrends products to expand into the Taiwan market as many businesses in Taiwan of a similar scale have the same kind of storage needs. In fact, AMI with a global network of branch operations has already developed important use case examples for Taiwan customers to draw from and gain more in-depth understanding on the application scenarios.

StorTrends targets SMEs and education sector in Taiwan

The Taiwan industry has been well known for their strength in OEM/ODM manufacturing of electronics such as PCs and servers. Frank Liu stated that AMI has maintained long-standing and close ties with the Taiwan electronics supply chain and ecosystem. Their outstanding OEM/ODM design and development capabilities combined with AMI's software and firmware technologies give StorTrends products differentiating

competitiveness and are also the major force driving AMI's expansion to develop its own brand. In addition to storage equipment, AMI also offers complete virtual desktop infrastructure (VDI) solutions.

Frank Liu spots a scenario where AMI's VDI solutions can be put to good use – enterprise and education where large quantities of computers are used and each is configured with a large storage space, especially computer centers at schools and computer learning labs. VDI can significantly reduce management time and costs by replacing the computers with virtual desktops and, in particular, allowing flexible allocations of hard disk space, which can greatly cut down upfront hardware investments by businesses or schools and lower the barrier for users.

Furthermore, system integrators or solution distributors can provide users long-term service contracts, for example, free software upgrades over a three-

year period, allowing users access to the latest version software. Such a mutually beneficial model of system sales and services replacing the traditional way of one-time hardware sales can help build long-lasting customer relationships. This is a win-win-win strategy for users, system vendors and the technology developer AMI.

Putting in continuing efforts toward the Taiwan market, AMI actively takes part in industrial alliances and is a leading member of Open Infrastructure Taiwan A-Team (OITA), which endeavors to broaden Taiwan's horizons in the storage equipment space and engage more active participation by the Taiwan electronics ecosystem and supply chain. AMI's StorTrends line satisfies diverse needs by enterprises arising from their digital transformation by providing network storage capabilities with centralized storage, simplified management, sustained operation, disaster recovery, high efficiency and virtualization support in addition to value-added features such as data compression, data deduplication and optimized data transfer over WAN. In 2018, AMI further adds multiple solutions to the StorTrends line including hybrid flash arrays, all-flash arrays, dual-controller storages. In particular, it offers storage systems for business applications of artificial intelligence with NVMe support, which will create more synergized benefits.

AMI plans to consolidate its sales channels in Taiwan this year and is now working on the final details of cooperation.

It has also allotted resources to build different use case examples to help AMI channel partners develop a new sales model different from before. At Computex 2018, AMI will showcase its products at booth L1332 on the fourth floor at Nangang Exhibition Center. AMI customers, partners and Computex visitors are all welcome to the AMI booth to see StorTrends products in action.

iST signs MoU with Dekra on cooperation for Wi-Fi and IoT-related services

Press release

iST, the market leader in electronics verification and analysis service, has made a great step forward on the cooperation with Dekra, the world leading expert organization in safety testing and inspection. iST has announced the two parties will be focusing on Wi-Fi and IoT-related services by signing a MoU to develop the world-class leading verification and certification capacity.

Recently, Dekra has opened a Wi-Fi laboratory in Shenzhen, and it has been authorized by the Wi-Fi Alliance and become the Authorized Test Laboratories which is entitled to perform Wi-Fi test for certification and logo application for customers.

The MoU between iST and Dekra, which underscores a comprehensive Wi-Fi services on IoT over 3C mobile devices, will be activated by these two parties, which means in the future, the upstream, midstream and downstream manufacturers of 3C mobile devices can

apply the pre-test, debugging, compatibility test, customized test and even the certification logo on Wi-Fi through either iST or Dekra.

iST observes that the range of IoT application is wide, including Wi-Fi, Bluetooth, Zigbee, BT, Lora, NFC and EMvco. However, Wi-Fi is the most common wireless transmission technology used by family and individuals and suitable for the embedded IoT designs especially after the optimization of 802.11ac Wi-Fi.

In light of this, this cooperation between iST and Dekra will be focusing on Wi-Fi service for its potential to drive huge IoT demand. iST will not only introduce the customized Wi-Fi performance test, but also provide professional wireless system testing. Dekra will provide the related logo application service for customers. The services both parties provide are not limited to Wi-Fi but also expand to Bluetooth, Zigbee, BT, Lora, NFC, EMvco.

iST signs MoU with Dekra on cooperation for Wi-Fi and IoT-related services

Telecom's size of capital is crucial to competitiveness in 5G market

As stated above, 5G deployment imposes great challenges. In particular, technologies such as SON/NFV, edge cloud computing, Cloud RAN and Open Network Automation Platform (OPAN) require changes to the core/radio access network architectures, which puts tremendous pressure on operators when making the transition.
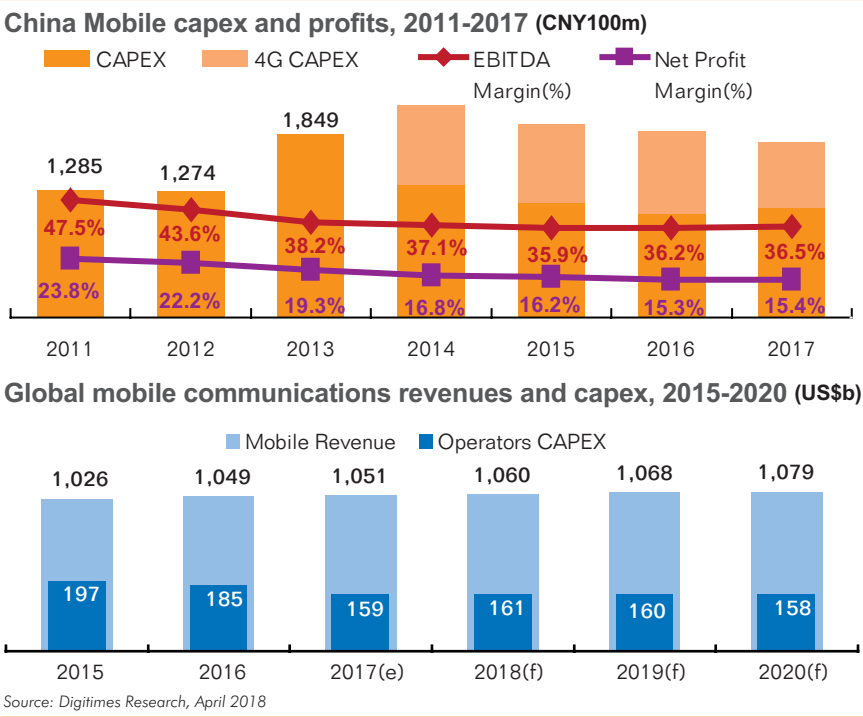
Although 5G roll-out may be a formidable task, tier-1 operators including Verizon Wireless and AT&T in the US, Vodafone in Europe, NTT Docomo in Japan, SK Telecom in Korea and China Mobile in China all share a common goal of bringing 5G commercial operation to reality as soon as possible.

Digitimes Research believe these operators are more aggressive in promoting 5G services not only because 5G communication, with influences across multiple sectors, is grabbing governments' attention on the telecom industry for its strategic importance but also because with 5G standards becoming consolidated, tier-1 operators feel compelled to offer 5G application services as a way to build up new entry barriers.

Throughout the development history of mobile communication technologies, operators have always had to address how communication technologies would impact their market strategies. In the early 2G era, a slew of communication standards including GSM, CDMA, TDMA, PDC, D-AMPS and PHS were competing against one another.

CDMA developed by Qualcomm finally became the centralized standard when mobile communication progressed to 3G but later again evolved into three different 3G standards – WCDMA, CDMA2000 and TD-SCDMA – amid the trend to foster independent communication industries.

It should be noted that these 2G and 3G standards are not interoperable. If a user subscribes to operator A's mobile network, he will not be able to connect to another operator's network using a different standard. As such, operators are able to offer differentiated services based on network coverage, communication quality and end device choices.

For example, China Mobile obtained operation rights to mainstream 2G GSM networks in the early stage of development and therefore was able to quickly rise as a leader dominating the China market. However, it was vested with the task of developing the country's independent communication standard amid 3G development so it opted for the non-mainstream TD-SCDMA. As the technology and end devices were relatively less mature, China Mobile ended up losing its dominating market share to the other two operators of China.

Digitimes Research thinks the mobile communication industry in the 4G era has experienced fundamental changes including the business model of IP-based network services and the phase-out of WiMAX from the mainstream market during late-stage 4G LTE development. As a result, there is practically no interoperability issue with FD/TD-LTE standards.

As a matter of fact, with 4G service experiences becoming similar, tier-1 4G operators throughout the US, Korea and China have all launched unlimited data plans to attract users. Even though operators hope to establish a business model where charges are based on data usage in the 4G era, they still end up in a fierce price competition due to undifferentiated services.

Looking forward into the times of 5G, operators no longer have to make a choice among different communication standards but instead they need to decide which application service markets to venture into. That is, they have to make a decision with regard to an "X as a Service" business model. The challenge for operators amid the 5G era is whether they have the ability to succeed in diverse vertical application markets.

In other words, only operators with sufficient capital will be capable of deploying complete 5G coverage to satisfy the network performance required by all types of application services. This is also why tier-1 operators are now keen to transition into 5G to again build up their leading edge in the competition.

5G deployment will be put off due to large 4G LTE investments

The fact that the 4G LTE market growth exceeded expectation has a direct link to increased operator investments to aggressively expand 4G coverage. However, it should be noted that although many operators have successfully upgraded their 2G/3G subscribers to 4G networks or have gained absolute advantage in terms of their 4G market shares, they still have not been able to deliver strong earnings performance.
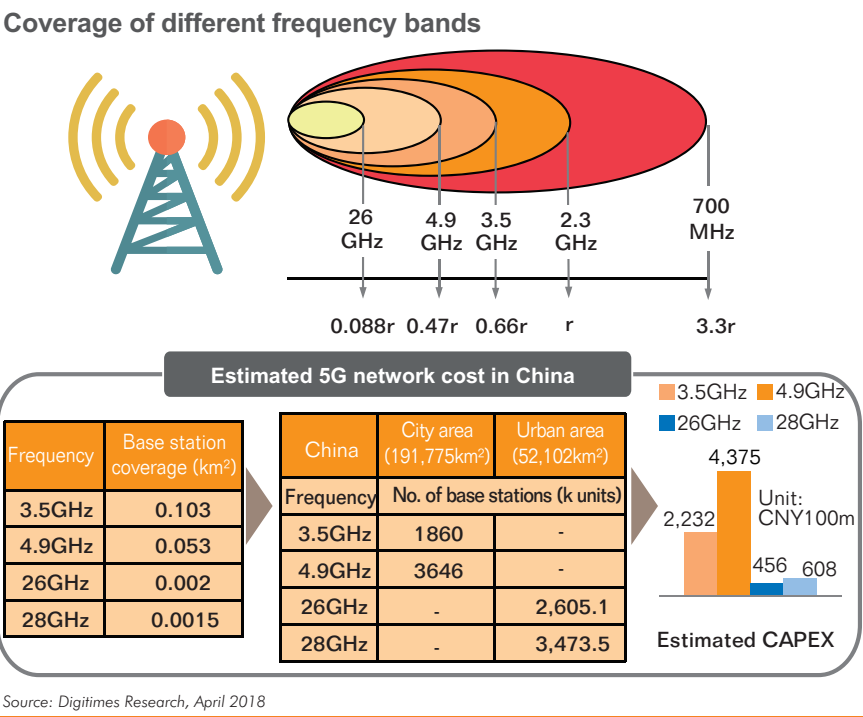
Back in the 3G era, China Mobile, shouldering the responsibility of developing the country's independent communication standard, opted for TD-SCDMA. However, the result failed to meet expectations because the industry ecosystem was immature. This prompted China Mobile to take a more active approach to its 4G operations.

An observation on the changes of China Mobile's operations in 2011-2017 indicates that in anticipation of obtaining its 4G license in 2013, China Mobile's capital expenditures in 2013 soared by CNY57.5 billion from 2012, up 45% on year.

China Mobile's capital expenditures in 2013-2017 showed year-over-year decreases from 2014 onward but it still spent nearly CNY50 billion more in 2017 than in 2012.

That is to say, even during late-stage 4G deployment, overall network capital expenditures still run much higher than before. With 4G service revenues being unable to catch up with the increase in expenditures, operators' earnings are weakening.

Furthermore, due to the significantly large increase in capital expenditures in 2013, China Mobile's EBITDA margin dropped 5.4 percentage points and net profit margin slipped 2.9 percentage points in 2013 from the levels of 2012. Subsequently, with capital expenditures remaining at peak levels, China Mobile's EBITDA margin and net profit margin continued on a downward trend and did not show any slight increase until 2017.

In fact, China Mobile's active attitude toward 4G business expansion coupled with complete mobile communication infrastructure allows it to maintain advantage in China's 4G market. As of year-end 2017, 65% of China's 4G users had subscribed to China Mobile's services. However, with respect to financial performance, its 4G earnings fell far below its 3G numbers, which could mainly be attributed to large capital expenditures.

For the global telecom market, an analysis on the changes of mobile communication revenues and expenditures in 2015-2020 shows that year-over-year revenue growths mostly fall short of 1%. As such, many operators worldwide agree they will continue to reduce capital expenditures to address the pressure of having to maintain or boost profit margins in the late 4G era.

A study on the capital expenditures of iconic 4G operators around the world indicates that American operator Verizon Wireless (excluding fixed network operations) spent 8.3% less in 2017 than in 2016; Japan-based NTT Docomo has announced that 2018 expenditures will be 4.7% lower than 2017 expenditures; China Mobile also expects to spend 6% less in 2018 compared to the previous year.

Digitimes Research thinks the iconic 4G operators are cutting down capital expenditures over recent years not only to raise earnings performance but also to prepare capital for upcoming 5G deployment. However, for other 4G carriers operating in smaller scales, lower-than-expected 4G profit margins and large capital expenditures being amortized over a short period of time put them in a dilemma over whether they can fully invest in 5G deployment to capture new business opportunities.

5G using high-frequency spectrum will impose tremendous capital pressure on telecoms

In addition to investments in multiple critical technologies, 5G deployment costs add up also because 5G networks use high-frequency ranges. Due to insufficient IMT spectrum resources, 5G networks will largely use mid-to-high frequency bands in the 3GHz-6GHz and 24GHz-86GHz ranges, which will definitely add to the cost burden for operators.

Frequencies for 5G testing currently underway around the world mostly focus on the 3.5GHz and 26GHz/28GHz bands, which are expected to be the mainstream frequency ranges in early-stage 5G commercial operation. China's Ministry of Industry and Information Technology (MIIT) announced in late 2017 a plan to allocate the 3.5GHz band and 4.9GHz band to 5G systems.

China Mobile capex and profits, 2011-2017 (CNY100m)

Legend: CAPEX | 4G CAPEX | EBITDA Margin(%) | Net Profit Margin(%)

Year	2011	2012	2013	2014	2015	2016	2017
CAPEX	1,285	1,274	1,849				
EBITDA Margin(%)	47.5%	43.6%	38.2%	37.1%	35.9%	36.2%	36.5%
Net Profit Margin(%)	23.8%	22.2%	19.3%	16.8%	16.2%	15.3%	15.4%

Global mobile communications revenues and capex, 2015-2020 (US$b)

Legend: Mobile Revenue | Operators CAPEX

	2015	2016	2017(e)	2018(f)	2019(f)	2020(f)
Mobile Revenue	1,026	1,049	1,051	1,060	1,068	1,079
Operators CAPEX	197	185	159	161	160	158

Source: Digitimes Research, April 2018

Coverage of different frequency bands

26 GHz	4.9 GHz	3.5 GHz	2.3 GHz	700 MHz
0.088r	0.47r	0.66r	r	3.3r

Estimated 5G network cost in China

Frequency	Base station coverage (km²)
3.5GHz	0.103
4.9GHz	0.053
26GHz	0.002
28GHz	0.0015

China	City area (191,775km²)	Urban area (52,102km²)
Frequency	No. of base stations (k units)	
3.5GHz	1860	-
4.9GHz	3646	-
26GHz	-	2,605.1
28GHz	-	3,473.5

Estimated CAPEX

Legend: 3.5GHz | 4.9GHz | 26GHz | 28GHz

| | 2,232 | 4,375 | 456 | 608 |

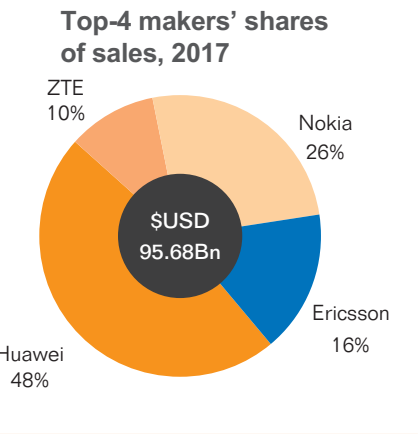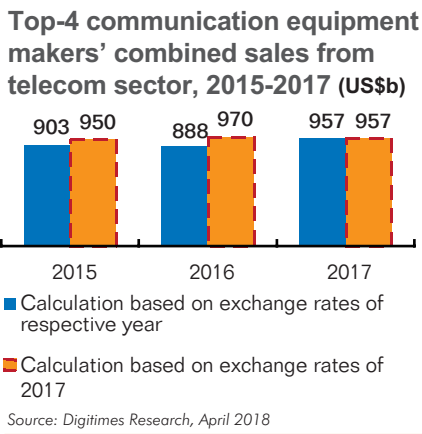Unit: CNY100m

Source: Digitimes Research, April 2018

China Mobile's 4G LTE network mainly using the 2.3GHz band can serve as a basis of calculation. If a 2.3GHz base station covers an area with a radius r, then in theory, 3.5GHz and 4.9GHz base stations will cover areas with a 0.66r radius and a 0.47r radius respectively. A 26GHz mmWave base station will only cover an area with a 0.088r radius. In contrast, a 700MHz base station will cover an area with a 3.3r radius.

In other words, under the condition of the same network coverage without considering transmission capacity, operators having access to lower frequency bands will need fewer base stations, thus sustaining less capital pressure. With 3GPP-allocated 4G frequencies mostly falling in the 700MHz-3.5GHz range, costs of 5G networks using mid-to-high spectrum will run higher than 4G investments.

Digitimes Research did some calculations on the amount of capital China Mobile would have to spend building 5G networks covering urban areas in China. Based on the coverage ratios of base stations supporting different frequency bands, Digitimes Research calculated the areas that 3.5GHz/4.9GHz/26GHz/28GHz base stations can cover compared to 2.3GHz and used the areas of Chinese cities and downtown districts as reported in the China Statistical Yearbook 2016 to arrive at a theoretical estimate on the quantity of required 5G base stations.

To completely cover urban areas in China, 1.86 million 3.5GHz or 3.646 million 4.9GHz base stations are needed. For 26GHz and 28GHz mmWave, it takes 26.051 million and 34.735 million small cells to cover city center hotspots.

Based on the data of China Mobile's past 4G tender projects, a three-sector base station costs about CNY120,000 and a small cell costs CNY1,750; so the costs for deploying 5G networks using 3.5GHz and 4.9GHz bands will fall in a range between CNY200 billion and CNY400 billion while it will cost about CNY40 billion-CNY 60 billion to deploy 26GHz/28GHz small cells

Top-4 communication equipment makers' combined sales from telecom sector, 2015-2017 (US$b)

903 950 | 888 970 | 957 957
2015 | 2016 | 2017

■ Calculation based on exchange rates of respective year
■ Calculation based on exchange rates of 2017

Top-4 makers' shares of sales, 2017

$USD 95.68Bn

ZTE 10%
Nokia 26%
Ericsson 16%
Huawei 48%

Source: Digitimes Research, April 2018

for in-depth coverage.

That is, if operators are to use these frequency bands to complete 5G deployment in urban areas and in-depth coverage in downtown districts, they will need to raise a capital of CNY300 billion to CNY500 billion. In comparison, China Mobile spent an accumulated total of CNY308.4 billion on 4G deployment in 2014-2017.

The said amount does not include upgrade costs of peripheral equipment, transmission over optical cables or optical transport networks (OTN), and 5G core/radio access network virtualization. The coverage is only for urban areas. As such, the actual expenditures will run much higher than the estimate.

Accordingly, with 4G investments still being amortized, 5G costs adding up and cross-sector business model remaining uncertain, Digitimes Research thinks telecom operators' 5G deployment timetables will likely be stretched over a long period of time in order to minimize business risks.

The telecom equipment market sustains impact as operators worldwide cut down spending

Digitimes Research has observed that with 4G LTE operators stepping up efforts to boost profit margins and therefore cutting down expenditures, the global telecom equipment market sustains a direct impact.

A look at the 2015-2017 revenues from carrier network operations by the world's leading four telecom equipment providers including Huawei, Nokia, Ericsson and ZTE indicates that

the combined total reached US$95.7 billion in 2017, the highest since 2015.

It should be noted that the euro and Swedish krona rose significantly in value against the US dollar in 2017, so the calculations in US dollars may be a bit off. In fact, when calculated based on local currencies, 2017 revenues from carrier network operations by Ericsson and Nokia fell 9.2% and 6% respectively from the levels of 2016.

Accordingly, based on the exchange rates in 2017, the four leading telecom equipment providers' total revenues from carrier network operations showed negative growth for the first time in 2017 since 4G deployment pushing capital expenditures to peak levels. This is consistent with global operators' move to reduce expenditures as mentioned above.

Furthermore, according to IHS Markit, Huawei holds a 28% share of the 2017 global mobile communication equipment market, taking the lead for the first time with Ericsson and Nokia trailing behind, holding a 27% and a 23% share respectively. However, Huawei is widening the gap between the two followers in terms of revenues from carrier network operations.

The four leading telecom equipment providers made a combined US$95.68 billion from carrier network operations in 2017 with Huawei alone accounting for 48% of the total, Ericsson 26% and Nokia 16%. Moreover, Ericsson's revenue from carrier network operations has been on a downward trend for three years in a row while Nokia's revenue has failed to reach a new high since the acquisition of Alcatel-Lucent in 2015. This shows

that operators' heightened efforts to cut down spending have caused a rather significant impact to the telecom equipment market.

As a matter of fact, an analysis on carrier network revenues of Huawei and ZTE by regions indicates that the China market accounts for 51% and 57% respectively. The two companies are able to maintain revenue growth amid the wave of operator expenditure reductions thanks to the flourishing 4G market in China.

Looking into to the future 5G communication market, the competition will only become more intense. For one reason, with 5G networks moving toward virtualization and cloud-based architectures, operators will tend to purchase existing commercial off-the-shelf (COTS) equipment in an attempt to reduce deployment costs. As such, providers of conventional network communication equipment will growingly penetrate into the telecom equipment market.

Secondly, to address the overwhelming costs of deploying new 5G base stations, operators are looking to re-use existing 4G base station resources, including integrated 4G/5G antenna, multiband radio remote unit (RRU) and 3G/4G/5G baseband unit (BBU). These fundamental communication devices require a high level of integration and miniaturization, which brings great challenges to equipment providers.

Furthermore, as 5G standards have consolidated, operators will not be able to differentiate their services based on traditional indicators such as communication technologies, network coverage and transmission speed. As a result, the incorporation of artificial intelligence (AI) will be instrumental to the telecom industry's ability to provide differentiated services amid highly standardized network communication.

AI will mainly be used by the telecom industry to enhance user experiences, create innovative services and raise network management efficiency. At MWC 2018, many iconic telecom equipment suppliers/operators presented solutions incorporating AI.

Chrontel and MSI IPC partner to provide HDMI 4K2K display for WindBOX embedded system MS-9A95

Press release

Underscoring its commitment to the personal computer and industrial embedded systems markets, Chrontel, a leading provider of video interface technologies, today announced that, together with development partner MSI IPC, a leading provider of high-quality embedded boards and systems, will provide HDMI display up to 4K2K resolution for video output to MSI IPC's new WindBOX IV Advanced, MS-9A95 product.

To support 4K2K, 60Hz HDMI display, the MSI IPC WindBOX adopted Chrontel's mixed signal CH7211 IC which is designed to convert the DisplayPort signal from the highly integrated processors into a HDMI video format for external displays and digital televisions. In addition to incorporating display conversion logic that delivers stunning video output to the PC computing industry, Chrontel's CH7211 IC supports other HDMI features including multicolor format options including RGB to YCC conversion / YCC 4:4:4/4:2:2 to YCC 4:2:0, High Dynamic Range (HDR), HDMI 3D protocol and HDCP 2.2. Furthermore the CH7211 IC supports both the DisplayPort and the Embedded DisplayPort (eDP) standards with transmission bit rates of up to 5.4Gbps and can be configured running 1, 2 or 4 lanes through the DisplayPort Link Training mechanism. When normal eDP signals do not contain audio packets, the CH7211 IC can accept S/PDIF or I2S digital audio into its audio codec and re-embed them into a HDMI signal that can be played back by the HDMI sink.

Equipped with premium DisplayPort video input, the CH7211 IC also supports the USB-C

specification, a newly emerging USB standard that introduces slim and sleek connector designs and provides revolutionary technology for fast charging and data transferring within the newest PCs, phones, tablets and other industrial segments like automotive. To comply with the USB-C state-of-the-art technology, the CH7211 IC's USB-C engine is equipped USB Power Delivery protocol capable of sourcing/sinking scalar power up to 20V through the USB Vbus line. The CH7211 IC's built-in USB-C plug detection method uses the CC' pins to detect an inserted USB-C cable's orientation in order to determine the correct USB Superspeed data signal paired functional connection within the cable. Furthermore the CH7211 IC can be easily configured to support USB-C Alt-mode. This USB-C extension mechanism allows auxiliary non-USB data such as DisplayPort sharing similar electrical characteristics with USB 3.1/3.2 to be transmitted through the USB-C cable.

The CH7211 IC is one of latest products to join Chrontel's popular DisplayPort product line, which offers a wide range of similar devices at various display resolutions. Other newly released Chrontel DisplayPort converter ICs with USB-C capable functionality include CH7212 (VGA), CH7213 (DisplayPort) and CH7215 (YPbPr and CVBS).