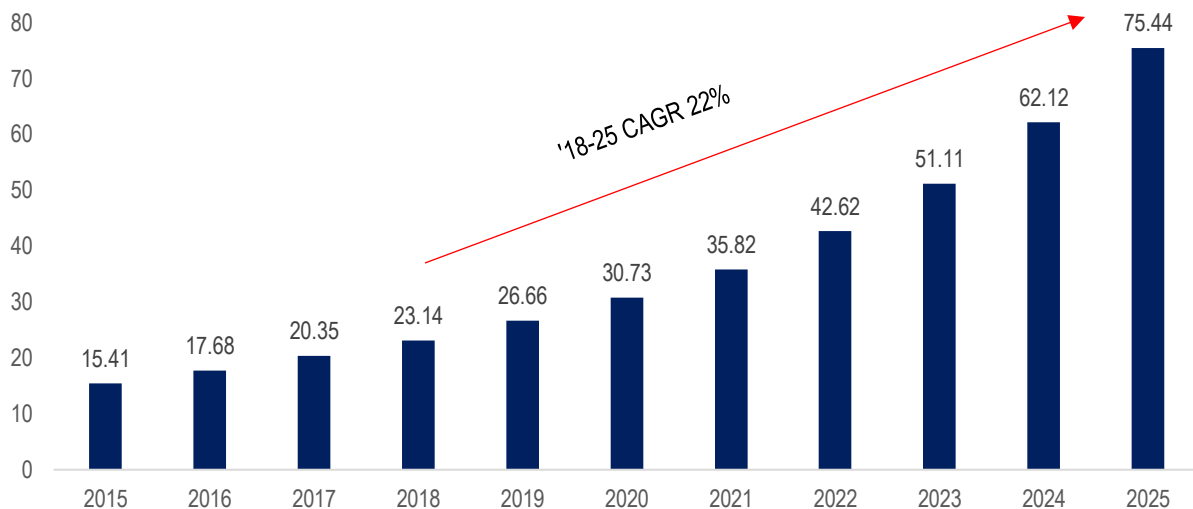## Internet of Things – one of the key drivers of productivity in 5G era

Figure 1: Global IoT installed base forecast, bn units

Source: IHS, AMTD Research

AMTD views: IHS forecasted in 2016 that the IoT market would grow from an installed base of 15.4 billion devices in 2015 to 30.7 billion devices in 2020 and 75.4 billion in 2025, which implied a CAGR of 22% from 2018 to 2025. On the other hand, according to IDC in June 2019, the amount of data generated by connected internet of things (IoT) devices was expected to generate 79.4 zettabytes (ZB) of data by 2025, implying a CAGR of 28.7% over the 2018-2025 forecast period. We believe the rapid growth of IoT market is expected to be driven by 5G deployment, which will further improve the performance of IoT device and expand its applications. In applications, the IoT device adoption growth is coming from: 1) the wide application of video surveillance; 2) the existing sensors in the industrial and automotive fields being upgraded to interconnectable devices; and 3) the intelligentization of household and wearable devices, such as smart speakers, smart watch, smart home appliances, etc.

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Internet of Things

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. It is an ecosystem that comprises things, connectivity and services.

- *Thing (or device)*

It is a piece of hardware with a sensor that transmits data from one place to another over the Internet. They can be imbedded into mobile devices, industrial equipment, environmental sensors, medical devices, etc. Today, in addition to basic components such as sensors and modems, specialized chips are imbedded in IoT devices to implement edge computing.

- *Connectivity*

Connectivity, the core component of IoT, allows the thing (or device) to communicate data gathered through sensors with other connected devices. Connectivity can be provided via cellular network, Wi-Fi, Bluetooth, LoRa, etc. In particular, LoRa Technology is a long range, low power wireless platform that has become the mainstream technology for IoT networks worldwide nowadays. There is little doubt that 5G will play a major role in IoT in the future, however, we believe LoRaWAN will co-exist with the 5G Ecosystem for a long period of time.

- *Service*

The ultimate goal of IoT is service. With the support of cloud infrastructure, all the data collected and preliminary processed by connected IoT devices will be transferred to cloud platform, which has AI and machine learning skills to conduct in-depth big data analysis, and subsequently can provide insights that lead companies to cost reductions, efficiency gains, and to seek new business opportunities.

Xiaomi – a pioneer in AIoT

At the MIDC 2019 in Beijing, Xiaomi released latest updates of its AIoT business. As of 3Q19, Xiaomi IoT platform has supported over 2,200 products, with more than 213mn smart devices connected, up 62% YoY. The number of users who have five or more devices connected to Xiaomi's IoT platform increased by 78.7% YoY to approximately 3.5mn. MAU of AI assistant was more than 57.9mn as of 3Q19, and MAU of Mi Home app reached 32.1mn in Sep 2019, among which 63.0% were non-Xiaomi smartphone users. In the meanwhile, Xiaomi announced new hardware, technology updates, and new services to its AIoT platform.

- *New IoT hardware*

Xiaomi released: 1) new onboard IoT BLE Mesh module (MHCB05P), which has ultra-low power consumption, voice connectivity, and external antennas, and can be used for ultra-large-scale dense networking; 2) new Mijia smart home gateway with the support of three different communication protocols.

- *New IoT technology updates*

Xiaomi announced several technology updates: 1) voice assistant Xiao Ai 3.0, which incorporates with a male voice option and the capability of having a naturally continuous dialogue via smartphones; 2) MiNLP1.2, its natural language processing platform; and 3) MACE 0.12.0 (Mobile AI Compute Engine), its open-source deep-learning framework.

- *New IoT solutions & services*

Regarding the AIoT applications in different scenarios, Xiaomi introduced several industry solutions: 1) hotel industry, in which Xiaomi offers IoT devices, including Xiaoai speaker, smart TV, intelligent lighting, etc., and is expected to serve 5,000+ hotel rooms in more than 34 cities; 2) real estate industry, in which Xiaomi partners with property developers and property management companies to provide smart home services; 3) IoT Enterprise Suite, which can help enterprises achieve intelligent and efficient administrative management; and 4) earthquake detection in MIUI 11 and Mi TV platform.

News updates

26 Nov 2019

Smartphone

Huawei

Huawei launched smartphone Honor V30 series and Magic Watch 2

Huawei launched Honor's first 5G smartphones - Honor V30 and Honor V30 Pro. Honor V30 comes with LCD display and single hole punch design, while the V30 Pro has an OLED display with wide hole punch design to house dual selfie camera, and supports 15W wireless fast charging. Both models will feature quad rear cameras and be powered by Kirin 990 5G + Balong 5000 processor. V30's price starts from RMB3,299. Huawei introduced Magic Watch 2 on the same event, which is sold starting from RMB1,199. (Source: Huawei)

25 Nov 2019

AI

Huawei

Huawei launched its new smart speaker – Huawei Sound X

Huawei introduced its new smart speaker – Huawei Sound X, co-engineered with Devialet, a French firm famous for making high-end Speakers and Audiophile Amplifiers. Huawei Sound X features 60W dual subwoofer, Hi-Res 360-degree surround sound, Virtual 5.1 home theater sound effects, one-touch control, and HiLink smart home control. It is equipped with a quad-core processor, 512MB RAM, 8GB internal storage. The price starts from RMB1,999 and the speaker will be available by the end of December. (Source: engadget)

21 Nov 2019

Smartphone

OPPO

OPPO Reno 3 series to come in Dec with ColorOS 7 and dual-mode 5G support

OPPO announced that the OPPO Reno 3 series would come with dual-mode 5G support (NSA/SA). It will be the first 5G phone launched in China by OPPO, as well as the first smartphone lineup to launch with ColorOS 7. Reno 3 may be equipped with Snapdragon 735 chipset and will be launched in December. (Source: Gadgets)

21 Nov 2019

Operating System

OPPO

OPPO unveiled Android 10-based ColorOS 7

OPPO has announced Android 10-based ColorOS 7. It brings a completely revamped UI that is designed to reduce visual fatigue and offers a more pleasing color palette. The new ColorOS 7 also features Focus Mode, Soloop Recording, GPU Acceleration mode, etc. In terms of performance enhancements, ColorOS 7 is said to increase the start speed by 25%, system fluency by 30% and RAM utilization by 40% (Source: Notebookcheck)

20 Nov 2019

IoT

Viomi

Viomi 3Q19 net revenues up 89.2% YoY, turning a profit

Viomi 3Q19 net revenues reached RMB1.07bn, up 89.2% YoY. Net income was RMB73.3mn, compared to a net loss of RMB59.8mn for 3Q18. The number of household users increased by 13.0% QoQ/85.7% YoY to 2.6mn, among which 17.1% had at least two connected products, compared to 16.1% in 2Q19 and 13.2% in 3Q18. Number of Viomi offline experience stores was around 1,600, compared to approximately 1,900 as of 2Q19 – this is because the company began to enhance and optimize store performance and productivity by closing underperforming stores, but revenues generated from offline channels still increased sequentially. (Source: Viomi)

20 Nov 2019

Cloud

Alibaba

Alibaba Cloud won the RMB113mn bid for Zhuhai Hengqin cloud platform

Recently, the website of Zhuhai Assets and Equity Exchange Service announced that Alibaba Cloud won the bidding of Hengqin New Area's cross-domain, multi-dimensional, big data cloud platform and unified intelligent service portal. Procurement is Da Hengqin Technology and the project amount is RMB22.7mn. Previously, Alibaba Cloud also won the bid for procurement project of cross-domain, multi-dimensional, big data cloud platform and basic components in Hengqin New Area, with the project amount of RMB90.9mn, totaling RMB113mn. In early May 2018, Ablibaba Group, Ant Financial Services Group, and Zhuhai Hengqin New Area Management Committee have also signed a strategic cooperation agreement. The three parties will cooperate in cloud computing, urban management, e-commerce and other fields, to build Hengqin into a new type of smart city. (Source: Eastmoney)

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20 Nov 2019

Smartphone

Samsung

Foldable Samsung W20 5G arrived in China with Snapdragon 855+

The latest edition of Samsung W series has launched 19th Nov. The new model, W20 5G has two touch screens as well as a T9 key board. It is exclusive to China Telecom and has a Snapdragon 855+ chipset. The specs of the phone are well known - 7.3" Dynamic AMOLED panel on the inside and a secondary 4.6" Super AMOLED screen on the cover. The battery is 4,235mAh and it supports wireless charging as well as quick charge 2.0 fast charging. As far as the cameras are concerned, the W20 has a total of six cameras, starting with three on the back, two on the inside and one on the front. The triple-camera array consists of a 12MP main camera with an f/1.5-2.4 lens, a 16MP ultrawide lens, and a 12MP 2x telephoto lens. In the notch on the foldable screen is a 10MP f/1.9 selfie camera along with an 8MP depth sensor. The outer cover has the same 10MP camera. The final retail price will be announced at the time of availability in December. (Source: Gsmarena)

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20 Nov 2019

Module

PCB

PCB production in Japan has shrunk for 10 consecutive months

According to Japan Electronics Packaging Circuits Association (JPCA), volume of PCB production has decreased to 1.016 million m^2 in Sept 2019, indicating a 14.7% YoY decline. It is the tenth consecutive month of decline. Total production value has decreased to JPY38.115bn, down 3.7% YoY, which is also the ninth consecutive month of decline. Production of Rigid PCB has decreased to 0.773 million m^2, implying a decline of 11.1% YoY. Production of Flexible PCB has decreased to 0.173 million m^2, implying a decline of 29.6% YoY. Production of Module Substrates has decreased to 0.071 million m^2, implying a decline of 7.6% YoY. (Source: Cntronics)

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19 Nov 2019

Cloud

Salesforce/Amazon

Salesforce and AWS expanded global strategic partnership

Salesforce and AWS expanded their global strategic partnership. Salesforce will integrate and offer Amazon Connect as part of Salesforce Service Cloud Voice to provide superior customer service. The two companies are making AWS content available on Trailhead, Salesforce's free online learning platform, to train anyone to become proficient in the cloud. Salesforce is also exploring ways to make Einstein Voice Skills — a declarative platform tool — compatible with Amazon Alexa, among other voice assistants and devices. (Source: Salesforce)

19 Nov 2019

Devices

TV

Korean TV makers dominated global market with Samsung taking the lead

According to a market report published by IHS Markit, South Korean manufacturers claimed nearly half of the global TV market as of the third quarter of this year with Samsung Electronics' solid lead in the large premium TV segment. Samsung topped the list with 30.3% in terms of sales value. The Korean electronics giant retained the top spot for the second straight quarter. LG stood in second place with 15.9%. In terms of shipment volume, Chinese TV providers slightly outpaced their Korean rivals at 33.5 %, but the companies' share of the market in terms of sales value stood at 23.2 % — only half of the Korean firms'. The data showed the Chinese companies shipped out more products than their Korean competitors, but the Chinese products were cheaper. (Source: Pulsenews)

18 Nov 2019

Cloud

Google

CloudSimple

Google acquired CloudSimple to facilitate cloud migration

Google has acquired VMware-as-a-Service provider CloudSimple. The integration of CloudSimple's products will allow customers to migrate on-premises workloads directly into Google Cloud. CloudSimple is currently the main mechanism for running VMware on Azure and GCP, while VMware on AWS is jointly engineered by VMware and AWS. Google Cloud reached an annual revenue run rate of US$8bn in 2Q19, doubling the rate in late 2017. (Source: Forbes)

18 Nov 2019

Semiconductor

DRAM

DRAM shipment recovered in 3Q19

According to DRAMeXchange, demand-side inventory in 2H19 has returned to relatively healthy levels. This shift skyrocketed DRAM suppliers' sales in 3Q19, driving total DRAM revenue up by 4% and ending the QoQ decline which lasted over three consecutive quarters. Despite an already strong-performing base period in 3Q19, the three major DRAM manufacturers are projected to increase their shipments even further in 4Q19, propelled by demands from the server and smartphone markets. Regarding the performance of 3Q19 revenues, Samsung increased its sales bits by 30% YoY/5% QoQ to US$7.12bn because Chinese smartphone vendors aggressively pulled their quarterly shipment forward and demand in the server market has gradually recovered. Likewise, SK Hynix grew its sales by 20% YoY/3.5% QoQto US$4.41bn. (Source: Epsnews)

18 Nov 2019

Smartphone

Xiaomi

Redmi Note 8 launched with price starting from RMB999

Xiaomi has launched a new 'Nebula Purple' color variant of the Redmi Note 8 in China. The phone started sale in China on Nov 18. It comes with a 6.3-inch 1080P IPS LCD, a Snapdragon 665 chip with 3GB, 4GB or 6GB of RAM, a 4,000mAh battery. The details of the Redmi Note 8's quad cameras are as follows: a 48MP main camera, an 8MP ultrawide, a 2MP dedicated macro camera and a 2MP depth sensor. On the front there's a 13MP selfie snapper. Price of Redmi Note 8 starts from RMB999. (Source: Bgr.in)

17 Nov 2019

Semiconductor

Intel

Intel unveiled GPU based on X^e architecture optimized for HPC/AI acceleration

Intel introduced its first general-purpose GPU based on the X^e architecture, code-named "Ponte Vecchio." It is optimized for HPC modeling, simulation workloads and AI training. Ponte Vecchio will be manufactured on Intel's 7nm technology. It will leverage Intel's Foveros 3D and EMIB packaging innovations and feature multiple technologies in-package, including high-bandwidth memory, Compute Express Link interconnect and other intellectual property. (Source: Intel)

14 Nov 2019

Cloud

Salesforce

Microsoft

Salesforce to move its Marketing Cloud to Microsoft Azure

Salesforce has picked Microsoft Azure as the public cloud provider for its Marketing Cloud product, expanding their existing partnership. This will enable customers to expand globally more quickly with Azure's global footprint and help address local data security, privacy and compliance requirements. Salesforce will also build a new integration between its Sales Cloud, Service Cloud products and Microsoft Teams. The two companies aimed to help customers meet the evolving needs of their businesses and boost team productivity. (Source: Microsoft)

13 Nov 2019

Devices

Apple

Apple introduced 16-inch MacBook Pro

Apple unveiled the new 16-inch MacBook Pro. It is designed for developers, photographers, music producers and other creators with demanding needs, featuring a 16-inch Retina Display - the largest ever. The new Magic Keyboard has a refined scissor mechanism that delivers 1mm of key travel. The 16-inch MacBook Pro is embedded with the latest 6- and 8-core processors, supporting up to 2.1 times faster performance than the quad-core 15-inch MacBook Pro. The price starts from US$2,399. (Source: Apple)

12 Nov 2019

Cloud

Kingdee/Jierui

Kingdee and Jierui partnered on a cloud platform for auto after-sales

Kingdee and Jierui partnered to build a cloud platform for automobile after-sales services. Jierui will pay over RMB50mn for Kingdee Cloud Cosmic services. Kingdee will help Jierui build an "industrial Internet platform based on automobile after-sales market" in three years, so that Jierui could realize whole-process control from insurance companies, platform merchants, repair shops to automobile glass distributors, and complete its digital transformation. (Source: Kingdee)

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We, Brian Li, Michelle Li and Roy Wu, hereby certify that (i) all of the views expressed in this research report reflect accurately our personal views about the subject companies and their securities; and (ii) no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed by us in this research report, nor is it tied to any specific investment banking transactions performed by AMTD Global Markets Limited.

As of the date the report is published, Brian Li holds financial interest in the securities of Amazon mentioned in the report.

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