Innovation, development, and upgrade: Transformation of industry in 5G era
# Table of contents

Brief introduction of China’s telecom industry 3

1 Brief introduction of China’s telecom industry segments and catalysis in 5G era 3

1.1 China’s telecom industry overview 4

1.2 Commercialisation of 5G – Catalyst for the industry 12

Review and outlook of M&A activities in China’s telecom industry (2016~2019) 13

2 M&A activities in China’s telecom industry 13

2.1 Overview of M&A transactions in China’s telecom industry (2016~2019) 14

2.2 China’s telecom M&A analysis (2016~2019) 17

3 Review of M&A transactions in China’s telecom industry 21

3.1 Telecom equipment suppliers 22

3.2 Telecom operators 24

3.3 IDC & cloud computing 25

3.4 IoT 28

2020 outlook and insight 29
Description of data/industry used in this report

• Data source: Data used in this report are based on information provided by the ChinaVenture, Mergermarket, PEdata database, Thomson Reuters, internet search, and PwC analysis, unless otherwise noted;

• Industry classification: In this report, the telecom industry is divided into telecom equipment suppliers, telecom operators, IDC & cloud computing, IoT and other telecom segments. The classification criteria are considered in accordance with the industrial structure of the telecom industry and the concentration of M&A transactions;

• Location: Location is determined by the location of the transaction target, that is, the actual registered location of the target company;

• Deal value/ deal size: The deal value appearing in this report is from the disclosed transaction data in the data source. In order to make them comparable, the foreign currency amounts are converted into RMB amounts according to the year-end exchange rate for the year;

• Deal volume: The deal volume in this report comes from disclosed transactions in the data sources.
Brief introduction of China’s telecom industry

1. Brief introduction of China’s telecom industry segments and catalysis in 5G era
1.1 China’s telecom industry overview

Telecommunications are close to our life and have the largest trading volumes in communications industry. According to the industry chain, telecommunications are comprised of equipment suppliers, telecom operators and telecom technology service providers.

In our analysis of M&A trends of the China’s telecom industry, we focused on four segments according to the structure of the industry and the concentration of M&A transactions, which are telecom equipment suppliers, telecom operators, IDC and cloud computing, and IoT.

- **Telecom equipment suppliers**: Telecom equipment can be classified into master devices, transmission equipment (wired and wireless transmission), auxiliary equipment, test equipment and terminal equipment according to their functions. In this report, we mainly analysed the M&A transactions of master devices and transmission equipment due to their important roles in 5G deployment.

- **Telecom operators**: From a geographic perspective, operators have stronger local advantages. Entry barriers of telecom industry varied by country. In this report, the target companies in this segment were mainly the top three telecom operators and broadband companies in mainland China.

- **IDC**: Internet Data Centre (IDC), based on the network, provides the foundation for operation and maintenance of equipment for centralised collection, storage, processing, and transmission of data and related services. The M&A transactions in this report include deals related to not only IDC companies, but also the companies providing server hosting, CDN services, and other value-added service to IDC companies.

- **Cloud computing**: Cloud computing is an internet-based computing method. By this method, hardware and software resources can be shared by any computers and other devices as needed. Cloud computing can be classified as IaaS, PaaS and SaaS based on key technology used, or by public cloud, private cloud and hybrid cloud based on operation mode.

- **IoT** (Internet of Things) refers to the achieving of intelligent management and monitoring through the interaction of information equipment and internet.

- **Others** include telecom network design, upgrading, and technology advisory. We do not discuss these segments in this report due to their lower proportion in M&A deals.
Master devices

- The master devices include base station equipment, cabinets, and base station management systems. In H1-2019, the top five suppliers had 73% of the market share, of which Huawei and ZTE accounted for 38% in total.
- The revenue of Huawei is much higher than the others due to its broad business scope over the whole telecom industry chain. In terms of the telecom equipment, Huawe has advantages in lower price and faster service responses, and its market share is close to Ericsson in the 4G era.
- Nokia became the world's second largest telecom master devices supplier after its acquisition of Alcatel-Lucent in 2016.
- In 2017, Ericsson enlarged its business scope by providing software services as well as selling traditional master devices. As Huawe and ZTE actively expanded overseas business and deployed global 5G market, Ericsson's global equipment market share declined in 2018.
- With the development of 5G technology, the competition in this market is expected to become more intense in the future.

Wired transmission equipment

An important component of wired transmission devices is the optical devices, of which the core component is optical chip, which is dominated by American and Japanese companies such as Finisar and Lumentum. Domestic suppliers are concentrated in the transceiver and downstream telecom equipment market and are mainly middle and small-sized companies, manufacturing low-end products and undertaking OEM projects for specific customers. The top companies continued to be engaged in M&A in recent years. In March 2018, Lumentum announced the acquisition of Oclaro with USD1.8 billion. On 8 November 2018, passive optical devices leading company II-VI announced the acquisition of Finisar, with USD3.2 billion.

Wireless transmission equipment

Base station antennas and RF devices are the most important segments of wireless transmission equipment. For base station antennas industry, the technical barriers are relatively low and Chinese companies took up over 40% of the global market.Huawei, the largest player, occupied 34% of the global market share. The other two domestic companies are Comba Telecom and Tongyu Communication, occupying 7% of the global market share in total. RF devices industry is technology-intensive and has extremely high entry barriers. American and Japanese companies have oligopolised the market, accounting for more than 90% of the RF front-end market share. Chinese manufacturers include MediaTek in Taiwan and UNISOC in mainland China.
Telecom operators in mainland China are monopolised by three state-owned companies. The DOU is increasing sharply, while the unit price and profit are dropping at the same time. Along with the commercialisation of 5G network in 2020, telecom operators will exploit more areas including internet, big data, and cloud processing in the future, and seek new growth points in conjunction with 5G development.

### Key indicators of three major telecom operators

<table>
<thead>
<tr>
<th>Item</th>
<th>Indicators</th>
<th>Unit</th>
<th>China Mobile</th>
<th>China Unicom</th>
<th>China Telecom</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial</strong></td>
<td>Revenue</td>
<td>RMB in billions</td>
<td>737</td>
<td>291</td>
<td>377</td>
</tr>
<tr>
<td></td>
<td>Net profit</td>
<td>RMB in billions</td>
<td>118</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>CAPEX</td>
<td>RMB in billions</td>
<td>167</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td><strong>Mobile</strong></td>
<td>User</td>
<td>Millions</td>
<td>925</td>
<td>315</td>
<td>303</td>
</tr>
<tr>
<td></td>
<td>ARPU</td>
<td>RMB/user/month</td>
<td>53</td>
<td>46</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>MOU</td>
<td>Minute/user/month</td>
<td>320</td>
<td>222</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>DOU</td>
<td>MB/user/month</td>
<td>3,194</td>
<td>3,970</td>
<td>4,058</td>
</tr>
<tr>
<td><strong>4G</strong></td>
<td>User</td>
<td>Millions</td>
<td>713</td>
<td>220</td>
<td>242</td>
</tr>
<tr>
<td></td>
<td>ARPU</td>
<td>RMB/user/month</td>
<td>53</td>
<td>53</td>
<td>56</td>
</tr>
<tr>
<td><strong>Broadband</strong></td>
<td>DOU</td>
<td>MB/user/month</td>
<td>4,300</td>
<td>6,052</td>
<td></td>
</tr>
<tr>
<td></td>
<td>User</td>
<td>Millions</td>
<td>157.0</td>
<td>80.9</td>
<td>145.8</td>
</tr>
<tr>
<td></td>
<td>New user</td>
<td>Millions</td>
<td>44.0</td>
<td>4.3</td>
<td>12.3</td>
</tr>
</tbody>
</table>

From a regional perspective, operators have strong local advantages. Entry barriers of telecom industry varied by country. This report mainly discussed the current situation and M&A of telecom operators in mainland China. As we know, the domestic market is monopolised by the three major operators due to the government limitation. The market capacity of traditional mobile services and broadband services is becoming saturated. As a result, competition among the three major telecom operators continues to grow.
Telecom operators overview (cont’d)

- First, services provided by operators are similar, competition among the operators has become more intense; Secondly, affected by the government policy of "boosting internet speed and cutting costs", the ARPU of the three major operators has decreased.

  - **Mobile service**: As of the end of 2018, the total number of users of the three major operators reached 1.5 billion, exceeding the total population of China. ARPU remained stable in 2016 and 2017, while declined in 2018 due to: 1) the cancelation of domestic data roaming charges and the reduction of 4G price; and 2) price war among three operators for attracting new users. The revenue were coming from the increase in DOU rather than ARPU.

  - **Broadband services**: As of 2018, the broadband usage rate met about 80%.

- The three major operators have begun to deploy 5G construction. Pre-tests of commercialisation began since 2019 and 5G commercialisation is expected to be widely adopted in 2020. At the same time, three major operators have increased their network capital investments in cloud computing and AI. In the future, telecom operators will provide services such as internet+, data operation, AI industries and IoT, seeking new development opportunities in conjunction with 5G development.
IDC & cloud computing overview

IDC, as the carrier of massive data, is the core resource for internet traffic calculation, storage, and exchange. With the rapid development of the internet, data traffic continues to see explosive growth, driving the demand for IDC.

Domestic situation and development trend

- The total market share of the three major telecom operators accounted for over 70% and their IDCs are mainly self-built. Other IDC service providers have a relatively lower market share but they have demonstrated a rapid growth rate, e.g. 21Vianet has grown quickly and is expected to become the main force of future M&A activities. However, in terms of scale, there is still a large gap between Chinese and overseas IDC companies.

- Customers of IDC services are distributed mainly in tier 1 and tier 2 cities. In order to be closer to customers to reduce system delays, IDC companies are distributed mostly in tier 1 cities. Limited by the stricter government energy policies, demand is expected to exceed supply in the next three to five years in tier 1 cities as a result of a lack of cabinet resources. According to market forecast, IDC prices and utilization will increase in the core areas in the future, while those in the surrounding areas will decline.

Methods of entering IDC industry

- Entering core areas through acquiring medium or small IDC companies.
- Direct access to areas surrounding tier 1 cities:
  - There are plenty source and competitive price in areas surrounding tier 1 cities (lower costs of land, utilities, construction and operating);
  - The internet system delays can be solved by optical fiber direct transmission. The third party IDC companies such as 21vianet, GDS and AtHub have entered the areas surrounding tier 1 cities.
The emergence of cloud computing has changed the concept of users from “buying products” to “buying services”. The cloud computing market is highly centralised, and the market share of leading companies in the global market is much higher than that of other companies. The domestic market size of cloud computing increased year by year. The support from the government combined with development demand of enterprises will boost the development of cloud computing and industrial internet. Along with the increasing demand in usage of cloud, this industry will attract more investors.

The United States started out earliest in the cloud computing industry, which has developed rapidly with a dominant position in the market.

As Alibaba Cloud, Tencent Cloud, Ucloud and other companies continue to expand the overseas markets, their market share of cloud computing has increased, although still lower than that of the European and American companies.

The Chinese domestic market size of cloud computing has increased year by year, and the market size of public cloud has grown rapidly. The hardware submarket accounted for a relatively large part of private cloud market. Driven by the support of government policies, market demand and digitalisation, cloud combined with 5G can help companies in data collection and storage. The usage of cloud is becoming necessary, which will drive more M&A deals in cloud computing.
China’s public & private cloud market size and growth rate

Rapid growth of the public cloud market in China
The cloud computing market size in China was approximately RMB96.3 billion with a growth rate of 23.1% in 2018. The public cloud market size increased by 65.2% and is expected to maintain a rapid growth rate from 2019 to 2022. The private cloud market has grown by 23.1% and is expected to maintain steady growth in the future.

Market size (RMB in billions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Market size</th>
<th>Growth rate</th>
<th>Market size</th>
<th>Growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>17</td>
<td>55.7%</td>
<td>34</td>
<td>52.8%</td>
</tr>
<tr>
<td>2017</td>
<td>26</td>
<td>23.8%</td>
<td>43</td>
<td>42.1%</td>
</tr>
<tr>
<td>2018</td>
<td>44</td>
<td>23.1%</td>
<td>53</td>
<td>36.7%</td>
</tr>
<tr>
<td>2019E</td>
<td>54</td>
<td>22.6%</td>
<td>79</td>
<td>22.1%</td>
</tr>
<tr>
<td>2020E</td>
<td>95</td>
<td>95%</td>
<td>130</td>
<td>31.8%</td>
</tr>
<tr>
<td>2021E</td>
<td>96</td>
<td>22.1%</td>
<td>117</td>
<td>21.8%</td>
</tr>
<tr>
<td>2022E</td>
<td>173</td>
<td>21.8%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


1H2019 China public cloud market share

The top companies have more advantages due to earlier entry. The market structure of the entire public cloud market has gradually become stable.

More companies have recognised that usage of cloud can further save costs in recent years. The increasing usage rate of cloud for entities (such as government related companies, finance companies and manufacturers) since 2018 in China has boosted the cloud computing market size.

Source: China Academy of Information and Communications, Research Institute of Orient Securities
With 5G technology, the IoT will achieve breakthrough development. Alongside the maturity of 5G technology and large-scale commercialisation, the IoT can realise a variety of application scenarios in multi-fields in the future, and will continue to be a new hotspot for M&A market.
1.2 Commercialisation of 5G – Catalyst for the industry

Telecommunications not only connects people, but also provides connections between human beings and things, and even among things. The development and application of 5G boost the development and innovation of the telecom industry chain. In addition, the development of 5G also improves other industries, such as self-driving applications, IoT and industrial internet.

### Development of 5G and market overview

- The invention of analog communication technology has brought the era of mobile communication. The popularity of smartphones in 2007 boosted OTT services, while it also caused a decline in traditional calling and text messaging services. In 2019, China entered 5G era. 5G licenses were officially issued on 6 June 2019 to China telecom operators.

- 5G technology is one of the most cutting edge technologies in the telecom industry. It is an extension of the existing mobile communication technology, far surpassing 4G mobile technology in terms of transmission speed, transmission delay, connection density, and energy consumption efficiency. 5G network is characterised by its high speed, large capacity and low latency.

- According to the White Paper on 5G Economic and Social Impact released by CAICT, it is expected that the direct and indirect economic output driven by 5G till 2030 will achieve RMB6.3 trillion and RMB10.6 trillion, respectively. As for the output structure, the commercialisation processes of 5G will change the industrial revenue growth driver. During 5G commercial exploration and start-up period, the demand of base station construction will boost the development of equipment manufacturers. After entering the high-speed development period, the usage of 5G network will boost the development of telecom operators, IDC & cloud computing industries and IoT.

- Meanwhile, the three major Chinese telecom operators and the global giant telecom companies have increased their investments in 5G industry, which will drive more M&A deals in the corresponding segments.

### 5G direct and indirect economic output from 2020 to 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Output</th>
<th>Indirect Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2024</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2028</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td>6.3 trillion</td>
<td>10.6 trillion</td>
</tr>
</tbody>
</table>

CAGR - direct output 29%, CAGR - indirect output 24%

### 5G direct economic output from 2020 to 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Telecom operator</th>
<th>Information service provider</th>
<th>Telecom equipment supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2022</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2024</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2026</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2028</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: CAICT’s White Paper on 5G Economic and Social Impact
Review and outlook of M&A activities in China’s telecom industry (2016~2019)

2. M&A activities in China's telecom industry
2.1 Overview of M&A transactions in China’s telecom industry (2016~2019)

Overview of M&A deals in the China’s telecom industry

Deal volume
Cumulative number of revealed deals totaled 587, of which 111 and 121 took place in 2018 and 2019 respectively.

Deals value
The revealed deals value in total was approximately RMB281.6 billion, where in 2017, total disclosed deal value increased to RMB115.4 billion including a mega deal of approximately RMB61.7 billion of China Unicom’s mix-ownership reform; deal value was RMB59 billion and RMB37.4 billion in 2018 and 2019, respectively.

Big deal
52 big deals (individual deal value over RMB1 billion), approximately RMB206.6 billion in total in the review period.

Avg. deal value
Average deal value is RMB380 million after excluding the impact from China Unicom’s mix-ownership reform. The average deal value of RMB530 million in 2018 was the highest among recent years.

Major investors
Nearly 73% of the cumulative deal value was contributed by strategic investors.

Geographic focus
Among domestic transactions, over 50% of the target companies were located in Beijing, Shanghai and Guangdong province.

Outbound deals
Accumulated inbound and outbound deal volume was 33, of which only three took place in 2019.

Popular sectors
In 2019, telecom equipment suppliers subindustry continued to gain popularity.

Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis
<table>
<thead>
<tr>
<th>No.</th>
<th>Target</th>
<th>Sector</th>
<th>Deal value (RMB)</th>
<th>Year</th>
<th>Investor type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tsinghua Tongfang</td>
<td>IoT</td>
<td>7 billion</td>
<td>2019</td>
<td>Strategic</td>
</tr>
<tr>
<td>2</td>
<td>iFlyTek</td>
<td>IoT</td>
<td>2.9 billion</td>
<td>2019</td>
<td>Financial</td>
</tr>
<tr>
<td>3</td>
<td>Xiangjiang Technology</td>
<td>IDC &amp; cloud computing</td>
<td>2.3 billion</td>
<td>2019</td>
<td>Strategic</td>
</tr>
<tr>
<td>4</td>
<td>Suzhou Qingfeng</td>
<td>IDC &amp; cloud computing</td>
<td>23.8 billion</td>
<td>2018</td>
<td>Strategic</td>
</tr>
<tr>
<td>5</td>
<td>CITIC Network</td>
<td>Telecom operator</td>
<td>7.8 billion</td>
<td>2018</td>
<td>Strategic</td>
</tr>
<tr>
<td>6</td>
<td>KSYUN</td>
<td>IDC &amp; cloud computing</td>
<td>5 billion</td>
<td>2018</td>
<td>Financial</td>
</tr>
<tr>
<td>7</td>
<td>Miningiamo Technology</td>
<td>IDC &amp; cloud computing</td>
<td>2 billion</td>
<td>2018</td>
<td>Financial</td>
</tr>
<tr>
<td>8</td>
<td>China Unicom</td>
<td>Telecom operator</td>
<td>61.7 billion</td>
<td>2017</td>
<td>Strategic</td>
</tr>
<tr>
<td>9</td>
<td>Northcom Group</td>
<td>Telecom operator</td>
<td>4.9 billion</td>
<td>2017</td>
<td>Strategic</td>
</tr>
<tr>
<td>10</td>
<td>Shuzhi AI</td>
<td>Telecom equipment supplier</td>
<td>3.4 billion</td>
<td>2017</td>
<td>Financial</td>
</tr>
<tr>
<td>11</td>
<td>Zhongyuan Electric</td>
<td>Telecom equipment supplier</td>
<td>2.5 billion</td>
<td>2017</td>
<td>Strategic</td>
</tr>
<tr>
<td>12</td>
<td>Dahua SuperLite</td>
<td>IoT</td>
<td>2 billion</td>
<td>2017</td>
<td>Financial</td>
</tr>
<tr>
<td>13</td>
<td>Global Switch</td>
<td>IDC &amp; cloud computing</td>
<td>20.6 billion</td>
<td>2016</td>
<td>Strategic</td>
</tr>
<tr>
<td>14</td>
<td>True Corp PCL</td>
<td>Telecom operator</td>
<td>5.5 billion</td>
<td>2016</td>
<td>Strategic</td>
</tr>
<tr>
<td>15</td>
<td>Xinwei Communication</td>
<td>Telecom operator</td>
<td>2.3 billion</td>
<td>2016</td>
<td>Strategic</td>
</tr>
<tr>
<td>16</td>
<td>AWS</td>
<td>IDC &amp; cloud computing</td>
<td>2 billion</td>
<td>2016</td>
<td>Strategic</td>
</tr>
</tbody>
</table>

Note: Mega deals in this page comprised deals over RMB2 billion from 2016 to 2019 in China telecom industry.
Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis.
From 2016 to 2019, M&A in China’s telecom industry were mainly strategic investments, both deal value and deal volume of which were higher than those of financial investments. By region, most of the deals were domestic deals, while inbound and outbound deals have dropped sharply since 2017.

### Overview of China telecom M&A transactions 2016 - 2019

<table>
<thead>
<tr>
<th>RMB in billions</th>
<th>Deal value 2016</th>
<th>Deal value 2017</th>
<th>Deal value 2018</th>
<th>Deal value 2019</th>
<th>Deal value 2018 vs 2017</th>
<th>Deal value 2019 vs 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic investors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>26</td>
<td>92</td>
<td>94</td>
<td>86</td>
<td>46</td>
<td>51</td>
</tr>
<tr>
<td>Outbound</td>
<td>29</td>
<td>11</td>
<td>3</td>
<td>7</td>
<td>0.3</td>
<td>3</td>
</tr>
<tr>
<td>Inbound</td>
<td>-</td>
<td>-</td>
<td>0.01</td>
<td>1</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>55</td>
<td>103</td>
<td>97</td>
<td>94</td>
<td>46</td>
<td>54</td>
</tr>
<tr>
<td><strong>Financial investors</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>14</td>
<td>73</td>
<td>19</td>
<td>71</td>
<td>11</td>
<td>54</td>
</tr>
<tr>
<td>Outbound</td>
<td>0.1</td>
<td>0.01</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Inbound</td>
<td>0.3</td>
<td>2</td>
<td>0.3</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>14</td>
<td>76</td>
<td>19</td>
<td>75</td>
<td>13</td>
<td>55</td>
</tr>
<tr>
<td><strong>Non-disclosed</strong></td>
<td>1</td>
<td>0.02</td>
<td>2</td>
<td>0.4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>70</td>
<td>184</td>
<td>115</td>
<td>171</td>
<td>59</td>
<td>111</td>
</tr>
</tbody>
</table>

Source: PEDATA, ChinaVenture, Mergemarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis

Data in the table above included only disclosed transactions; it excluded overseas M&A deals (both buy and sell side were from overseas). This report is based on the table set above, and there may be transactions not counted. The classification criteria of the above table are as follows:

- **Investor type – strategic investors and financial investors**
  - **Strategic investors** represent companies aiming to integrate the industry, expand the market or diversify their business scope. They usually incorporate the target companies’ business into their own business scope after completing the deal;
  - **Financial investors** refer to investors aiming to gain profit from future transactions, usually consisting of various private equity funds (“PE”) and venture capital fund (“VC”).

- **Deal location – domestic, outbound and inbound deals**
  - **Domestic**: Deals took place within China, both the investors and the target companies are Chinese individuals or enterprises;
  - **Outbound**: Buy-side are Chinese investors and the target companies located overseas;
  - **Inbound**: Buy-side are overseas investors while the target companies located in China.
We divided the telecom industry into four major segments: telecom equipment suppliers, telecom operators, IDC & cloud computing and IoT. As disclosed, from 2016 to 2019, 587 M&A transactions were conducted in China’s telecom industry, with a total deal value of RMB281.6 billion.

2.2 China’s telecom M&A analysis (2016~2019)

Overview of M&A deals
From 2016 to 2019, M&A deals in sub-segments took place frequently. Telecom equipment suppliers, operators and technology service companies have accelerated their investments in preparation for 5G commercialisation.

- The deal value in China’s telecom industry was the lowest in 2019, a sharp drop of 37% from 2018, resulting from the decrease of deal size in the telecom operators and IDC & cloud computing segments. The overall deal volume indicated a downward trend, except for a small rebound in 2019, owing to the increase of deal volume in the telecom equipment suppliers segment. The declining number of deals stemmed from the economic downturn and the international trade tensions, making investors more cautious when considering M&As.

- In 2017, the M&A deal value of telecom operators rose sharply due to China Unicom’s mix-ownership reform of RMB61.7 billion.

Overview of M&A deals in sub-segments
- The proportion of deals in telecom equipment suppliers segment was relatively stable as a result from 1) concentration of domestic market, and 2) technology barriers in certain components. With the construction of 5G network, the demand for equipment is increasing, and more M&A activities are expected in this segment in the future.

- Deal volume of telecom operators was relatively low. China Unicom’s mix-ownership reform was the largest deal in 2017, after which M&A deals decreased. There will likely be more opportunities of M&A with the commercialisation of 5G and mobile communication resale business.

- Deal volume of IDC & cloud computing dropped after 2017, but the deal value increased significantly in 2018 due to the industry strategic integration. Although deal volume decreased due to the capital winter, the total deal value increased significantly due to the increased average deal value.

- Deal value and deal volume of IoT segment have increased since 2019 and continue to be a investment hotspot in the future.

- Other Telecommunications segments include mobile telecom network design and optimization, telecom technology advisory and service companies, accounting for a fairly low proportion of total M&A deals, and thus will not be analysed in detail.

Source: PEDATA, ChinaVenture, Mergersmarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis.
Deal volume of strategic investments was just slightly higher than that of financial investments, while the average deal value of strategic investments (RMB495 million regardless of China Unicom’s mixownership reform) was significantly higher than that of financial investment (RMB241 million).

In terms of total deal volume, telecom equipment suppliers received more capital from both strategic and financial investors.

Due to the strategic integration plans, deal volume of strategic investments in telecom equipment segments was higher than that of financial investments. In recent years, mega deals strategic investors were mainly from manufacturing, finance, and telecom industries, such as Shagang Group, China Life, Tencent Xinda and China Mobile.

Financial investors of mega deals were mostly PE and VC, such as FutureX Capital, Zhuhai Plant, HuaAn Future Assets, CCB Principal Asset Management and China Life AMP Asset Management. The investors abovementioned have focused on the telecom industries in recent years, covering IDC & cloud computing, IoT and telecom equipment suppliers segments.

Deal value by investor type

<table>
<thead>
<tr>
<th>Year</th>
<th>Strategic</th>
<th>Financial</th>
<th>Non-disclosed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>55</td>
<td>14</td>
<td>61</td>
</tr>
<tr>
<td>2017</td>
<td>97</td>
<td>19</td>
<td>49</td>
</tr>
<tr>
<td>2018</td>
<td>46</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>2019</td>
<td>22</td>
<td>14</td>
<td>38</td>
</tr>
</tbody>
</table>

Deal volume by investor type

<table>
<thead>
<tr>
<th>Year</th>
<th>Strategic</th>
<th>Financial</th>
<th>Non-disclosed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>103</td>
<td>76</td>
<td>27</td>
</tr>
<tr>
<td>2017</td>
<td>94</td>
<td>75</td>
<td>51</td>
</tr>
<tr>
<td>2018</td>
<td>54</td>
<td>55</td>
<td>46</td>
</tr>
<tr>
<td>2019</td>
<td>68</td>
<td>50</td>
<td>38</td>
</tr>
</tbody>
</table>

Accumulated deal volume from 2016 to 2019

<table>
<thead>
<tr>
<th>Segment</th>
<th>Strategic</th>
<th>Financial</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecom equipment suppliers</td>
<td>153</td>
<td>95</td>
<td>248</td>
</tr>
<tr>
<td>Telecom operators</td>
<td>42</td>
<td>27</td>
<td>69</td>
</tr>
<tr>
<td>IDC &amp; Cloud computing</td>
<td>43</td>
<td>35</td>
<td>78</td>
</tr>
<tr>
<td>IoT</td>
<td>58</td>
<td>71</td>
<td>129</td>
</tr>
<tr>
<td>Other telecom segments</td>
<td>23</td>
<td>29</td>
<td>52</td>
</tr>
</tbody>
</table>

Nearly 73% of the deals value were coming from strategic investment. Financial investments indicated a high deal volume but lower average deal value. In terms of deal volume, the telecom equipment subindustry was more popular in China’s telecom industry.
2.2 China’s telecom M&A analysis (2016~2019) (cont’d)

Most of M&A in the review period were domestic deals. From 2016 to 2019, the deal value of domestic and inbound deals accounted for 88% of the total deal value. Outbound deal value was high in 2016, but started to drop from 2017. Since 2018, there have been only a few inbound and outbound deals.

Deal value by location

<table>
<thead>
<tr>
<th>Year</th>
<th>Inbound (RMB in billions)</th>
<th>Outbound (RMB in billions)</th>
<th>Domestic (RMB in billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>0.3</td>
<td>29.3</td>
<td>40.2</td>
</tr>
<tr>
<td>2017</td>
<td>0.4</td>
<td>2.9</td>
<td>12.1</td>
</tr>
<tr>
<td>2018</td>
<td>1.3</td>
<td>0.4</td>
<td>57.4</td>
</tr>
<tr>
<td>2019</td>
<td>0.4</td>
<td>37.0</td>
<td>118</td>
</tr>
</tbody>
</table>

Deal volume by location

<table>
<thead>
<tr>
<th>Year</th>
<th>Inbound</th>
<th>Outbound</th>
<th>Domestic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>2</td>
<td>12</td>
<td>170</td>
</tr>
<tr>
<td>2017</td>
<td>4</td>
<td>8</td>
<td>160</td>
</tr>
<tr>
<td>2018</td>
<td>1</td>
<td>3</td>
<td>107</td>
</tr>
<tr>
<td>2019</td>
<td>1</td>
<td>2</td>
<td>118</td>
</tr>
</tbody>
</table>

Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis

Note: The chart above did not include those deals which investor was not disclosed, thus deal volume was not consistent with “2.1 Overview of M&A deals in China’s telecom industry (2016~2019)”.

Deal value

Outbound deal value was relatively high in 2016. In contrast, only a few inbound and outbound deals took place between 2017 and 2019.

- (*1) Deal value increased significantly in 2017 due to China Unicom’s mix-ownership reform of RMB61.7 billion. Excluding the significant impact of this deal, deal value rose steadily from 2016 to 2018.
- (*2) Outbound M&A deals in 2016 were concentrated in IDC and telecom operators segments:
  - Elegant Jubilee, a consortium in China, acquired Global Switch, a British data centre operator with several IDCs in Europe, for GBP2.4 billion to obtain its high-quality as sets to expand China and Asian markets.
  - China Mobile expanded its overseas business through the acquisition of True Corporation, a Thailand telecom operator, with a deal value of approximately RMB5.5 billion.
- In addition to the two large deals mentioned above, outbound deals value between 2016 and 2019 were relatively small and the target companies located in more than 10 countries and regions, such as Finland, Turkey, and Nigeria.

Deal volume

Most M&A deals were domestic deals, and since 2018, there have been only a handful of inbound and outbound deals.
The domestic target companies in the review period were highly concentrated in Beijing, Jiangsu, Guangdong, Shanghai, and Zhejiang, having accounted for over 70% of the total deals volume. Deals in the telecom equipment suppliers segment were scattered, while IDC & cloud computing deals were concentrated among tier-1 cities.

Legend
- Telecom operators
- IoT
- Telecom equipment suppliers
- IDC & cloud computing
- Other telecommunications segments

Note: Bubble size represents deal volume.
Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis
From 2016 to 2019, there were 255 of deal volume for telecom equipment suppliers segment, of which total deal value amounting to RMB58.1 billion, which peaked in 2017. M&A deals were mainly domestic deals, and there were few outbound and inbound deals in the recent two years.

3.1 Telecom equipment suppliers

- As domestic telecom equipment market was mainly made up by top suppliers, M&A deal value and volume have declined since 2017, but rebounded in 2019.
- The deal value in this segment were the highest in 2017, which dropped sharply in 2018 due to the shortage of domestic funds and turbulent global trading environment.
- However, the downward trend in M&A market was reversed in 2019. The increase of deal value was driven by the mega deals such as the acquisition of Huawei Marine, CCT Group, and Fibocom.
- In the review period, deals covered various subsectors in the industry chain, among which, companies who provide both equipment and IT solutions became the hotspot in the past three years. Other popular sectors include optical communications, RF devices, chips and satellite radars. Benefiting from the government policy and injection of capital, the business value of military and satellite application gradually became prominent, which are expected to drive more M&A activities in the future.
3.1 Telecom equipment suppliers (cont’d)

From 2016 to 2019, deals were invested mainly by strategic investors, and the proportion of deals invested by financial investors has increased year by year. Furthermore, historical investors were not concentrated in a certain sub-sector and there were few overlapping investments.

- From 2016 to 2019, there were mainly domestic deals, while a few large outbound deals in 2016 and 2017 and only two outbound deals in 2019.
- In 2019, both domestic deal value and volume rose again, mainly due to industry integration and strategic investments. For example, Hengtong Optic-electronic acquired Huawei Marine in an aim to achieve upstream and downstream integration of the marine cable industry.
- In 2017, domestic deal value significantly increased due to the financing activities of listed companies. For example, Shuzhi.AI, Zhongyuan Electronics and FiberHome completed the financing of RMB7.7 billion. Furthermore, the outbound deals in 2017 were mainly from the acquisition of Sepura in England and Norsat in Canada by Hytera, approximating RMB664 million and RMB480 million respectively.
- In 2016, outbound deals were mainly strategic investments. The biggest outbound deal was that ZTE strategically invested in Netas Telekomunikasyon AS (a Turkish telecom company) with approximately RMB700 million.
- In recent years, there have been only 4 inbound deals and the total deal value was relatively low, at about RMB100 million.
- In the review period, deal value and volume of strategic investments were greater than those of financial investments.
- In recent years, strategic investors of mega deals were mainly from IT, tourism, manufacturing, material, and telecom industries, such as Greatwall Technology, Shajiabang Tourism, Hengtong Optic-electric, and ZTE, etc.
- Mega deals invested by financial investors mainly consisted of the private placement of listed companies and mature phase investments, such as the private placement of Shuzhi AI amounting to RMB3.4 billion and that of FiberHome amounting to RMB1.8 billion.

### Deal value by investor type

<table>
<thead>
<tr>
<th>Year</th>
<th>Strategic</th>
<th>Financial</th>
<th>Non-disclosed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>7.03</td>
<td>4.35</td>
<td>0.74</td>
</tr>
<tr>
<td>2018</td>
<td>4.17</td>
<td>3.23</td>
<td>0.37</td>
</tr>
<tr>
<td>2017</td>
<td>15.13</td>
<td>8.58</td>
<td>0.02</td>
</tr>
<tr>
<td>2016</td>
<td>11.77</td>
<td>2.16</td>
<td>0.59</td>
</tr>
</tbody>
</table>

### Deal volume by investor type

<table>
<thead>
<tr>
<th>Year</th>
<th>Strategic</th>
<th>Financial</th>
<th>Non-disclosed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>36</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>2018</td>
<td>21</td>
<td>18</td>
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<tr>
<td>2017</td>
<td>49</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>2016</td>
<td>48</td>
<td>30</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis
3.2 Telecom operator

China telecom operators market are dominated by three major operators. Fewer M&A deals happened during recent years due to the market saturation. The top mega deal in 2017 was from the China Unicom mixed-ownership reform, with deal value of approximately RMB61.7 billion.

Investment status of telecom operators in mainland China

- Owing to the government policy and market access, the telecom market in China has been dominated by three major operators. Fewer M&A deals have taken place in recent years amid market saturation.
- Apart from China Unicom’s mixed-ownership reform, M&A deals in this segment comprised wireless broadband, basic telecommunications and network construction and operation services as well as solution companies.
- Deals involved mainly strategic investors.
- As for location, domestic transactions have dominated the M&A market in recent years except in 2016. Mega outbound deals in 2016 included: 1) China Mobile acquired True Corporation PCL (a Thailand telecom operator) with approximately RMB5.5 billion; and 2) Private virtual telecom operator, Sharing Mobile acquired GiCell (Nigerian operator) with approximately USD200 million. There have been only a few outbound deals afterwards.

Development opportunities

- As the government issued 5G license to China Telecom, China Mobile, China Unicom, and China Broadcasting Network, Chinese telecom operators may seek new business opportunities by integrating 5G with other emerging industries such as the internet, cloud computing, IoT and streaming media. As such, more cross-industry M&A opportunities may arise.
- In 2018, the MIIT approved the commercialisation of the first batch of pilot mobile communication resale enterprises. Virtual telecom operators may attract more domestic and foreign investors.
- In recent years, telecom giants in the US and European markets have expanded their service scope, developed network ecosystems and strengthened the integration of content and network to improve their competitive advantages in diversified competition through M&A. Chinese telecom operators are expected to expand their business and achieve diversified development by the same means as overseas telecom operators.
The M&A deal value (excluding special transactions) of IDC & cloud computing segment have risen slightly in recent years. The choice on target companies in IDC mainly depends on the investor’s business model. In the cloud computing field, SaaS was the most popular sector to investors.

### M&A deals overview of IDC and cloud computing segment

<table>
<thead>
<tr>
<th>Year</th>
<th>Deal value (RMB in billions)</th>
<th>Deal volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>2017</td>
<td>21 (*1)</td>
<td>16</td>
</tr>
<tr>
<td>2018</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>2019</td>
<td>14</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis

### Overview of M&A deals in IDC & cloud computing

- IDC in China continues to be in the construction stage, thus M&A deals rose slowly, while the growth in 2019 mainly benefited from cross-industry transactions. In cloud computing segment, the public cloud market structure has been gradually steady, whereas no absolute leading companies emerged into the private cloud and hybrid cloud market. In the future, capitals are expected to enter those two sectors.
- Deal value in 2016 and 2018 was higher, mainly due to two related mega deals (*1). In 2016, Elegant Jubilee, acquired Global Switch with GBP2.4 billion (approximately RMB20.6 billion). Later in 2018, Shagang Group acquired Elegant Jubilee (now renamed Suzhou Qingfeng) with RMB23.8 billion.
- After excluding the impact of the above mega deals, deal value of IDC and cloud computing segments steadily increased from 2016 to 2019, whereas the deal volume was low. With the widespread popularity and application of cloud computing, more opportunities are expected to emerge.

### The choice on target companies in IDC industry mainly depends on the investor’s business model. In the cloud computing field, SaaS was the most popular sector to investors

- When choosing their target company, investors focus on business model, asset quality and potential customers. Specifically: 1) Retail IDCs are more likely to directly buy existing companies to acquire resources and customers; 2) Wholesale IDCs tend to purchase assets and land or buildings available to build a brand new IDC.
- The IDC M&A deals were mostly cross-industry deals in the past two years, and investors were from traditional industries such as manufacturing and engineering. In addition to the cross-industry acquisition from Shagang Group in 2018, the two huge cross-industry strategic acquisitions consisted of the acquisition of Xiangjiang Technology by Chengdi of RMB2.3 billion, and iTeaQNetwork by traditional manufacturing giant, Black Peony, with RMB1.5 billion in 2019.
- As for cloud computing deals, SaaS service providers were more popular. Enterprise software companies, IT giants, and even non-traditional technology companies have entered the cloud computing market, hoping to seize the development opportunities in the SaaS market. Along with the development of cloud market, more transaction opportunities will emerge in the SaaS market in the future.
3.3 IDC & cloud computing (cont’d)

Most M&A deals related to IDC and cloud computing segments took place in China, with only 1 outbound deal in 2016. In mainland China, deals took place mostly in tier 1 and tier 2 cities. As going cloud becomes more popular among companies, emerging regions may attract capital investments.

M&A deals by location

![Deal value and volume graph]

- Deal value (RMB in billions)
- Deal volume

Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis

There was only one outbound deal in IDC & cloud computing segment in 2016 and 2017 respectively, and no inbound deal in recent years.

As mentioned, the domestic deal value increased significantly in 2018 due to the acquisition of Suzhou Qingfeng (*1) by Shagang Group (the post 2016 outbound deal). After excluding the impact of (*1):

- From 2016 to 2019, the deal value increased steadily. The deal volume have reduced since 2017, whereas the average deal value have increased.

- Small and medium IDC companies in tier 1 and tier 2 cities will become key target assets in the IDC market. In addition, as the three China telecom operators suffered from the government policy to “boost internet speed and cut costs”, the revenue growth rate slowed down and capital expenditure declined, benefiting the development of the third-party private owned IDC companies. There may be more deals targeting third-party private IDC companies in the future.

- Deals in cloud computing sector were mainly domestic deals. In 2018, cloud computing companies were active in capital market, and many of them completed large amount of financing. For example, Kingsoft Cloud completed D-round financing of RMB5 billion and Huayun completed pre-IPO financing of RMB1 billion. With the increasing demand for using cloud service in Chinese companies, domestic deals are expected to be sought in the future and some high-speed emerging regions may also become a hotspot in cloud computing M&A.
Except two mega deals, with the average deal value of over RMB20 billion, in 2016 and 2018, the total size of deals invested by financial investors steadily increased from 2016 to 2019. In 2018, financial investments increased gradually and their deal value has exceeded that of strategic investments.

M&A deals overview by region in China

M&A deals by investor type

Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis

M&A deals were mainly concentrated in tier-1 cities and backbone node cities

- Domestic deals in IDC & cloud computing segment concentrated in tier-1 and tier-2 cities, including Jiangsu, Beijing, Guangdong, Shanghai, and Zhejiang, the total deal value accounted for more than 97% of the domestic deal value.

- The deal value of Jiangsu was significantly higher than that of other provinces in 2018, mainly due to the domestic mega deal (*1) mentioned in previous page. As for other regions, bigger deals in Beijing and Zhejiang were related to IDC and value-added services companies, while the ones in Guangdong were concentrated in the investments in the cloud computing & big data market.

Financial investments have been more active since 2017

- M&A deal volume of strategic investments was slightly higher than that of financial investments before 2018. But it has declined in 2018, and there were only 4 strategic investments in 2019.

- Deal value of financial investments increased from 2016 to 2018, the boost in 2017 came largely from the development of the cloud computing market. Strategic investors, such as Sinnet, Alibaba and Huaxing Chuangye intended to deploy the cloud computing market. Financial investments such as CMS investing Qing Cloud and Oriza investing Ucloud also showed active trend in the cloud computing market.

- With the development of IDC and cloud computing industry, more capital will be injected, while cross-industry and strategic investments may become the main stream in the future M&A market.
With the commercialisation of 5G, M&A deals in the IoT market accelerated in 2019, while most of which were domestic deals. In terms of the target companies, intelligent terminal application and vertical application platform were popular.

### Characteristics of M&A deals in the IoT market

- The IoT market underwent rapid development in 2019. The number of IoT links grew sharply, benefiting from the development of 5G technology. In 2019, total deal value of the IoT market stood at RMB13.8 billion, which was much higher than that in the past two years. IoT has become a new hotspot in the telecom M&A market.

- The total deal value of IoT increased rapidly in 2019, among which the mega deals over RMB1 billion included the acquisition of Tsinghua Tongfang Co., Ltd. of RMB7 billion by China National Nuclear Corporation, the private placement issuance of RMB2.9 billion financing by Ilytek, and Qianxun SI financing of RMB1 billion.

- In terms of target companies type, investments were concentrated mainly in intelligent terminal application, vertical application platform and companies provided not only terminal devices but also IoT solutions.

- Deals were concentrated mainly in Beijing, Guangdong, Zhejiang and Shanghai. The total deal value in the above cities accounted for over 80% of total IoT M&A deal value. All target companies were located in China apart for one in Germany.

- Strategic investors began to dominate the M&A in 2019. In 2016, the total deal value in the IoT M&A market was approximately RMB13.5 billion, of which strategic investments accounted for 24%. In 2019, the total deal value approximated RMB13.8 billion, of which strategic investments accounted for about 63%

### IoT M&A overview

<table>
<thead>
<tr>
<th>Year</th>
<th>Deal value (RMB in billions)</th>
<th>Deal volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>2017</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>2018</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>2019</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>

### M&A overview of IoT by investor type

<table>
<thead>
<tr>
<th>Year</th>
<th>Proportion of Deal value</th>
<th>Deal volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>21%</td>
<td>13%</td>
</tr>
<tr>
<td>2017</td>
<td>17%</td>
<td>15%</td>
</tr>
<tr>
<td>2018</td>
<td>19%</td>
<td>9%</td>
</tr>
<tr>
<td>2019</td>
<td>21%</td>
<td>14%</td>
</tr>
</tbody>
</table>

### M&A deals of IoT by region in China

<table>
<thead>
<tr>
<th>Region</th>
<th>Deal value (RMB in billions)</th>
<th>Deal volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guangdong</td>
<td>14.0</td>
<td>2</td>
</tr>
<tr>
<td>Beijing</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>Zhejiang</td>
<td>2.8</td>
<td>3.1</td>
</tr>
<tr>
<td>Shanghai</td>
<td>3.1</td>
<td>6.3</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

Source: PEDATA, ChinaVenture, Mergermarket, Thomson Reuters, other deal information disclosed on the internet and PwC analysis
2020 outlook and insight
With the deployment of 5G networks, the procurement of telecom equipment has accelerated. The increasing demand and market size provides opportunities for M&A

- China telecom operators have been accelerating their 5G networks deployment and centralised procurement. On January 16, 2020, China Telecom officially announced the successful candidates (including Huawei and ZTE) in the bid for the centralised procurement of STN equipment construction projects for 2019-2020. The demand for the master devices will provide an opportunity for domestic manufacturers. Thus, the growth of the market size will provide opportunities for M&A transactions.

In 2020, telecom equipment suppliers will continue to be the most attractive segment in China’s telecom industry along with the construction of 5G networks

- From 2016 to 2019, telecom equipment was the most attractive segment in China’s telecom industry. Deal volume in this segment accounted for 36% in 2018, which rose to 49% in 2019.
- We estimate that with the growth of the demand side of telecom equipment, this segment will continue to be active in the coming year.

5G network construction is still in early stage, M&A market is expected to be dominated by strategic investments in 2020

- From 2016 to 2019, deals were dominated mainly by strategic investors. Cumulative deal volume of strategic investments was 82% higher than that of financial investments. As 5G construction in 2020 is still in early stage, we believe that strategic investors will still dominate M&A deals in the future, considering their plan to gain market shares.

- In March 2018, Lumentum announced the acquisition of Oclaro of USD1.8 billion. On November 8th in the same year, the passive optical device giant II-VI announced the acquisition of top active optical device company, Finisar, for USD3.2 billion. Optical devices, as the core devices of 5G communication equipment, became the key unit for strategic investors to plan industry integration in the upcoming 5G era.
- In addition, as 5G construction accelerates in China, the procurement of equipment by telecom operators will lead to an increase in capital investments, and in turn provide more opportunities for strategic investments.

The COVID-19 outbreak will slow down M&A activities in the short term, but the M&A market is expected to recover after the epidemic dies out

- The target companies in the telecom equipment sector have spread across China historically. Due to the COVID-19 outbreak, due diligence may only be performed through VDR and the field work are limited by government policy. Thus, we expect M&A activities to slow down before March 2020.
- However, the market outlook is optimistic with regards to activity in this segment in the long run. At the meeting of the Standing Committee of the Political Bureau of the CPC Central Committee held on March 4, 2020, government officials emphasized the need to speed up the construction of 5G networks and internet data centers. They also emphasized the importance of encouraging private investments. We predict that with the acceleration of 5G construction and the growth of market size, the demand for telecom equipment will require more capital expenditures. Thus, opportunities are expected to arise in the M&A market for this segment in the future.
With the commercialisation of 5G, telecom operators plan to accelerate their rhythm in 5G M&A market

- In 2H2019, with the preparation for 5G commercialisation, three China telecom operators have declared the establishment of 5G equity funds over RMB10 billion. On 6 September 2019, China Unicom stated at 5G Application Innovation Ecology Conference that it will set up a fund, led by itself, with an initial fund of 10 billion for 5G application investment. On 15 November 2019, China Mobile claimed at its global partner conference that it will lead an alliance to set up a 5G fund with RMB30 billion in the future. China Telecom established an equity fund of RMB10 billion in as early as 2017, managing assets worth over RMB100 billion. In 2020, telecom operators are expected to accelerate the pace of M&A in 5G field.

• In 2016, China Mobile started to expand its business scope through equity investments. The portfolio includes Xiaomi, iFlyTek, Ucloud and Channelst. The total investment amount has exceeded RMB100 billion, most of which were minority-equity investments.

• In June 2019, China Broadcasting Network became the fourth company holding the 5G license in mainland China. In November 2019, the number porting service was officially launched, leading to the increasingly intense competition among telecom operators. Cross-industry investments may become a main method of generating new business models in the future.

Considering more fierce competition for traditional telecom business, cross-industry acquisitions and business diversification may help with business growth for telecom operators in mainland China

- Before 2016, cross-industry acquisitions were rare among Chinese telecom operators. New business models usually generated internally, such as Best Pay setup by China Telecom and Migu Music created by China Mobile. The American telecom giants were actively making cross-industry acquisitions to expand their business in recent years. For example, AT & T, the largest telecom operator in the United States, acquired DirecTV for USD48.5 billion and Time Warner (media company) for USD85.4 billion in 2014 and 2018, respectively. Verizon, the second-largest US telecom operator, acquired AOL, a media platform, for USD4.4 billion in 2015. Later in 2017, Verizon acquired Yahoo for USD4.48 billion.

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• In terms of business models, services provided by the three major operators are highly homogeneous, and price competition is becoming increasingly fierce. New business models, such as B2B2X (consisting of B2B2B and B2B2C models), will help telecom operators to differentiate their products and service. Based on the B2B2X model, clients do not need to worry about the data costs when using cloud service or visiting media platform after purchasing a package from the telecom operator or cloud/media service providers. Telecom operators will gain revenue directly from customers or indirectly from third party cloud/media service providers under this model. Telecom operators can expand vertically in the market and create a win-win situation with third-party partners.

Thus, cross-industry acquisitions and business diversification may help with business growth for telecom operators in mainland China.
The commercialisation of mobile communication resale business may create more M&A opportunities

- The MIIT announced that the first batch including 15 pilot enterprises engaged in the mobile communication resale business were permitted to start formal commercialisation business from 1 May 2018. Prior to this announcement, a total of 42 private companies had obtained pilot qualification. In July 2018, the MIIT issued operating licenses to the first batch of 15 companies which contracted with China Unicom.

- According to the chairman of the China Communications Enterprise Association, as of the end of June 2019, the number of users of companies operating mobile communication resale business in China has exceeded 100 million. The rapid development of mobile resale business may create more M&A opportunities.

The COVID-19 outbreak may slow down M&A activities in the short term but the influence will not last long after the epidemic

- As mentioned on “The future M&A market of telecom equipment suppliers” section, business travel may be restricted to some extent currently, the investments of telecom operators may be affected by the inconvenient of remote communication. Therefore, the M&A activities in the first quarter of 2020 may slow down, but are expected to recover in the long run.
With the commercialisation of 5G, data usage has surged, stimulating IDC demand; M&A may become the way to expand for IDC companies

- With the commercialisation of 5G, data usage increased rapidly. According to the statistics of Lightcounting, Chinese DOU was 4GB/month/person in 2018, and the DOU for users who use 5G during 5G pilot in 2019 was 60GB/month/person. The growth in data usage will stimulate the demand for IDC. According to the statistics from the China Academy of Information and Communications Technology, as of October 2017, there were 1,417 IDC companies with licenses in China, among which three China telecom operators dominated the IDC market, accounting for 72% in total.

- Considering the regulations for IDC in first-tier cities are more restricted in the past two years, M&A is expected to become the main way to acquire both assets and customers for existing IDC companies.

The rapid growth of the cloud computing market size will attract more investors

- According to Gartner, the size of the cloud computing market is estimated to grow by about 30% for China’s market and 18% for the global market in 2020. The high growth rate of China’s cloud computing market size indicates a high potential market in cloud computing. According to the “2018 Chinese Enterprise Going Cloud Report” published by the Chinese Institute of Electronics, the number of Chinese companies that using cloud computing accounted for 30.8% in 2018, which was much lower compared with that of the US and Europe, showing great potential of cloud computing market in China.

- At the same time, the government policies have encouraged companies to use cloud computing. According to the MIIT’s “Guide to Promote the Implementation of Enterprises to the Cloud (2018-2020)”*, cloud computing will be widely promoted, and the MIIT estimated an increase of 1 million companies using the cloud computing in 2020.

- We believe that the increasing demand for cloud computing will accelerate the development of the cloud computing market and more investors will be attracted in the future.

The COVID-19 outbreak increased the demand for online education and telecommuting, making companies switch to online working and using cloud computing, resulting in the growth of IDC and cloud computing demand

- People may have to work or study from home temporarily due to the COVID-19 outbreak, resulting in the growing demand for IDC and cloud computing by these online service companies. For example, there were several system bugs took place in DingTalk (belongs to Alibaba) and WeChat Work (belongs to Tencent) at the beginning of COVID-19 outbreak in China, as online office communicating apps, resulting from the sudden rapid growth of traffic. As a result, they have to expand the capacity and memory of their servers to solve the problem.

- In the long run, the epidemic is expected to bring potential opportunities for IDC and cloud computing market. Enterprise users will realize the intelligence and reliability of cloud computing in this black swan event, while customer loyalty and habits will be enhanced following the epidemic given the prolonged online experience. Adopting cloud computing will be the trend after the end of COVID-19 outbreak and further increase the data usage. IDC and cloud computing market are expected to attract more investors in the future.
Huge potentials, especially in vertical industries, in IoT M&A market along with the commercialisation of 5G

- According to the "China Internet of Things Development Annual Report" issued by the China Economic Information Service in 2018, the market size of IoT had exceeded RMB1.2 trillion, and revenue from IoT business had increased by 72.9% over the previous years. According to the forecast by the MIIT, the market size of IoT in China is estimated to increase to RMB2 trillion in 2020. As for the global market, according to the data released by Gartner, the number of IoT devices worldwide is estimated to be 20.4 billion in 2020, and the terminal market size of the IoT will be USD2.93 trillion. The prospects for IoT market are promising.

- In terms of government policy, the guidance by the government and government support also help the acceleration of investments in the IoT market. On January 20, 2020, Wei Miao, the Minister of MIT, in his speech at the press conference, emphasized that the "blue ocean" brought by 5G is IoT and industrial internet. In March 2019, the MIT and the Ministry of Transportation agreed to accelerate the digital and intelligent transformation of highways, aiming to accelerate the information exchange speed among vehicles and real-time traffic situation by taking advantage of the high-speed, low-latency characteristics of 5G network. This collaboration will lead to the development of internet of vehicles, alongside the research in self-driving.

- The network layer is the key technology of the IoT, and the telecom technology is the key technology of the network layer. The great breakthrough of 5G in the telecom technology with higher speed, more links, lower latency, and higher controllability features will accelerate the development of the IoT industry, such as internet of vehicles, piloted aircraft, etc. From 2016 to 2019, the targets of M&A were mainly smart terminal applications and vertical application platforms. In 2020, the rapid development of IoT applications in vertical industries is expected to attract more investors and continue to be a hot spot for investors.

Strategic investors are expected to dominate IoT M&A market

- The total deal value of IoT in 2016 was approximately RMB13.5 billion, of which strategic investments accounted for 24% (lowest in the past four years). In 2019, the deal value of IoT segment was approximately RMB13.8 billion, of which strategic investments accounted for 63%.

- With the commercialisation of 5G, large companies in China's telecom industry have been paying more attention to the IoT market when making strategic plans. For example, in January 2020, Volvo and China Unicom announced the set-up of a joint innovation laboratory as part of their strategic cooperation, for the purpose of R&D of 5G and V2X technologies in automobiles. In the same month, at the end-to-end ecological cooperation promotion conference held by China Telecom, the executives of China Telecom stated that they will be working on developing the intelligent IoT market and using 5G technology to empower other industries. The attention from large companies will bring more opportunities in the IoT M&A market.

COVID-19 outbreak may bring M&A opportunities in WIT120

- In recent years, the growth of the IoT was generated mainly from the growth of smart home and remote monitoring. Meanwhile, influenced by the COVID-19, WIT120 may bring about new M&A opportunities for the IoT.

- After the COVID-19 outbreak, according to The Guardian, in order to avoid infection risks of medical staff when treating infected patients, a medical center in Washington treated the first infected patient in the US using robots with cutting edge IoT technologies. The COVID-19 outbreak may increase the demand for not only smart medical devices in hospitals, but also wearable medical devices.
Data collection methods and disclaimers

The data in this report and press release may differ from those in previous press releases. There are three main reasons: when the deal is finalized or completed, the PEdata Database and Thomson Reuters regularly update their historical data; PwC excluded deals that were not, in essence, a transfer of control but closer to an internal restructuring; PwC’s previous data came from a different source.

Transactions include:

- Change of control resulting from acquisition of listed and unlisted companies
- Investments in listed and unlisted companies (an at least 5% ownership)
- Company merger
- Leveraged buyouts, management buyouts, management sales
- Privatization of enterprises
- Offer
- Spin-off
- Splitting of wholly owned subsidiaries through listing
- The divestment of companies, departments and operating assets has led to changes in control rights at the parent company level
- A reverse takeover
- Re-capitalisation
- The joint venture was bought as a whole
- A joint venture
- Receivership or receivership and auction
- Tracking stock
- Delisting of listed companies

Transactions exclude:

- Real estate in a property/individual property
- Rumored deal
- The option to acquire additional equity issued without the acquisition of a 100% equity
- Purchase of the right to use trademark
- Land acquisition
- Fund market share raising
- The purchase of shares in a mutual fund
- In the process of non-enterprise privatization, shares of listed companies are repurchased or cancelled in the open market
- Balance sheet restructuring or internal restructuring
- Investment in new projects
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