香港

增持 *(此前为未评级)*

市场共识评级*:	买入 4	持有 0	沽出 0

前收盘价	HK$8.97
目标价	HK$11.91
此前目标价:	*HK$*
上升/下跌空间:	32.8%
CGI／市场共识:	-5.2%
路透股票代号:	1675.HK
彭博股票代号:	1675 HK
市值:	US$829.8m
	HK$6,510m
平均每日成交额:	US$0.52m
	HK$4.07m
目前发行在外股数:	713.8m
自由流通量:	23.1%

*来源：彭博

来源：彭博

股价表现

	1M	3M	12M
绝对表现 (%)	10.2	7.8	
相对表现 (%)	10	13.9	

主要股东 持股百分比

中信资本控股有限公司	30.0
田溯宁	16.0

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亚信科技

受惠 5G 投资增长

- 亚信科技是中国最大的电信软件提供商，在 BSS 市场占据主导地位。亚信科技在网络功能虚拟化方面已取得了突破，而 OSS 市场将带来巨大的增长动力。

- 汇兑收益/损失和股权激励费用等项目的影响预计将在 2019 年下半年和 2020 年明显减低。

- 亚信科技可利用其产品组合和与电信运营商的业务关系来发展其数据相关业务，这有助推动公司中长期的增长。

- 我们预计，在 2019-2021 年 5G 推出和企业领域需求增长期间，亚信科技的收入增长将加快。亚信科技现时的 2019 年预测市盈率为 18.9 倍，2020 年预测市盈率为 11.1 倍，与其他香港上市的 IT 服务股和 5G 硬件股相比，估值并不昂贵。我们首次覆盖亚信科技，给予「增持」评级，目标价为 11.91 港元，基于 15 倍 2020 年市盈率，这估值接近其上市 IT 服务同业的平均 2020 年市盈率 14 倍。

中国最大的业务支撑系统（BSS）供应商

亚信科技是业务和运营支撑系统市场的领导者。电信运营商相关业务占 19 年上半年营业额的 96.8％。公司在电信软件市场中占有 25％市场份额，领先于华为和中兴。

5G 推出将推动公司增长

在 5G 时代，非硬件公司将受益于系统升级和转型所产生的需求。5G 将需要网络功能虚拟化来提供新的功能和应用，例如网络切片，这将为电信非硬件行业提供商机。预计电信运营商将以多维模式收取 5G 资费。例如，它们可以通过数据速率/宽带、功能/网络切片或延迟时间来收取 5G 资费。这些新解决方案将为电信非硬件行业提供巨大机遇。亚信科技在网络功能虚拟化方面取得了突破，公司很可能将进入运营支撑系统（OSS）领域。预计亚信科技将保持在 BSS 领域的领先地位，而 OSS 相关业务将为盈利带来额外增长空间。

非电信业务

亚信科技拥有强大的数据分析能力，并拥有 100 多种行业数据挖掘计算方法和模型，同时亦对运营环境和客户业务重点有深入了解，这些都有助公司为不同行业的客户提供 SaaS 场景驱动的运营服务。亚信科技正致力推进国企客户的复杂和大型的项目，这些项目具有较高的准入门槛和较低的信用风险。2018 年，亚信科技的数据驱动运营服务收入为 8,250 万元人民币，是 2017 年的两倍。数据驱动服务 2019 年上半年营业额同比增长 104.6％。

首次覆盖，目标价 11.91 港元

我们预计，由于 5G 推出以及企业领域需求增长，亚信科技的收入增长将在 2019-2021 年加快。亚信科技的 2019 年市盈率为 18.9 倍，2020 年市盈率为 11.1 倍，与香港上市的其他 IT 服务股和 5G 硬件股相比，其估值并不昂贵。我们首次覆盖亚信，给予「增持」评级，目标价 11.91 港元，基于 15 倍 2020 年市盈率，与上市同业的平均水平相若。主要的投资风险来自较高的行业集中度、运营商合并交易和私隐相关法规。

主要财务指标	Dec-17A	Dec-18A	Dec-19F	Dec-20F	Dec-21F
收入（百万人民币）	4,948	5,211	5,841	6,883	8,083
经营 EBITDA (百万人民币)	428	612	717	849	1,001
净利润（百万人民币）	328.8	202.9	309.3	527.7	675.6
每股核心盈利（人民币）	0.60	0.39	0.43	0.73	0.93
每股核心盈利增长	305%	(36%)	11%	69%	28%
全面摊薄市盈率(倍)	13.45	21.02	18.87	11.14	8.70
每股派息(人民币)	0.00	0.00	0.17	0.22	0.28
股息率	0.00%	0.00%	2.10%	2.69%	3.45%
EV/EBITDA (倍)	11.19	8.15	7.02	5.60	4.47
股价/股权自由现金流(倍)	NA	NA	NA	10.08	11.80
净负债权益比	(7.9%)	(12.0%)	(20.9%)	(27.0%)	(30.0%)
市净率(倍)	1.68	1.79	1.66	1.49	1.32
股本回报率	13.5%	8.3%	9.1%	14.1%	16.1%
每股核心盈利预测的变动					
每股核心盈利/市场共识每股盈利(倍)			0.55	0.85	1.02

来源：中国银河国际证券研究部，公司，彭博

Hong Kong

ADD *(previously NOT RATED)*

Consensus ratings*:	Buy 4	Hold 0 Sell 0

Current price:	HK$8.97
Target price:	HK$11.91
Previous target:	*HK$*
Up/downside:	32.8%
CGI / Consensus:	-5.2%
Reuters:	1675.HK
Bloomberg:	1675 HK
Market cap:	US$829.8m
	HK$6,510m
Average daily turnover:	US$0.52m
	HK$4.07m
Current shares o/s:	713.8m
Free float:	23.1%

*Source: Bloomberg

Source: Bloomberg

Price performance	*1M*	*3M*	*12M*
Absolute (%)	10.2	7.8	
Relative (%)	10	13.9	

Major shareholders	% held
CITIC Capital	30.0
Dr. Tian Suning	16.0

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AsiaInfo Technologies

Beneficiary of 5G investment

- AsiaInfo Technologies (AsiaInfo) is the largest telecom software provider in China, with a dominant market share in the BSS segment. AsiaInfo has achieved breakthroughs in network function virtualization, and the OSS segment offers huge growth opportunities.

- The impact of reconciliation items, such as FX and share-based compensation, is expected to fall significantly in 2H19F and 2020F.

- AsiaInfo can leverage its product portfolio and business relationships with telecom operators to develop its data-driven business, which should create medium- to long-term growth for the Company.

- We expect AsiaInfo's top-line growth to accelerate in 2019F–2021F during the 5G roll-out and increasing demand from the enterprise segment. AsiaInfo is trading at 18.9x 2019F P/E and 11.1x 2020F P/E, which doesn't look expensive compared with other HK-listed IT services names and 5G hardware names. We initiate coverage on AsiaInfo with an ADD rating and a target price of HK$11.91, based on 15x 2020F P/E, which is in line with the average of 14x 2020F for its listed IT services peers.

Largest business support systems (BSS) provider in China

AsiaInfo is a leading player in business and operations support systems. Telecom operator-related business accounted for 96.8% of its turnover in 1H19. The Company has a 25% market share in the telecom software market, ahead of Huawei and ZTE.

5G roll-out to drive growth

In the 5G era, non-hardware companies will benefit from demand for systems upgrades and transformation. Network functions virtualization will be required in 5G to provide new functions and applications, such as network slicing, which will provide an opportunity for the telecom non-hardware industry. Telecom operators are expected to charge 5G tariffs in a multi-dimensional mode. These new solutions under 5G will provide the telecom non-hardware industry with substantial opportunities to expand the scope and scale of its engagements. AsiaInfo achieved a breakthrough in network functions virtualization (NFV), and the Company is likely to break into the operations support systems (OSS) segment. AsiaInfo should maintain its leading position in the BSS segment, and OSS-related business opportunities offer upside. We forecast that AsiaInfo's operators business will grow at a CAGR of 14.3% in 2018–2021F.

Non-telecom segment

AsiaInfo has leveraged its strong data analyzing capability, with over 100 industry data mining calculation methods and models, as well as its in-depth understanding of the operating environment and key points of its customers' business, to provide Software as a Service (SaaS) scenario-driven operation services to customers in different industries. AsiaInfo is concentrating on sophisticated, large-scale projects for SOEs, which have high entry barriers and low credit risk. In 2018, AsiaInfo's data-driven operation services reported revenue of Rmb82.5m, double that of 2017. Data-driven services reported 104.6% yoy growth in turnover in 1H19.

Initiate with ADD and a target price of HK$11.91

We expect AsiaInfo's top-line growth to accelerate in 2019F–2021F because of the 5G roll-out and increasing demand from the enterprise segment. AsiaInfo is trading at 18.9x 2019F PER and 11.1x 2020 PER, which doesn't look expensive compared with other HK-listed IT services names and 5G hardware names. We initiate coverage on AsiaInfo with an ADD rating and a target price of HK$11.91, based on 15x 2020F P/E, which is in line with the average of its listed peers. Key investment risks include industry concentration, operator mergers and privacy regulations.

Financial Summary	Dec-17A	Dec-18A	Dec-19F	Dec-20F	Dec-21F
Revenue (Rmbm)	4,948	5,211	5,841	6,883	8,083
Operating EBITDA (Rmbm)	428	612	717	849	1,001
Net Profit (Rmbm)	328.8	202.9	309.3	527.7	675.6
Normalised EPS (Rmb)	0.60	0.39	0.43	0.73	0.93
Normalised EPS Growth	305%	(36%)	11%	69%	28%
FD Normalised P/E (x)	13.45	21.02	18.87	11.14	8.70
DPS (Rmb)	0.00	0.00	0.17	0.22	0.28
Dividend Yield	0.00%	0.00%	2.10%	2.69%	3.45%
EV/EBITDA (x)	11.19	8.15	7.02	5.60	4.47
P/FCFE (x)	NA	NA	NA	10.08	11.80
Net Gearing	(7.9%)	(12.0%)	(20.9%)	(27.0%)	(30.0%)
P/BV (x)	1.68	1.79	1.66	1.49	1.32
ROE	13.5%	8.3%	9.1%	14.1%	16.1%
% Change In Normalised EPS Estimates					
Normalised EPS/consensus EPS (x)			0.55	0.85	1.02

SOURCES: CGIS RESEARCH, COMPANY DATA, BLOOMBERG

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Investment Positives

Largest Provider of Telecom Software Products in China

AsiaInfo is the largest provider of telecom software products and related services in China. According to Frost & Sullivan, AsiaInfo is the largest telecom software product and related services provider in China, with a market share of 25.3% as measured by revenue in 2017, and the largest provider of BSS software products and related services in the telecom industry in China, with a market share of 50.0% as measured by revenue in 2017.

Telecom operators in China require highly specialized, reliable and scalable software products to support the world's largest subscriber population across online and offline channels in real-time, which only a few suppliers in China can provide. Having collaborated with China Telecom since 1995 and China Mobile and China Unicom since 1999, and having actively participated in the formulation of every generation of their BSS/OSS system technical standards, AsiaInfo has developed deep insights into their business and operational needs over the years, which has enabled it to develop an extensive portfolio of over 500 software products.

Its leadership position in the technologically demanding telecom software product and related services market has also facilitated its expansion into the non-telecom enterprise software market, addressing similar needs of large enterprises in business transformation and digitalization.

Long-Term Customer Relationships and a Loyal Customer Base

AsiaInfo's software products and services primarily target Chinese telecom operators and large enterprises. Over the past two decades, AsiaInfo has introduced a large number of large-scale, sophisticated and specifications-intensive software systems to its customers' satisfaction, through which AsiaInfo has accumulated deep industry understanding and expensive project management skills and technological competencies, while establishing high entry barriers. As at June 30, 2019, AsiaInfo had built a large nationwide customer base, comprising primarily 225 telecom operators and 43 large enterprise customers in the cable TV, postal and financial services sectors, with whom AsiaInfo negotiates and enters into contracts individually and direct.

As the software systems using AsiaInfo's products are critical elements in the day-to-day operations of AsiaInfo's customers, they generally prefer to maintain the continuity and compatibility of these systems and minimize the risks and costs related to integrating disparate systems from multiple vendors, resulting in high customer stickiness. AsiaInfo's customers have demonstrated strong reliance on AsiaInfo's products and services, which is evidenced by:

- AsiaInfo's high customer retention rate, which was over 90% for all customers and 99% for its telecom operator and large enterprise customers in 2015, 2016, 2017, 2018 and 1H19; and

- the long-term framework cooperation agreements AsiaInfo has entered into with a number of telecom operator and large enterprise customers, which have designated AsiaInfo as their preferred provider of BSS/OSS systems.

In addition, AsiaInfo's established relationships with its customers have favourably positioned it to address their additional software needs, creating opportunities for cross-selling and up-selling. For example:

- Once a system using AsiaInfo's software products is launched, AsiaInfo is typically engaged by the customer to provide ongoing operation and maintenance services to ensure the stable functioning of the system. This broadens AsiaInfo's revenue streams and allows it to remain in close contact with its customers and to secure more and higher-value engagements as its relationship with its customers matures over time.

- The software systems deploying AsiaInfo's products require regular upgrades and expansion to enhance performance, stability and security in line with the growth of customers' business, generating repeat purchases. In addition, AsiaInfo is poised to participate in its customers' ongoing business transformation and digitalization, and has developed next-generation software products for China Mobile, China Unicom and China Telecom to consolidate their disparate systems and migrate to cloud and future technology compliant IT platforms, while maintaining business and operational continuity throughout the transition. For example, as at June 30, 2018, AsiaInfo had been engaged by 19 of China Mobile's provincial companies and five specialized companies to transform their legacy IT systems, following China Mobile's newly adopted Third-Generation Business Support System General Architecture Specifications.

- AsiaInfo's software products and services are also well suited to meet additional needs and demands created within its existing telecom operator customers' organizations. In recent years, China Mobile, China Unicom and China Telecom have established specialized companies and divisions focusing on specific operational areas or customer groups (such as their government and enterprise customers, which have higher purchasing power and require more specialized services than other end users). AsiaInfo has developed various software products targeting these newly established specialized companies and divisions, such as the Government and Enterprise Customers Self-Service Platform for the government and enterprise business division of China Telecom's Jiangsu subsidiary in November 2015.

- AsiaInfo's established relationship with its customers also provides it with opportunities to expand its cooperation with them and diversify both AsiaInfo and its customers' revenue streams. Leveraging its industry expertise, in recent years, AsiaInfo has provided data-driven operation services for telecom operators and their government and enterprise customers through data-driven operation platforms under a pay-as-a-result model.

The reputation and leading stature of AsiaInfo's customers in their respective industries have also served as strong references that can be leveraged to market AsiaInfo's software products and services to an increasing number of customers in other industries. For example, in 2016, AsiaInfo developed the CITIC cloud big-data platform for CITIC Industrial Cloud Co., Ltd. (a wholly-owned subsidiary of China CITIC Group Corporation Ltd.), and in 2017, it developed the integrated CRM system for China Post, the state-owned enterprise operating the official postal service of China.

AsiaInfo's longstanding strategic relationship with this large and loyal telecom and large enterprise customer base will continue to favourably position AsiaInfo as their preferred partner in addressing their future needs in terms of system optimization and digital transformation, and enable AsiaInfo to build strong references as it continues to expand its customer base.

Industry-Leading R&D Capabilities and a Full-Spectrum, Highly-Specialized, Continuously Innovated Product Portfolio

AsiaInfo's industry-leading R&D capabilities and full-spectrum, highly specialized, continuously innovated product portfolio allow it to address the business needs of Chinese telecom operators and large enterprises and effectively differentiate AsiaInfo from its competitors.

AsiaInfo's industry-leading R&D capabilities are one of its core competitive advantages and will continue to effectively set it apart from its competitors. Over the past two decades, AsiaInfo has built a large portfolio of advanced proprietary technologies, such as real-time data processing and distributed computing, and it is receptive to the application of technologies such as dockers and microservices in its products. These technological advances have enabled AsiaInfo to launch a wide variety of highly specialized software products that consistently meet customers' increasingly complex business and operational needs and help deliver some of the world's largest telecom software projects. To stay abreast of the latest industry trends and developments, AsiaInfo has invested in the integration of various new technologies, such as AI, machine learning and deep learning, IoT and SDN/NFV, into its software products.

AsiaInfo conducts centralized R&D at its product R&D centre, building an extensive knowledge base of core assets that can be shared among business divisions. This centralized R&D has enabled AsiaInfo to develop highly specialized, reliable and scalable software products quickly and cost-effectively. AsiaInfo's R&D at the business division level focuses on customer-driven customization.

AsiaInfo has developed a full-spectrum of highly-specialized, continuously innovated software products. These products are purpose-built to address the most prevalent business challenges throughout a telecom operator's or large enterprise customer's lifecycle, including rapid service launch, agile order management, and efficient user acquisition and retention, providing vital connections between its customers and their end users.

Full-Spectrum. With a full-spectrum of over 500 software products, AsiaInfo can provide products that either add specific features and capabilities to upgrade a customer's existing systems as its business evolves, or build new systems with local, provincial or nationwide coverage from the ground up. This flexibility enables its customers to engage AsiaInfo at any stage of their customer lifecycle, such as introducing their first offerings to market, scaling for growth and transforming their entire operations, which eliminates the costs and risks of integrating disparate software products from multiple vendors.

Highly Specialized. Compared to smaller entities with more basic business needs, telecom operators and large enterprises in China require carrier-grade software products and highly-flexible services from leading providers that can support the world's largest population and a massive amount of transactions and data across online and offline channels in real-time, which only a few suppliers in China can provide. AsiaInfo's software products are designed to be high-performance, highly specialized, scalable and reliable. Powered by real-time data processing technologies, AsiaInfo's products can support a massive number of end users nationwide on a real-time basis across online and offline channels and handle a high volume of requests. AsiaInfo's products are designed with high-availability, disaster-recovery features, which enable fast recovery and effectively prevent data loss in the event of system downtime, ensuring business continuity.

Continuously Innovated. AsiaInfo's products undergo continuous innovation in response to emerging technologies and market trends. For example, along with telecom operators' rapid transition toward more centralized, cost-effective operations, AsiaInfo has designed its software products using the multi-layer, cloud-enabled model, and has helped China Mobile, China Unicom and China Telecom move certain aspects of their BSS/OSS systems to the cloud, which can be accessed by provincial networks, achieving centralized management of resources and significant cost savings. AsiaInfo has also launched IoV platforms for automobiles and automotive parts manufacturers and car-sharing service providers, including one of the largest IoV platforms in China in terms of the number of smart terminals supported, which enable vehicle status monitoring, route planning, fleet management and integration with third-party products and services such as location-based services.

AsiaInfo's strong R&D capabilities and the full spectrum of highly specialized, continuously innovated products will serve as a sustainable competitive differentiator for AsiaInfo and keep both AsiaInfo and its customers at the forefront of the industry. As the customers continue to reinvent their business models and end user experience to adapt to the digital world and expand their range of services, AsiaInfo remains their trusted technology partner on the path to a 5G, next-generation architecture.

End-to-End Professional Deployment Service Capabilities, Custom Development Service Capabilities, and High-Quality Onsite Services to Rapidly Meet Customer Demand

To meet the comprehensive, complex, continuously evolving, high-performance business needs of customers and ensure the successful delivery of large-scale software systems, AsiaInfo delivers its products through the on-premise, project-based delivery model, accompanied by end-to-end professional deployment services. By taking responsibility for the entire project development process with high-quality onsite services, AsiaInfo helps its customers achieve time-to-market advantages.

Dedicated teams and end-to-end professional deployment services. To meet the varied business and operational needs of its customers, AsiaInfo has formed dedicated business divisions targeting each of its customer groups: China Mobile, China Unicom, China Telecom, cable and media service providers, and other enterprise customers. Each division has its own R&D, sales & marketing, project delivery, quality assurance, and operation & maintenance personnel, with in-depth knowledge of their respective target markets and customer groups. Supported by its centralized R&D, consulting, quality assurance and in-house teams, providing other core capabilities, these business divisions interact directly with their respective customer groups and focus on designing, developing, and deploying products and services tailored to its customers' specific business and operational needs. For each project, AsiaInfo assembles a dedicated project development team within the relevant business division, whose composition is tailored to specific customer needs and requirements, to provide end-to-end professional deployment services throughout the project development process, including demand analysis, project design and planning, software development and sourcing, system installation and launch, and trial operation and acceptance, to rapidly meet customer demand.

Custom development service capabilities. As a critical component of its end-to-end, professional deployment services, its project development team works closely with its customers onsite in demand analysis, project design and planning and custom development. For example, the project development teams

conduct a comprehensive assessment of the customer's existing IT and network environment, and business and operational needs, and based on this, they customize AsiaInfo's products to the customer's individual requirements, growth strategy and budget. AsiaInfo's custom development service capabilities enable it to deliver software products and services tailored to the specific standards and requirements of the respective customer groups, helping it build strong customer relationships.

High-standard onsite services, localized support and fast response time. AsiaInfo's services extend beyond initial deployment. Once a system using AsiaInfo's products is launched, AsiaInfo is typically engaged to provide ongoing operation and maintenance services for the system, including 24/7 system diagnosis, troubleshooting and support, and maintaining a dedicated service hotline that responds to service requests within a prescribed time frame to minimize disruption to its customers' business operations. These services are provided by a dedicated operation and maintenance team based either on the customer's premises or at one of AsiaInfo's regional offices in close proximity to the customer. The Company has 127 regional offices in close proximity to its customers across 28 provinces, municipalities and autonomous regions. As part of its operations and maintenance services, the dedicated operations and maintenance team also monitors the performance of the installed system to proactively identify potential issues and risks, based on which AsiaInfo periodically releases new product version, features and functionalities to optimize system performance and respond to its customers' evolving business needs. In the six months ended June 30, 2018, AsiaInfo released an average of two to three key features or upgrades per month for its telecom operator customers.

AsiaInfo's end-to-end professional deployment services have enabled it to build close relationships with its customers.

Data-driven Operation Capabilities Powered by AI, Machine Learning, Big Data and Other Technologies to Increase Customer Value

In recent years, AsiaInfo has provided comprehensive data-driven operation services to telecom operators and their government and enterprise customers through data-driven operation platforms under a pay-as-a-result model. These services, ranging from real-time, in-depth analysis of user purchasing and consumption patterns, characteristics and lifecycles, to design and implementation of marketing campaigns and management activities, are designed to help telecom operators and their government and enterprise customers more comprehensively and accurately analyze market developments and customer trends, ultimately increasing their sales, operational efficiency and customer value.

AsiaInfo is favourably positioned to provide data-driven operation services to telecom operators and their government and enterprise customers, leveraging the extensive technical capabilities and industry insights AsiaInfo has accumulated over years of collaboration with telecom operators. With hundreds of in-house developed, big-data based models and algorithms that have been widely applied in various operational scenarios and continuously improved and upgraded, as well as emerging technologies, such as AI and machine learning, and telecom operators' existing big data capabilities, AsiaInfo's data-driven operation services enable intelligent application of data across departments and domains and more effective data monetization, while allowing AsiaInfo to explore new cooperation opportunities with telecom operators and diversify revenue streams for both parties, achieving a win-win situation.

For example, AsiaInfo has built a data-driven operation platform for China Mobile's Beijing subsidiary and has been providing data-driven operation services to one of its government and enterprise customers in the public security sector through this platform, primarily including (i) real-time analysis of population distribution, mobility and clustering patterns within the district, and (ii) real-time analysis of major traffic hubs and tourist attractions' passenger flow during the holidays. These services effectively strengthen the government and enterprise customers' capabilities in analysis, aggregation and visualization of massive amounts of resident data, improve their operational efficiency, and achieve cost savings. For example, when governments use AsiaInfo's data-driven operation services, they now receive over 30 types of up-to-date demographics statistics of the entire district every 10 minutes, which eliminates the need to conduct annual household surveys to obtain the district's demographics statistics.

AsiaInfo built a data-driven operation platform for China Mobile's Yunnan subsidiary and has been providing data-driven operation services through this platform, which enable China Mobile's Yunnan subsidiary to conduct precise marketing through its online and offline sales channels, provide more personalized product and service recommendations to users, and increase its sales, operating efficiency and market share. AsiaInfo also built a data-driven operations platform for China Unicom's Tianjin branch, and has been providing data-driven operation services through this platform, including WeChat Store basic inquiry, payment and processing services, matrix management of multiple WeChat official accounts, message template publication, marketing event management, data analysis and operational support. These services are designed to make WeChat a major online sales channel of China Unicom's Tianjin branch by increasing its WeChat official accounts' subscriber number and activity level and number of transactions. After it started using AsiaInfo's data-driven operation services, China Unicom Tianjin branch's WeChat official accounts' number of new subscribers in the fourth quarter of 2017 increased by 180% compared to the same period in 2016.

AsiaInfo's innovative data-driven operation services will continue to strengthen its relationships with telecom operators, diversify revenue streams for both parties, and differentiate AsiaInfo from its competitors.

Business

Figure 1: Business matrix of AsiaInfo

Business	Product lines	Major product categories	Descriptions
Software Business	Software products and related services	CRM products	Customer relationship management (CRM) products are widely implemented for managing an enterprise's interactions with existing and potential end users. These products help enterprises conduct a comprehensive analysis of the needs and preferences of their end users, enabling them to improve the efficiency of their sales, marketing and customer service, to attract, serve and retain end users, to build stronger customer relationships, and to increase value for their end users.
		Charging and billing products	Charging and billing products are essential components of BSS/OSS systems and are widely used by enterprises to monetize services ranging from traditional telecom to modern digital services.
		Big data products	AsiaInfo's big data products collect, process and analyze massive amounts of data scattered across many different online and offline channels in real time, and help customers extract value and intelligence from these data to make more informed business decisions, better serve end users, promote products and services, design products, services and business processes, and reduce risk.
		Other products	N/A
	Data-driven operation services (or operations products)	Smart Sharing	Data-driven operation platform products that enable real-time analysis of demographics statistics, abnormal event monitoring, financial statistics analysis and emergency response services, and other functionalities.
		Smart Operations	Support scenario-based marketing, enable users to quickly design and implement marketing campaigns through a user-friendly web interface, and improve the operating efficiency of sales staff and sales channels.
		Smart Store	Enables retail operations to use data-mining technologies.
		Smart Info	Supports complete WeChat integration for the business of telecom operators and enterprises to provide various digital services to end users, such as inquiry, payment, processing and redemptions.
		Smart Connection	Enables Internet of Vehicles data monetization, including establishing connections between vehicles and the internet, connects enterprises and customers, and customers and services, closing the loop of the Internet of Vehicles ecosystem.
	Others	Procurement of third-party hardware and software	The systems deploying AsiaInfo's software products typically use a variety of third-party hardware (such as servers) and software (such as database and middleware software), which are primarily sourced by the customers, and in a few cases, by AsiaInfo. In such cases, AsiaInfo customarily provides its customers with 1–2-year warranties for this third-party hardware and software, and will try to arrange back-to-back warranties with third-party hardware and software vendors to reduce risk.
		System integration services	N/A
		Business consulting services	AsiaInfo provides business consulting services pursuant to consulting service agreements that AsiaInfo enters into with telecom operators and large enterprises, with a term of 2–24 months. In the process of providing business consulting services, AsiaInfo can accurately assess the customer's medium- to long-term business trends, business challenges and specific business needs, which allows AsiaInfo to promote products and services that are best aligned with their growth strategies when appropriate.
		Corporate training	N/A
Network Security Business	N/A	N/A.	N/A

SOURCES: CGIS RESEARCH, COMPANY DATA

1) Software Business

AsiaInfo's software business refers to (i) the provision of mission-critical, carrier-grade software products and related deployment services, and (ii) the provision of ongoing O&M services (operation and maintenance services).

a) Software products and related services

AisaInfo offers an extensive portfolio of over 500 software products, ranging from CRM, charging and billing, and big data to IoT and intelligent network products, which can be deployed individually or as a suite, enabling its customers to quickly and cost-effectively upgrade, optimize or transform their

business and operation architecture. The products are high-performance, highly specialized and continuously innovated, and are designed to address the increasingly complex, mission-critical business and operational needs of telecom operators and large enterprises, serving as vital connections between telecom operators and their end users.

The Company delivers the software products using the project-based, on-premises delivery model, accompanied by a comprehensive set of end-to-end, professional deployment services, including a) demand analysis, b) project design and planning, c) software development and sourcing, d) system installation and launch, and e) trial operation and acceptance, which integrates the software products with its customers' existing IT and network infrastructure to maximize the value of the products. AsiaInfo's products can either add specific capabilities to upgrade a customer's existing systems as its business evolves or build new systems with local, provincial or nationwide coverage from the ground up. This flexibility enables customers to engage the AsiaInfo at any stage of their lifecycle. When a system is launched, customers typically engage AsiaInfo to provide ongoing O&M services to ensure the stable functioning of the system.

- **CRM products.** AsiaInfo's CRM products provide comprehensive functionalities, covering an enterprise's full customer lifecycle (e.g. user profile management, order management and campaign management), helping customers provide high-quality, fully-integrated customer services to end users at every point of interaction, from retail stores, call centres and websites to mobile apps and social media platforms.

Figure 2: Details of AsiaInfo's CRM products		
Major product categories	**Functionalities**	**Key products**
Customer services and products	▪ Supports a broad range of customer services (including, among others, voice services, multi-media messaging services and Internet services) and both the active and passive service models ▪ Its customer service centre product supports tens of thousands of call centre consoles and centralized PC access, decentralized mobile access, home access and other access methods	• Nine o'clock Super Care Product • Knowledge Base System
Campaign management products	▪ Helps enterprises more efficiently organize their business operations and campaign activities, drive end user participation and achieve cross selling ▪ Helps enterprises create a brand new marketing model powered by AsiaInfo's campaign management products' brand marketing, customer-relation marketing and data marketing capabilities, which enables integrated advertisement, sales, marketing, promotion and public relations activities, improves sales and marketing efficiency, and enhances end-user satisfaction, brand influence and media attention	• Marketing Support Platform • Grid Marketing Management Platform • Network-wide Care Platform • Integrated Operation Platform • Enterprise Customer Sales Center
Channel management products	▪ To meet the 24/7 shopping needs of consumers, AsiaInfo's channel management products handle all types of services across all channels (including offline channels, e-commerce channels and mobile e-commerce channels) in a smart manner ▪ AsiaInfo's channel management products are consumer centric and take a holistic view of consumers, products, time and location to provide personalized services and enhance the customer experience, which in turn, helps enterprises improve operating efficiency	• Self & Social Channel Management System • Channel Consumption Management Platform • Channel Lifecycle Management Product • Star-rating Management System
E-channel products	▪ Help enterprises build integrated operations ▪ Platforms for all online and offline channels, integrating supply and demand across the supply chain (including suppliers and consumers) ▪ Enhance channel efficiency, lower customer service costs, and provide end users with a one-stop-shopping experience	• Online Self-Service Center • Distribution Platform— Platform Business Portal, Distributor Portal, Supplier Portal
Fundamental CRM products	▪ A suite of standardized products with universal business capabilities, which are developed based on telecom operator and large enterprise customers' common needs in the CRM area ▪ Help customers build up enterprise-grade CRM capabilities cost-efficiently and rapidly	• Order Center • Customer Center • Product Center • Activation Center • Marketing Resources Center
AIF Infrastructure platform products	▪ Basic frameworks support elastic computing ▪ Support the formulation of cloud-based architecture for application services and management of services	• Technology Foundations • IPU Mobile Application Development Platform • Application Foundations

SOURCES: CGIS RESEARCH, COMPANY DATA

▪ **Charging and billing products**. AsiaInfo offers a complete portfolio of charging and billing software products, providing all major charging and billing functions, including billing, rating, charging and settlement. These products enable real-time management of the charging and billing-related activities of all end users, regardless of user type (individual, family or business), payment method (prepaid, postpaid or hybrid), network technologies (fixed, IP or wireless) and service type (voice, data, messaging or video), providing valuable, consolidated customer insights. Its charging and billing products also feature a unified rating engine, which provides flexible pricing mechanisms and memory database technology, which supports complex rating and billing activities, enabling customers to offer innovative and personalized service bundles that attract new end users and build loyalty among existing end users.

Figure 3: Details of AsiaInfo's charging & billing products

Major product categories	Functionalities	Key products
Billing management products	▪ Support customer bill generation, electronic invoice generation and settlement management for third-party business partners	• Account Center • Payment Center • Settlement Center • Integrated Reporting System
Fundamental billing products	▪ Enable centralized management of all fundamental billing processes	• Cloud-based Billing Products • Convergent Billing Products
Accounting management and revenue assurance products	▪ Support business accounting management, product accounting management and revenue assurance	• Financial Data Center • Revenue Assurance System
Mediation and service provisioning products	▪ Enable mediation, pre-processing and monitoring of metadata and other billing sources ▪ Enable service provisioning and configuration of network resources	• Integrated Mediation System • Unified Provisioning System
Billing platform products	▪ Enable the formulation of cloud-based architecture for billing application services	• Billing Distributed Stream Framework Platform

SOURCES: CGIS RESEARCH, COMPANY DATA

▪ **Big data products.** AsiaInfo's big data products feature advanced analytics technical, algorithms and machine learning techniques, and enable real-time analysis, visualization and management of complex data, assisting customers in solving increasingly prevalent information-related challenges.

Figure 4: Details of AsiaInfo's big data products

Major product categories	Functionalities	Key products
Big data application products	▪ Applications powered by data convergence and data mining technologies improve enterprises' overall operating capabilities and efficiency ▪ Provide innovative big data application solutions that enable enterprises across industries to monetize data and transform business operations in a smarter manner	• Marketing Management Center • Intelligent Recommendation Center • Decision Support Center • Geographical Label Data Management Platform
Big data processing and management products	▪ Data-oriented management platforms covering the entire data lifecycle (planning, definition, model design, data development, data collection, data creation, data consumption, data filing and data retention) ▪ Build standardized, process-oriented, automated and integrated data management systems that enable integrated management of data, applications and systems, ensuring appropriate data structure, clear data organization, well-controlled process and rapid data accumulation ▪ Enable full-process, full lifecycle, 360 degree comprehensive data management	• Content Analysis Center • Tag Management Center • Data Governance Product • Data Security Center
Big data platform products	▪ Help enterprises build big data platforms adopting internationally accepted standards and industry standards and featuring unified open-source component databases and software tool databases ▪ Deliver core big data capabilities, including data channel establishment, data storage, machine learning and platform security, suitable for telecom operators and large enterprises' business operations	• Machine Learning Platform

SOURCES: CGIS RESEARCH, COMPANY DATA

▪ **Other products.** AsiaInfo offers a variety of other software products that address a broad spectrum of needs and specifications of telecom operators and large enterprises, spanning DevOps integrated

development and operation products, IoT products, and intelligent network products.

Figure 5: Details of AsiaInfo's other products		
Major product categories	Functionalities	Key products
DevOps integrated development and operation products	▪ Products that manage communication, cooperation and process among the software development, technical operations and quality assurance departments	• Software Lifecycle Management Products • Continuous Integration and Continuous Delivery Products • Automated Testing Products • Operation and Maintenance Optimization Products
IoT products	▪ Enable IoT industry applications and platform capabilities	• IoT Applications
Intelligent network products	▪ Support dynamic monitoring of virtual networks; use AI technologies to establish and train intelligent network optimization models and provide dynamic tuning functions to help customers prevent network failures, improve application experience, and enhance network operation quality ▪ Support dynamic monitoring, analysis and O&M management of business operation systems	• SDN/NFV Products • Business and Operation Network Management Products

SOURCES: CGIS RESEARCH, COMPANY DATA

b) Data-driven operation services

To explore new growth opportunities that diversify the revenue streams of both AsiaInfo and its customers, AsiaInfo provides comprehensive data-driven operation services to telecom operators and their government and enterprise customers through data-driven operation platforms under a pay-as-a-result model (i.e. payments are contingent on the results of the products provided or services rendered) to help them increase sales, operational efficiency and customer value. These services primarily include real-time, in-depth analysis of user purchasing and consumption patterns, characteristics and lifecycles, and the design and implementation of marketing campaigns and management activities.

AsiaInfo's management highlights that the Company deploys data-driven operation platforms on the private cloud of telecom operators and conducts data authority control and data security audits in strict compliance with the relevant laws, regulations, data security management protocols and processes to ensure the legality and security of user data privacy. AsiaInfo has taken various measures to ensure the security of its customers' user data it has access to during the provision of its data-driven operation services: a) AsiaInfo strictly complies with confidentiality clauses in its agreements with its customers; b) all of AsiaInfo's employees working on customers' premises sign confidentiality undertakings to keep confidential the personal information they have access to; c) all AsiaInfo employees sign confidentiality and non-compete undertakings that ensure that they will strictly adhere to the confidentiality policies of its customers when working on their premises; d) all user data are processed on its customers' premises or locations authorized by its customers; e) AsiaInfo desensitizes all user data it uses when providing data-driven operation services; and f) AsiaInfo strictly complies with data security-related laws and regulations, as well as telecom operators' data/information security protocols.

AsiaInfo has accumulated extensive technical capabilities and industry insights over years of collaboration with telecom operators. AsiaInfo has developed hundreds of big-data based models and algorithms, including cluster analysis, customers behaviour prediction, critical factor analysis and semantic recognition, which have been widely applied in various operational scenarios and continuously improved and upgraded. These advanced models and algorithms, combined with emerging technologies, including AI and machine learning, as well as telecom operators' existing big data capabilities, enable intelligent application of data across telecom operators' or their government and enterprise customers' various departments and domains.

AsiaInfo is also actively exploring collaboration opportunities with enterprise customers, such as automobile manufactures, in this area. In Aug 2018, AsiaInfo entered into a strategic cooperation agreement with China Merchants Bank Co., Ltd. to provide financial service sector-oriented data-driven operation services to China Merchants Bank, further expanding the enterprise customer base of AsiaInfo's data-driven operation services.

AsiaInfo provides data-driven operation services through data-driven operation platforms the company has developed according to telecom operators or their government and enterprise customers' operational or management needs. Telecom operators or their government and enterprise customers' staff can conveniently access AsiaInfo's data-driven operation services through a user-friendly web interface anytime, anywhere. AsiaInfo also provide onsite, 24/7 operational support when needed.

c) Others

AsiaInfo provides a variety of other services, including: a) procurement of third-party hardware and software for some of its projects; b) system integration services; c) business consulting services; and d) corporate training.

The systems deploying AsiaInfo's software products typically also use a variety of third-party hardware (such as servers) and software (such as database and middleware software). These third-party hardware and software are primarily sourced by customers, and in a few cases, by AsiaInfo. For projects for which AsiaInfo is responsible for sourcing third-party hardware and software, AsiaInfo purchases the hardware and software from third-party suppliers in accordance with AsiaInfo's customers' requirements and specifications. AsiaInfo enters into supply agreements with third-party hardware and software suppliers against back-to-back orders from its customers. These supply agreements, typically with a contract term of one year, provide for the third-party hardware or software to be provided, the contract price and payment terms, and so forth. The third-party hardware and software suppliers generally grant AsiaInfo credit terms of 90–180 days.

AsiaInfo provides comprehensive business consulting services. In the process of providing these services, AsiaInfo can accurately assess the customer's medium- to long-term business trends, business challenges and specific business needs, which allow AsiaInfo to promote products and services that are best aligned with their growth strategies when appropriate.

AsiaInfo provides business consulting services pursuant to consulting service agreements AsiaInfo enters into with telecom operators and large enterprises, whose term is generally 2–12 months. The contract price for AsiaInfo's consulting service agreements is typically a fixed amount based on the estimated costs to provide the business consulting services, calculated at the day or hourly rates of the relevant business consulting personnel. AsiaInfo generally requires a deposit upon signing the project development contracts, with the remaining contract price due upon completion of the project.

2) Network Security Business

In late 2015, AsiaInfo disposed of a subsidiary that carried out network security business. After the disposal, to accommodate its customers' needs, AsiaInfo kept doing network security business, but outsourced all tasks at the same price to the former subsidiary. The Company charged the former subsidiary service fees, which amounted to 2% of related contracts, which were offset against the cost of sales. Starting in 2018, the Company stopped signing new contracts for its network security business; all contracts for its network security business will be completed by the end of 2020F.

Operations

AsiaInfo delivers its products and services through an **on-premise, project-based delivery** model, and maintains a dedicated workforce under the **Business Division** scheme.

The Business divisions target different customer groups: a) China Mobile, b) China Unicom, c) China Telecom, d) cable and media service providers, e) enterprises requiring business consulting services, f) enterprises requiring data-driven operation services, and g) other enterprise customers. Each business division comprises its own R&D, sales, project delivery, quality assurance, and operation and maintenance personnel, who have extensive experience in software and IT, and are responsible for the design, development and delivery of products and services for its target customer groups. Various teams work together to provide core capabilities to ensure the successful delivery of the projects.

Figure 6: Main project teams in AsiaInfo

Team	Description
Pre-sales consulting teams (sales and solution consulting teams) (sales and marketing teams)	AsiaInfo's selling cycle typically begins with the generation of a sales lead through its sales efforts or word-of-mouth referrals. In addition to proactively seeking new customers, its sales and solution consulting teams maintain ongoing dialogue with existing customers to explore additional cooperation opportunities. The sales and solution consulting teams work together to provide comprehensive solution consulting services, which include assessing the customers' business needs, operational challenges and IT system capabilities, helping them formulate business plans, growth strategies and tailored IT solutions, and demonstrating the advantages of its products and services.
Project development teams	At the beginning of the project development process, a dedicated project development team is formed within the relevant business division, which typically includes a project manager and a specific number of R&D, sales, project delivery and quality assurance personnel. The composition of the project development team is tailored to the requirements of the customer and complexity of the project. The project development team works closely with the customer throughout the project development process to develop a detailed project design, outlining the project requirements and identifying a comprehensive set of scenarios that will ensure successful delivery.
Operation and maintenance teams	Once AsiaInfo is engaged by the customer to provide operation and maintenance services for the systems deploying its products after system launch, a dedicated operation and maintenance team is assembled to provide operation and maintenance support around the clock.
R&D teams	There is a centralized R&D team at product R&D center at AsiaInfo's headquarters (accounting for approximately a third of its total R&D personnel), which focuses on the centralized R&D of core products. The team builds an extensive knowledge base of core assets that can be shared among business divisions, including (i) key products, (ii) baseline products, (iii) universal components, and (iv) development and operation tools. The team undertakes forward-looking R&D of new technologies that align with its strategies, as well as quality management and quality assurance during the R&D process. There are also R&D teams at the business-division level focusing on specific projects, which are responsible for (i) conducting comprehensive assessment of the relevant customers' existing IT and network environment, and industry- and company-specific business challenges, objectives and opportunities for both the short and long term, which are then translated into customized products and services catering for customers' specific needs and demands, and (ii) developing products catering for customer needs for specific projects using the key products, universal platforms and tools centrally developed at headquarters, and supporting the delivery of products they develop in the context of specific projects.

SOURCES: CGIS RESEARCH, COMPANY DATA

Sales and Marketing

AsiaInfo acquires customers primarily through its in-house sales force. AsiaInfo has sales and marketing teams and regional offices at its key customers' locations to directly interact with existing and prospective customers to promote its products and services and establish long-term, stable business relationships, identify and gain new business from prospective customers, and initiate brand building and other company-level marketing efforts to increase market awareness of its brand, products and services.

AsiaInfo provides comprehensive pre-sales efforts, giving it significant insights into its customers' IT infrastructure construction and decision-making processes

with respect to its products and services. This allows AsiaInfo to keep pace with its customers' evolving demands and specifications and direct its R&D efforts and product roadmap accordingly, securing more and higher-value engagements as their businesses grow and the competitive landscape evolves.

Project Development Process

The project development process for AsiaInfo's software products and related services varies in length, typically ranging from 6 months to 2 years, and involves eight key stages. The project development process for AsiaInfo's data-driven operation services typically ranges between two weeks to six months, and involves four key stages.

Figure 7: Project development process of AsiaInfo

Software Products and Related Services	Data-driven Operation Services
Stage 1: Tender / negotiation (2–3 months) (a) The delivery of new software systems generally involves a tender process. (b) Projects for upgrade or expansion of existing software systems deploying AsiaInfo's software products are generally granted to AsiaInfo via bid negotiation.	**Stage 1: Initial assessment and onsite demonstration (1 day–1 month)** The project development process begins with an initial comprehensive assessment of the customer's business and operational needs, followed by an onsite demonstration of AsiaInfo's products and services.
Stage 2: Signing a project development contract AsiaInfo enters into a project development contract with the customer.	**Stage 2: Signing an operations support agreement (2 days–1 month)** AsiaInfo enters into an operations support agreement with the customer.
Stage 3: Demand analysis (1–2 months) AsiaInfo's project development team works with the customer to (i) understand the customer's industry- and company-specific business needs by helping the customer identify its key business concerns and the key capabilities that AsiaInfo's products are expected to deliver, and (ii) assess and analyze the strengths and weaknesses of the customer's existing IT and network infrastructure.	(The demand analysis of data-driven operation services is in Stage 1.)
Stage 4: Project design and planning (5 days–1 month) AsiaInfo's project development team creates a tailor-made project design and implementation plan. AsiaInfo may conduct further analysis on the functional needs and technical requirements of the customer in this stage.	**Stage 3: Customized development of the operations platform (6 days–2 months)** Based on the customer's specific needs and requirements, AsiaInfo adds specific features and functionalities to AsiaInfo's standardized operations products to customize a data-driven operation platform for the customer (regardless of whether the platforms are developed by AsiaInfo or not).
Stage 5: Software development and sourcing (1–6 months) AsiaInfo's project development team translates the software design into integrated codes to develop customized software products. New software products are generally developed by adding specified features or functionalities to the relevant product baseline. AsiaInfo is sometimes responsible for sourcing the relevant third-party hardware and software to be integrated into the system for the customer.	
Stage 6: System installation and launch (1–3 months) AsiaInfo installs the products on the customer's premises, deploys them into the customer's IT and network environment, and launches the system. Before the system is officially launched, AsiaInfo's project development team works alongside the customer to conduct user acceptance tests to make sure the installed system can handle required tasks in real-world scenarios according to specifications.	**Stage 4: Rendering data-driven operation services (6 days–2 months)** AsiaInfo provides ongoing data-driven operation services to the customer (or the customer's government and enterprise customers) through the new data-driven operations platform AsiaInfo develops, or through the customer's existing operations platform. Depending on the customer's needs, some of data-driven operation projects involve AsiaInfo forming dedicated data-driven operation teams providing onsite, 24/7 technical support to optimize the results of its data-driven operation services.
Stage 7: Trial operation and acceptance (3–6 months) After the system is launched, AsiaInfo coordinates with the customer to conduct the system's initial acceptance. Then the project enters the trial operation period, typically ranging from 3–6 months, while AsiaInfo focuses on resolving issues discovered during initial acceptance and continues to enhance and optimize the system. Upon the expiration of the trial operation period, the customer or a third-party acceptance agency appointed by the customer conducts final acceptance of the system.	
Stage 8: After-sales service (typically one year) and operation and maintenance services (ongoing) AsiaInfo provides a range of after-sales services to the customer, including (i) project training, and (ii) product warranties. In addition to product warranties, once a system is implemented, AsiaInfo is usually engaged by the customer to provide comprehensive ongoing operations and maintenance services pursuant a separate operation and maintenance service agreement.	

Pricing

The prices of AsiaInfo's software products and services are determined taking into consideration a number of factors, including, as applicable: (i) estimated project execution and delivery costs, (ii) estimated procurement costs for third-party hardware and software products (if applicable), (iii) the complexity of the projects and other factors, such as target customer groups, the customers' acceptable price range, and the prices of competing products and services.

For projects that involve a tender process, AsiaInfo also takes into consideration its competitors' prices in order to succeed in the tender process. Some contracts are determined based on bid negotiations between suppliers and their customers.

Tenders

Contracts for the delivery of new software systems generally involve a tender process, whereby potential suppliers are required to submit detailed bidding proposals in response to a tender offer. The tender offer typically sets out the technical requirements and specifications of the project, as well as other details, such as payment terms and delivery deadlines.

Once AsiaInfo receives the tender offer, AsiaInfo researches and analyzes the feasibility of the project. Various factors, including budget, pricing, project complexity and specifications, payment terms, timetable, competitive landscape and bidder requirements, such as industry experience and track record, are taken into account.

After feasibility studies are completed, AsiaInfo management considers whether a detailed bidding proposal should be prepared for the potential project, based on the results of the feasibility studies. If AsiaInfo decides to proceed with the tender, AsiaInfo formulates a preliminary project design plan, based on which the detailed bidding proposal is prepared and submitted.

It generally takes 2–3 months from the opening of the tender bids to the announcement of tender results. In 2015, 2016, 2017 and 1H18, approximately 20%, 23%, 25% and 22% of AsiaInfo's contracts with its customers went through a tender process, and the success rate of AsiaInfo's tender bids was approximately 96%, 94%, 96% and 91%, respectively.

Bid negotiation

Projects for O&M, upgrade or expansion of existing software systems deploying a supplier's software products are generally granted to the supplier via bid negotiation, instead of tender.

The bid negotiation process generally takes 2–3 months. Whether a project can be granted through tender or bid negotiation is ultimately determined by customers case by case in accordance with the relevant laws and regulations and their internal policies.

Project Development Contract and Operations Support Agreement

AsiaInfo enters into (1) project development contracts with its customers for the provision of its software products and related deployment services, which outline details of the project, and (2) one-year operational support agreements with its customers for its data-driven operation services, which outline the specific operations products, data-driven platforms and services to be provided, the composition of the dedicated project development team, and its rates and fees

for the products and services. The contracts and agreements are usually based on its customers' standardized form of agreements.

Figure 8: Key terms in the agreements between AsiaInfo and its customers

Software Products and Related Services' Project development contracts	Data-driven Operation Services
Duration. AsiaInfo's project development contracts generally have a term range from 6 months–2 years, on a case-by-case basis.	**Duration.** AsiaInfo's operational support agreements generally have a 1-year term and are renewable upon mutual agreement.
Scope of work. The project development contracts specify (i) AsiaInfo's responsibilities throughout the project development process, (ii) the software products to be developed, and (iii) the specified level of deployment services AsiaInfo will provide throughout the project development life cycle.	**Scope of work.** The operational support agreements specify (i) AsiaInfo's responsibilities throughout the contract period, (ii) the composition of AsiaInfo's project development teams, and (iii) the level and scope of data-driven operation services AsiaInfo will provide (for example, whether it will be developing new operations platforms or provide any onsite operational support).
	Performance targets. The agreements typically provide for monthly or quarterly performance targets, such as (i) number of new subscribers, (ii) number of transactions, and (iii) quality of onsite operational support services. Failure to meet these performance targets will result in a corresponding price reduction in its contract price, based on a prescribed formula in the agreements.
Delivery milestones. The project development contracts provide for several delivery milestones, generally including (i) system launch, (ii) initial acceptance, and (iii) final acceptance. AsiaInfo generally grants its customers a trial operation period ranging from 3–6 months after the completion of initial acceptance. Final acceptance is conducted upon the expiration of the trial operation period by the customer or third-party acceptance agencies appointed by the customer. AsiaInfo may be subject to penalties or a corresponding contract price reduction for failure to adhere to the prescribed delivery milestones caused by AsiaInfo.	
Pricing, credit and payment terms. The contract price for AsiaInfo's project development contracts is typically a fixed amount, consisting of: (i) estimated costs for project execution and delivery, and (ii) estimated procurement costs for third-party hardware and software, if applicable. AsiaInfo generally requires a deposit that ranges between 10% to 50% of the contract price upon signing the project development contracts, with the remaining contract price paid in instalments pursuant to delivery milestones. AsiaInfo generally grants a credit term of 30 days to customers.	**Pricing, credit and payment terms.** The contract price of AsiaInfo's operational support agreements is generally paid in quarterly instalments, with about 60% of the contract price paid to AsiaInfo as a fixed rate and about 40% of the contract price paid to AsiaInfo based on its completion of the monthly and/or quarterly performance targets. AsiaInfo generally grants credit terms of 30 days to customers of its data-driven operation services.
Intellectual property. In general, AsiaInfo owns the intellectual property rights of the baseline of the software products that AsiaInfo has developed in-house, while intellectual property rights related to the custom designed part of the software products are jointly owned by AsiaInfo and the customer or solely owned by the customer.	
Termination. AsiaInfo's project development contracts may be terminated by either party upon the occurrence of certain specified events, such as a force majeure event.	**Termination.** AsiaInfo's operational support agreements may be terminated by either party upon the occurrence of certain specified events, such as a force majeure event.

After-Sales Services

Product warranties

AsiaInfo typically provides 12-month product warranties for its software products, which are generally limited to product repair and maintenance. As part of its after-sales services, AsiaInfo offers free upgrades to new versions of its software products, such as new versions that address compatibility or security issues. AsiaInfo also operates a dedicated customer service hotline, which provides technical support to its customers and answers to customer queries.

The repair and maintenance of third-party hardware (which generally has 1–2-year product warranties) and software (which generally has 12-month product warranties) that are procured by AsiaInfo and integrated into its customers' software systems are handled by the relevant third-party suppliers, with the repair and maintenance costs borne by these suppliers.

Product training

Once a software system is launched, AsiaInfo provides a range of professional training related to system operation and maintenance on-site or at AsiaInfo's training centres in Beijing or Nanjing for the customer's employees. These training courses primarily cover the technologies, functionalities, day-to-day operations and troubleshooting techniques, which are designed to ensure the proper function of the implemented systems.

Operation and maintenance (O&M) services

Software products and related services customers generally engage AsiaInfo to provide ongoing O&M services to ensure the stable functioning of the installed system. AsiaInfo provides comprehensive O&M services, including (i) system monitoring, (ii) maintenance and recovery, (iii) performance management, (iv) software and hardware repair and replacement, (v) specified system upgrades and (vi) handling of customer inquiries and complaints, with the specific scope of services agreed upon between customers and AsiaInfo on a project by project basis pursuant to O&M service agreements. AsiaInfo's O&M services are chargeable services, provided in addition to product warranties for its software products, which are generally for a term of 12 months and are limited to product repair and maintenance and are provided free of charge.

AsiaInfo assembles a dedicated O&M team for each system, composed of, among others, a specified number of highly trained software engineers, who are able to quickly diagnose and resolve system performance problems. Each software engineer is subject to the customer's assessment, training and approval before the provision of services, and is subject to the customer's ongoing evaluation in terms of technical expertise and service quality. AsiaInfo's O&M teams are located in AsiaInfo's regional offices in close proximity to customers or on the customers' premises. Each O&M team maintains a dedicated service hotline to respond to customer service requests within a prescribed time frame and provides on-site or remote diagnosis, troubleshooting and support on a 24/7 basis. AsiaInfo's O&M teams also conduct continuous system monitoring to optimize their availability and performance and proactively identify potential issues and risks.

AsiaInfo enters into O&M service agreements with customers for the provision of its O&M services, which are generally based on the customers' standardized form.

Figure 9: Operation and maintenance service agreements for software products and related services

Duration. AsiaInfo's operation and maintenance service agreements generally have a one-year term and are renewable upon mutual agreement.

Scope of work and performance targets. The operation and maintenance service agreements specify AsiaInfo's responsibilities throughout the service period, the composition of the operation and maintenance teams, and the level and scope of operation and maintenance services AsiaInfo provides. The agreements provide for monthly, quarterly and/or annual performance targets, including (i) the length of scheduled and unscheduled system downtime, system failures or interruptions, (ii) the time required to handle system failures or interruptions, and (iii) quality and responsiveness of the services. Failure to meet these performance targets will result in monetary penalties or a corresponding price reduction for the following year, based on a prescribed formula in the agreements.

Pricing, credit and payment terms. AsiaInfo generally charges a fixed amount for its operation and maintenance services, which is based on the estimated costs to be incurred by the relevant operation and maintenance team. The contract price is generally paid in quarterly instalments, and AsiaInfo sometimes requires a deposit that ranges between 10% and 25% of the contract price upon signing the operation and maintenance service agreements. In some circumstances, AsiaInfo is paid every quarter, based on the actual number of days AsiaInfo's operation and maintenance team has worked, pursuant to an agreed day-rate. AsiaInfo generally grants credit terms of 30 days to customers of system operation and maintenance services.

Termination. AsiaInfo's operation and maintenance service agreements may be terminated by either party upon the occurrence of certain specified events, such as a force majeure event or a material breach that cannot be rectified within a prescribed time period.

SOURCES: CGIS RESEARCH, COMPANY DATA
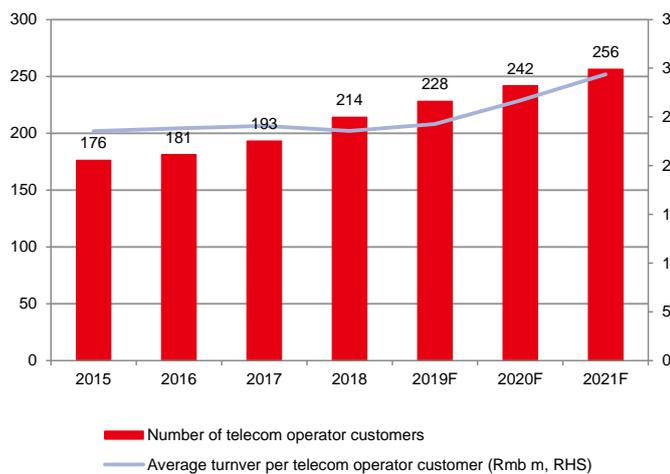
Customers and Suppliers

Customers

AsiaInfo's customers include China-based telecom operators and enterprises.

Telecom Operator Customers. Over the past two decades, AsiaInfo has provided software products and services to, and has negotiated and entered into contracts individually and direct with, telecom operators within the corporate groups of China Mobile, China Unicom and China Telecom, including their headquarters, provincial companies operating provincial telecom networks, municipal companies, specialized companies focusing on specific operations, customer groups, and joint ventures.

Enterprise Customers. Since 2010, AsiaInfo has also been providing software products and services to i) China-based large enterprises in the cable TV, postal and financial services industries, and to a lesser extent ii) small and medium-sized enterprises in selected industries, such as mobile virtual network operators (MVNOs).

Figure 10: Number of AsiaInfo telecom operator customers and business profitability

Number of telecom operator customers
Average turnver per telecom operator customer (Rmb m, RHS)

SOURCES: CGIS RESEARCH, COMPANY DATA

Figure 11: Number of AsiaInfo large enterprise customers and business profitability

Number of large enterprise customers
Average turnver per large enterprise customer (Rmb m, RHS)
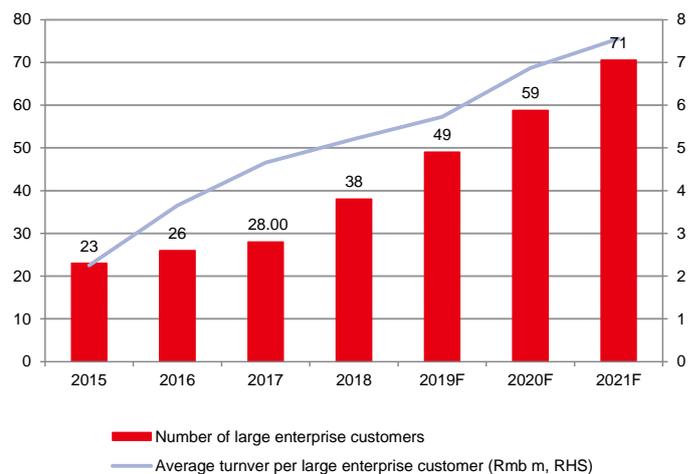
SOURCES: CGIS RESEARCH, COMPANY DATA

Suppliers

AsiaInfo suppliers include outsourcing service providers and third-party hardware and software suppliers. In 2015, 2016, 2017 and 2018, purchases from its five largest suppliers, which included hardware suppliers and outsourcing service providers, in aggregate accounted for 7.3%, 21.5%, 11.6% and 9.0% of cost of sales, respectively, and purchases from the largest supplier, which included outsourcing service providers, accounted for 2.4%, 10.7%, 3.7% and 3.0% of cost of sales, respectively.

Industry Overview

Currently, China is at a pivotal stage in transforming its growth model, improving its economic structure, and fostering new growth drivers. The Chinese government is clear that it will further improve the software industry and give full play to the supporting role of software in the development of a high-quality economy.

Figure 12: Turnover of China's software industry

Rmb bn

SOURCES: CGIS RESEARCH, COMPANY DATA, WIND
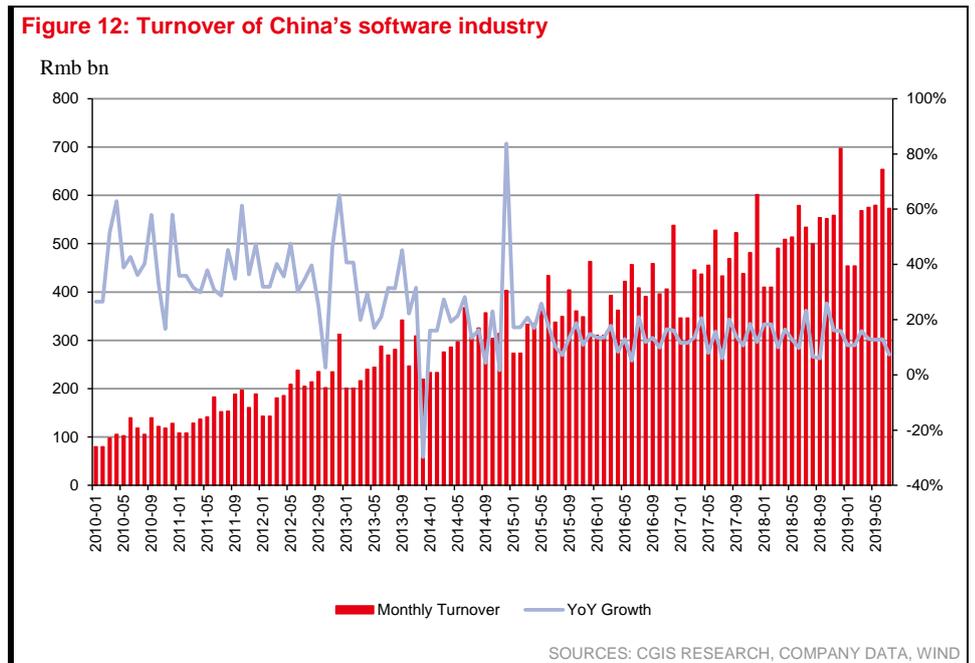
1) China's enterprise software market

Enterprise software products refer to software systems designed to operate in corporate environments, primarily CRM (Customer Relationship Management) products, charging and billing products, PM (Project Manager) products, EAM (Enterprise Asset Management) products, ERP (Enterprise Resource Planning) products, SCM (Supply Chain Management) products, MOM (Manufacturing Operations Management) products, big data products, and BI (Business Intelligence) products. Enterprise software services refer to enterprise software-related services, including system integration and configuration, operation and maintenance, and system upgrade and expansion.

Enterprise software products and related services are more complex than services targeting individual users and require deep understanding of the relevant enterprises' business and extensive software development capabilities.

According to Frost & Sullivan, the total market size of China's enterprise software product and related service market by revenue increased from Rmb189.7bn in 2012 to Rmb279.2bn in 2017, for a CAGR of 8.0%, and is expected to reach Rmb465.8bn by 2022F, for a CAGR of 11.1% from 2018 to 2022. The telecom industry made up 6.6% of China's enterprise software product and related service market in terms of 2017 revenue.

Figure 13: China's enterprise software product and related services industry
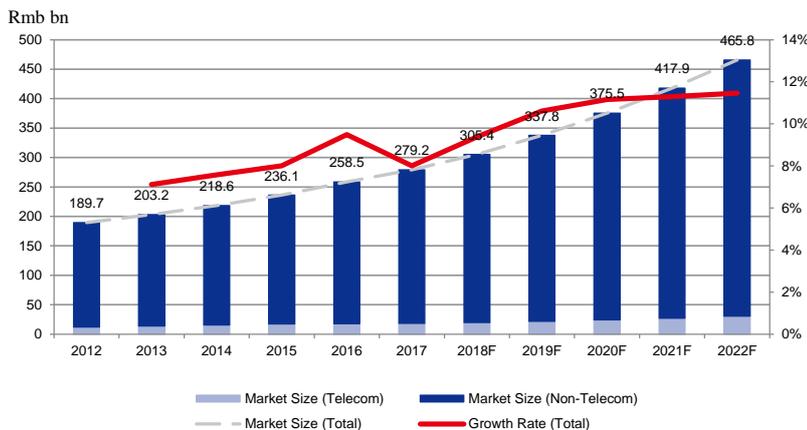
SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN

Figure 14: Market breakdown of China's enterprise software product and related services industry in 2017
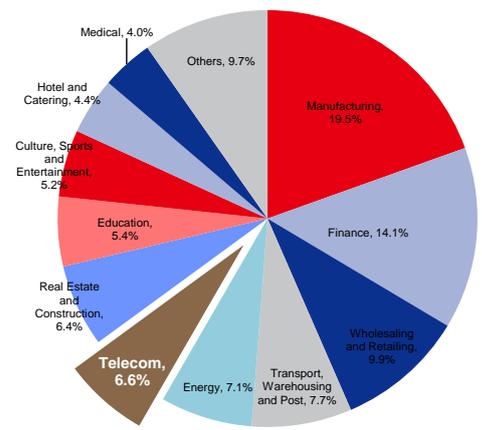
SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN

Market status, trends and drivers

(1) Localization (import substitution). In view of the importance of cybersecurity and the urgency of ensuring the security of government, enterprises and personal networks, China has set cyberspace security as a national security strategy, and has introduced laws and regulations related to cybersecurity in recent years. For example, the SASAC's latest "Assessment Measures for Assessing the Operation Performance of Persons in Charge of Enterprises Directly under the Central Government", released in Mar 2019, included cybersecurity in the assessment for the first time. The localization of enterprise software as the nerve centre for data has become an important trend, offering more opportunities for domestic enterprise software providers.

(2) Emerging Technologies. The emergence of new technologies, such as cloud computing, microservices, dockers, big data, AI, machine learning, IoT and SDN/NFV, provides enterprises with opportunities to increase revenue, enhance operating efficiency and achieve cost savings.

(3) Mobilization. Real-time communication and information delivery is a key for enterprises to succeed in this information era. Software providers with extensive telecom-related knowledge and expertise are therefore likely to gain a competitive edge and receive a higher level of recognition.

(4) Cloudization (Migrating enterprise business to the cloud). Cloud computing is being adopted by enterprises, because the technology frees enterprises from the significant costs and complexities associated with establishing and managing on-premise infrastructure, and as a result, helps them achieve increased business flexibility, faster time-to-market and cost savings. Especially with the deep integration of the internet and various industries, B2B, C2B and other rapid developments, (a) enterprise front end accelerates the development of online sales and socialized sales, and (b) enterprise back end transforms its supply chain and logistics to form a digital platform.

(5) Customization. Standardized software cannot completely match the unique requirements and characteristics of different enterprises in the Chinese market with regional differences. To maintain a competitive edge, it is essential for enterprise software providers to design, develop and deliver software products tailored to an enterprise's specific IT and network structure, as well as business and operational needs, and offer a comprehensive range of related services.

<u>Entry Barriers</u>

(1) Customer stickiness. Replacing an enterprise's entire existing back-end system is costly and time-consuming, so enterprises tend to work with the same providers for system upgrades and expansion instead of switching to new providers. Enterprises also exhibit high brand loyalty, especially to leading providers with nationwide coverage. This requires significant capital investment, as well as investments in building sales and marketing, customer services and other capabilities, for new entrants to attract customers that have already established deep relationship with leading providers.

(2) Technology barriers. Enterprises prefer to work with software providers that can provide advanced software products and end-to-end professional services, which require strong R&D capability. It takes significant time and resources for new entrants to build up such technology capabilities.

(3) Deep understanding of industry- and company-specific needs. The needs and requirements of enterprises in terms of software products and related services differ significantly from industry to industry. Software product and related service providers who have accumulated deep insight into enterprises' industry environment and business models over years of collaboration with these enterprises can provide tailored software products and related services catering for the enterprises' industry- and company-specific needs and requirements. These capabilities are difficult for new entrants to replicate.

China's telecom enterprise software market

Overview of China's telecom industry

Currently, China's telecom industry is dominated by three big operators: China Mobile [0941.HK], China Unicom [0762.HK] and China Telecom [0728.HK]. China Broadcasting Network [unlisted] also joins the list of 5G operators under the background of "Tri-networks Integration". China Tower [0788.HK] and CCS [0552.HK] are also major players in the telecom infrastructure.

According to Frost & Sullivan, the market size of China's telecom industry grew from Rmb1.08tn in 2012 to Rmb1.26tn in 2017, representing a CAGR of 3.2%. As Chinese telecom operators continue to compete intensively on, and invest significantly in, product upgrades and 5G network development, the market size of China's telecom industry is projected to grow at a higher CAGR of 5.7% from 2018F to 2022F, reaching Rmb1.67tn in 2022F.

Figure 15: Market size of China's telecom market

SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN
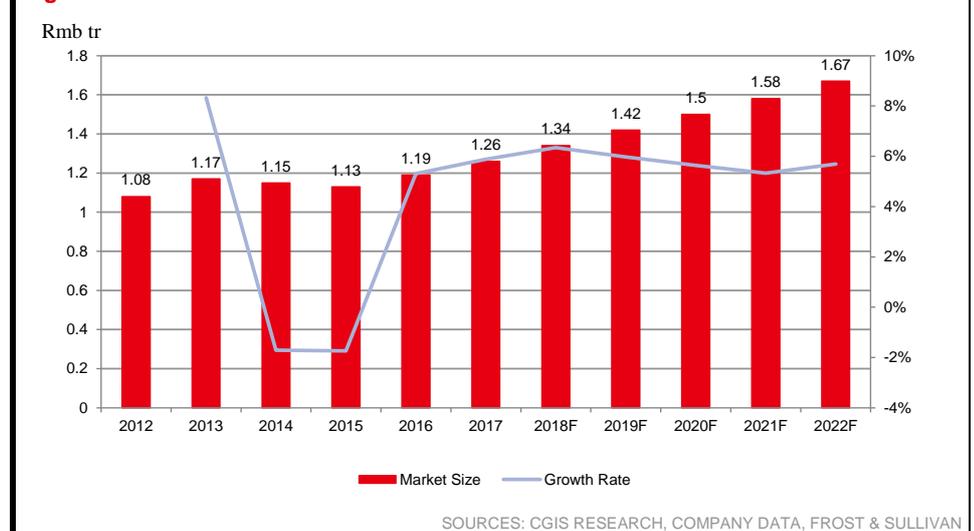
Overview of China's telecom enterprise software market

Designed to provide telecom operators with business capability and support their daily operations, telecom software products and related services can be divided into the following three categories: BSS, OSS and MSS.

Figure 16: Three categories of telecom enterprise software products

Name		Purpose	Products
BOSS (Business & Operation Support Systems)	**BSS** (Business Support Systems)	Run business operations for customers	(1) CRM (Customer Relationship Management) products, (2) charging and billing products, (3) product management products, (4) order management products, and (5) big data products.
	OSS (Operations Support Systems)	Manage networks to better serve customers	(1) Network management products, and (2) network optimization products.
MSS (Management Support Systems)		Manage various domains of businesses	(1) Financial management products, and (2) procurement management products.

Notes: Above products may not be unique to telecom industry; for example, CRM is a common enterprise software product, and it was classified as a BSS product in telecom industry.

SOURCES: CGIS RESEARCH, COMPANY DATA

According to Ovum, the market size of the global OSS/BSS market will grow from US$17.0bn in 2017 to US$22.5bn in 2022, representing a CAGR of 5.75%.

According to Frost & Sullivan, the market size of China's telecom software industry (OSS/BSS/MSS) by revenue reached Rmb18.3bn in 2017, representing a CAGR of 8.6% from 2012 to 2017. In 2017, the market size of China's BSS, OSS and MSS software markets by revenue accounted for 50%, 32% and 18% of China's telecom software industry, respectively. The growth in market size slowed down slightly between 2015 and 2017, primarily because of the shift in telecom operators' investment and strategic focus from developing and optimizing 3G and 4G networks to constructing 5G networks. The demand for telecom software products and related services is forecast to experience accelerated growth, driven by the following: (i) telecom operators will increase their investment in 5G networks; (ii) telecom operators will continue to expand their business and conduct system upgrades and expansion to keep abreast of new technology trends; and (iii) to cater for each enterprise's specific business model and customer needs, tailored operation and integration services are becoming increasingly favoured by Chinese telecom operators. As a result, the market size of China's telecom software market by revenue is expected to reach Rmb30.5bn by 2022, representing a CAGR of 11.5% from 2018F to 2022F.

Figure 17: China's telecom enterprise software product and related services industry
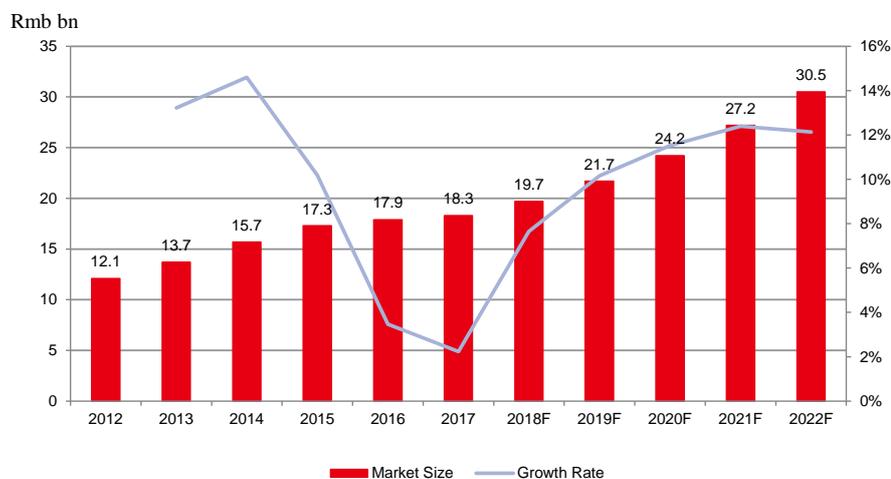
SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN

Figure 18: Market breakdown of China's telecom enterprise software product and related services industry in 2017
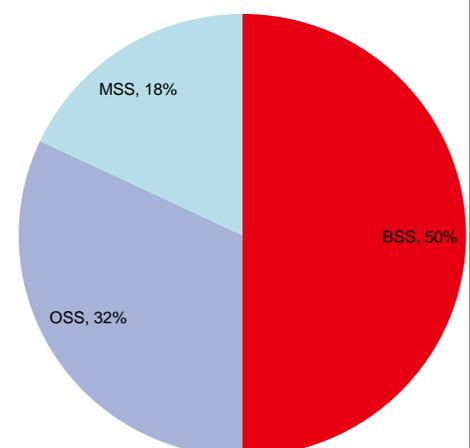
SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN

Figure 19: Development history of China's telecom enterprise software industry		
Year	Characteristics	Content
1996 | 2000	Leading by "97 project"	The first domestic telecom BSS industry standard "97 Project Business Process" of the former Ministry of Posts and Telecommunications was completed, and the construction of 300 local networks nationwide started, including mainly business acceptance and billing, with more than 100 competitors.
2000 | 2004	Represented by local billing systems and BOSS construction	In 2000, the Chinese government substantially completed the industry restructuring: China Mobile was separated from China Telecom. China Telecom began to build a local telecom service billing system; China Mobile began to design and build BOSS1.0; and China Unicom began building a comprehensive accounting management system. The number of competitors was reduced to dozens.
2004 | 2006	Upgrading the centralized billing system	China Telecom released ITSP (Information Technology Strategy Plan) 1.0, established the billing model 1.0 and started the construction of BOSS2.0; China Unicom carried out the post-construction of the comprehensive accounting system. Market concentration was further enhanced.
2006 | 2008	Building real-time OCSs (Online Charging Systems) for 3G services	China Telecom began the construction of a real-time online system; China Mobile launched an OCS pilot project; and China Unicom conducted OCS pilots in seven provinces.
2008 | 2012	Full-business operations support system	In 2008, the Chinese government arranged further industry restructuring: (a) the acquisition by China Telecom of the CDMA network then owned by China Unicom; (b) the merger between China Unicom and China Netcom; (c) the transfer of the basic telecommunications services business then operated by China Satellite to China Telecom; and (d) the consolidation of China Tietong into China Mobile. China Telecom and China Unicom started construction of their own full-service support systems. China Telecom released ITSP 2.0, OSS2.5 and OSS2.8. China Unicom released its plan for BSS. China Mobile released NGBOSS (Next Generation BOSS) 1.0, NGBOSS2.0, and PBOSS; market concentration further increased.
2012 | now	Intensification with new technologies	At the end of 2013, MIIT granted TD-LTE 4G licenses to the three telecom operators, and opened up the country's mobile market to MVNOs, providing more opportunities in the telecom software market. Network traffic management became the new trend. In 2013, China Unicom started to discuss how to move BSS to the cloud. In 1H16, China Telecom established the ITSP3.0 strategy and started to use BSS 3.0 in 2017. According to the China Telecom CTNET2025 Network Architecture White Paper, China Telecom would add SDN/NFV into its new OSS. In May 2018, China Mobile integrated its Department of Business Support System, China Mobile (Shenzhen) Limited, and southern base of China Mobile into China Mobile Information Technology to integrate its IT system.

SOURCES: CGIS RESEARCH, COMPANY DATA

Entry Barriers

(1) Mission-Critical Systems. Telecom operators require high-performance, mission-critical software systems to address their increasingly complex business and operational needs. Only providers with a large amount of advanced, proprietary technologies (such as real-time data processing, concurrent data processing, distributed computing and big data analysis) that are familiar with China's telecom industry and telecom operators' business and technology environments can develop and deploy these mission-critical systems.

(2) Long-Term Relationships. Telecom operators tend to stick with providers with whom they have worked on a long-term basis. These providers have in-depth understanding of the telecom operators' business models and can provide customized products and related services. In addition, these providers are often responsible for providing ongoing O&M services for the software systems deploying their products, which allow them to remain in close contact with the telecom operators to secure additional opportunities.

(3) Complex Integration. Telecom software systems are often intricately connected and complement each other. For instance, a telecom operator's big data platform analyzes data generated from its CRM and charging & billing systems, and extracts value and intelligence from these data to optimize operations. Therefore, telecom operators generally prefer to source telecom software products and related services from the same vendor to maintain system continuity and compatibility and minimize the risks and costs related to integrating disparate systems from multiple vendors.

(4) Participation in Technical Standards Formulation. Telecom operators have formulated detailed technical standards for their software systems. Leading telecom software providers are often invited to participate in the formulation of these technical standards, enabling them to direct their R&D efforts and formulate product roadmaps accordingly, and effectively setting them apart from new entrants, which may lack a thorough understanding of these technical standards.

Market Drivers

(1) Business Model Innovation. Traditional telecom services primarily include voice call and text message services, which only telecom operators can provide, enabling them to dominant the telecom industry. However, with the proliferation of the internet, the industry is undergoing fundamental changes: smart terminal manufacturers can now deal direct with customers, and content and service providers are expanding their roles across the telecom industry value chain. In response to these changes, telecom operators are innovating their business model (such as the establishment of specialized companies and divisions focusing on specific operational areas or customer groups), generating substantial demand for telecom software products and related services tailored for the internet business model.

(2) Reorganization of Network Infrastructure. Telecom operators used to rely solely on communications technology (CT) to provide traditional telecom services and have constructed network infrastructure accordingly. The development of network technologies such as SDN/NFV provides opportunities for enterprises to operate in a more agile and highly efficient manner by integrating CT and IT. Telecom software providers who facilitate the reorganization of network infrastructure to a converged CT and IT network infrastructure are therefore expected to secure additional business opportunities.

(3) 5G and IoT. Telecom operators will upgrade their BSS/OSS to adapt to new business models powered by 5G and IoT. For example, 5G will enable different pricing models for different terminals, which will generate substantial demand for charging and billing products with more complex capabilities. Telecom operators will also require software platforms with larger scale and greater computing capabilities to adapt to the proliferation of the Internet of Things, creating business opportunities for providers of corresponding telecom software products. For example, China Telecom is building a Business Support System (CRM/Billing etc.) for NB-IoT networks, and WeChat Service (part of BSS ecosystem), which provides customer service through WeChat.

Competitive Landscape

The market size of China's telecom software product and related services market by revenue reached Rmb18.3bn in 2017, and the top five players accounted for an aggregate 60.6% market share, measured by revenue.

The market size of China's BSS software product and related services market by revenue reached Rmb9.2bn in 2017, and the top five players accounted for an aggregate 94.4% market share, measured by revenue.

Figure 20: Top 5 telecom enterprise software product and related services providers in China in 2017

SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN

Figure 21: Top 5 BSS software product and related services providers in China in 2017
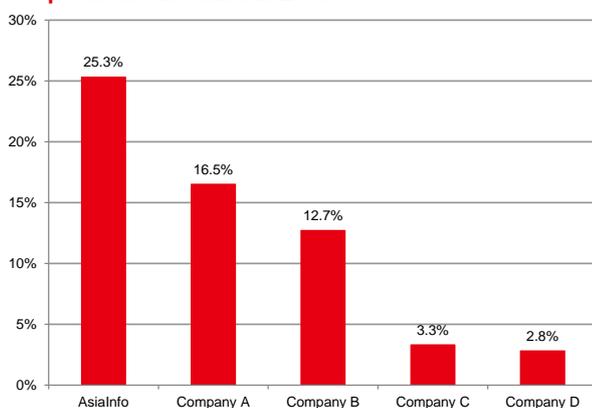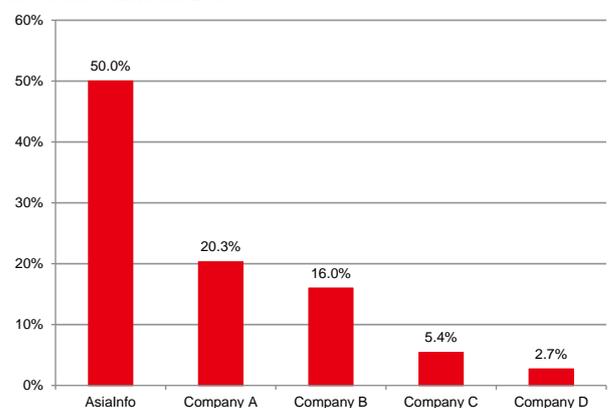
SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN

Figure 22: Top 5 players in China's telecom software product and related services market in 2017

Company	Major Business			*POSSIBLE* companies and characteristics (our estimate)
AsiaInfo [1675.HK]	Telecom software products and services with a focus on BSS/OSS software products and services			AsiaInfo [1675.HK]: China's biggest BSS/OSS products and services provider with an extensive portfolio of over 500 mission-critical, carrier-grade software products.
Company A	Information and Communication Technology (ICT) infrastructure and smart devices with integrated solutions covering telecom networks, IT, smart devices and cloud services, among others			Huawei [unlisted]: A leading global information and communications technology (ICT) solutions provider, which ranked first in "China's top 100 software company list" for 17 consecutive years. Based on its strong position among hardware suppliers and its close relationship with telecom operators, using a product bundling strategy, Huawei is enhancing its competitive position in the telecom software market.
Company B	ICT infrastructure and related solutions, cloud computing and IT solutions, among others			Whale Cloud (浩鲸云计算) [unlisted]: A company owned by Alibaba [BABA.US] and ZTE [0763.HK], formerly known as ZTEsoft Technology (中兴软创科技), with a strong Internet and cloud technology background and decent telecom software development experience. Leveraging its own core product brands (ZSmart and uBoss), Whale Cloud's telecom BSS and OSS products have made it one of the world's top 20 vendors in the global telecom software industry.
Company C	Application software products for telecom, public security, financial and other industries			Shenzhen Tianyuan DIC Info (天源迪科) [300047.CH]: A good player among telecom software providers for China Telecom and China Unicom, which works closely with giants such as Alibaba and Huawei to expand the software market.
Company D	Collection, management, data analysis, and the provision of related application products, services and solutions			Neusoft (东软集团) [600718.CH]: China's first listed software company and first company that passed CMM5, CMMI5 and PCMM Level5. Neusoft is the main BSS provider for China Unicom. In 2017, Neusoft served China Unicom's headquarters and 15 provincial companies, and China Mobile's headquarters and 17 provincial companies.

SOURCES: CGIS RESEARCH, COMPANY DATA

Other players in the telecom software market include China Comservice [0552.HK], Si-Tech Info [300608.CH], GuoChuang [300520.CH], BOCO Inter-Telecom [600289.CH], and Seahigh Telecom [OC:839211.CH].

China's non-telecom enterprise software market

According to Frost & Sullivan, the market size of China's non-telecom enterprise software industry by revenue reached Rmb260.9bn in 2017, representing a CAGR of 8.0% from 2012 to 2017. With the development of the Chinese economy and the rise of numerous industries, there will be rising demand for enterprise software system upgrades to keep abreast of the latest information technology. Demand for non-telecom enterprise software products, such as ERP, HRM, CRM, and billing systems is forecast to grow continuously. The size of China's non-telecom enterprise software product and related services market by revenue is expected to reach Rmb435.3bn by 2022F, representing a CAGR of 11.1% from 2018F. Analysts estimate that the size of China's SaaS CRM (including SFA, field sales, and SCRM) market will reach Rmb6.79bn in 2019F.

Figure 23: Market size of China's non-telecom enterprise software industry
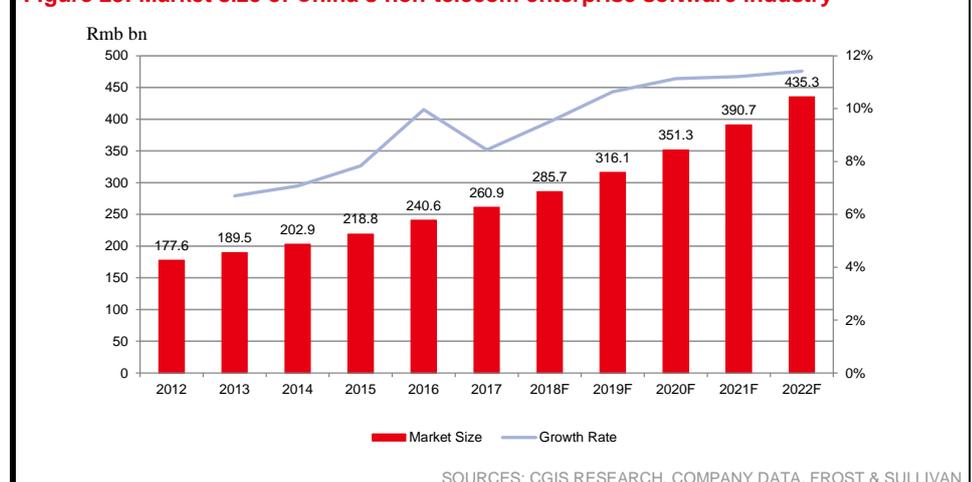
SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN

2) China's data-driven operations service market

Data-driven operation services refer to the comprehensive data operational analytics services provided to analyze customer behaviour, and increasing operational efficiency and customer value by leveraging the service providers' strong data analytical skills, deep insights in operation scenarios, and extensive industry expertise and technical capabilities.
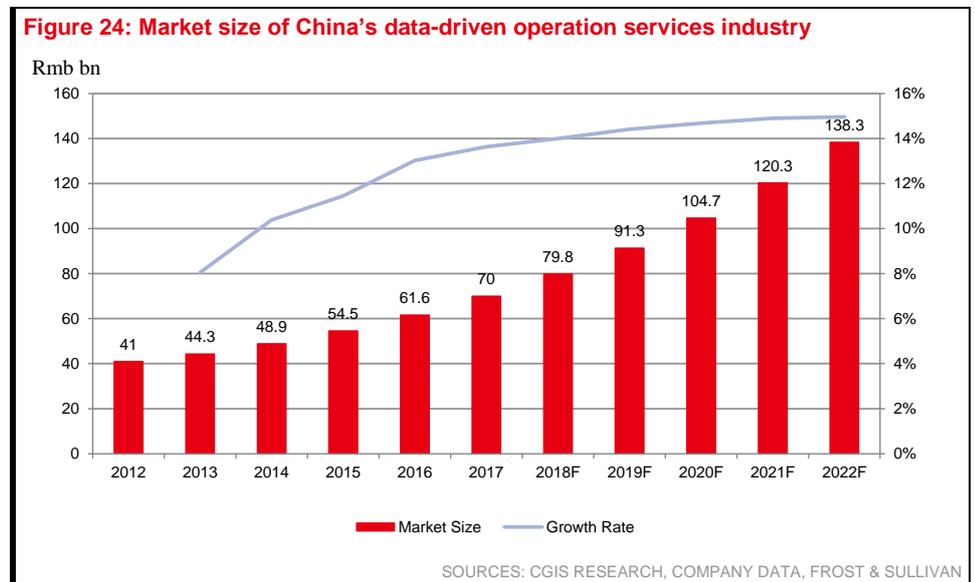
Figure 24: Market size of China's data-driven operation services industry

SOURCES: CGIS RESEARCH, COMPANY DATA, FROST & SULLIVAN

According to Frost & Sullivan, the market size of China's data-driven operation service market by revenue experienced strong growth in recent years, reaching Rmb70.0bn in 2017, representing a CAGR of 11.3% from 2012 to 2017. The market size of China's data-driven operation service market by revenue is expected to reach Rmb138.3bn in 2022F, representing a CAGR of 14.7% from 2018F to 2022F.

Market Drivers

(1) There is rising demand by enterprises across industries to increase the value of their existing customers (including telecom operators' government and enterprise customers), attract new customers, and explore new business opportunities. This requires seamless collaboration with enterprise software product and service providers with strong data analytics and service capabilities and extensive industry know-how, which can provide data-driven operation services that more efficiently monetize their data and resources, such as more comprehensive analysis of customer profiles, characteristics and lifecycles, to increase sales and marketing efficiency.

(2) Over years of collaboration with enterprises, enterprise software product and service providers have accumulated extensive data analytics and service capability and industry know-how. Providing data-driven operation services enables enterprise software product and service providers to deepen their relationship with enterprises, adapt to new business models in the dynamically changing digital world, and diversify the revenue streams of both their customers and themselves.

Earnings Forecast

AsiaInfo's software products and related services include CRM, charging and billing, big data, IoT, intelligent network software products, and related deployment, operation and maintenance services.

Telecom operators' software business accounted for 96.8% of total turnover in 2018. The number of AsiaInfo telecom operator customers increased 6.1% yoy, from 212 in 1H18 to 225 in 1H19. Telecom operators have been expanding their business portfolio to drive top-line growth, which offers business opportunities for AsiaInfo. The Company's telecom operators software business segment reported good growth in 2015–2018 due to both an increase in the number of telecom operator customers (CAGR of 6.7% in 2015–2018) and stable revenue per customer of Rmb24m. We forecast that AsiaInfo will report a CAGR of 6.2% in 2018–2021F for the number of telecom operator customers and a CAGR of 7.6% in 2018–2021F for revenue per telecom operator customers, driven by 5G roll-out and the adoption of new applications.

AsiaInfo's enterprise business is classified into large enterprises and SMEs. The number of large enterprise customers increased 34.4% yoy, from 32 in 1H18 to 43 in 1H19. Its large enterprise segment reported good growth in 2015–2018 owing to an increase in both the number of clients (a CAGR of 18.2% in 2015–2018) and revenue per client (a CAGR of 32.2% in 2015–2018). AsiaInfo will focus on largest enterprise software product and services, which have high entry barriers and low credit risk. The large enterprise business requires complex large-scale IT solutions. We forecast that AsiaInfo will report a CAGR of 22.9% in 2018–2021F for the number of large enterprise customers and a CAGR of 13.2% in 2018–2021F for revenue per large enterprise customer, driven by AsiaInfo's expansion into other industries and the increase in complexity of the requirements of large enterprises.

AsiaInfo's gross margins declined from 37.2% in 2015 to 33.8% in 2017 and rebounded to 36.1% in 2018. The margin drop in 2015–2017 was due to a decline in the gross margins of the software business because of a mismatch of revenue and costs recognition and contract delays. The gross margin of the network security business dropped from 34% in 2015 to 2% in 2017, as AsiaInfo is exiting this business. The rebound in gross margin in 2018 was partly due to a lower contribution from the low-margin network security business. We expect AsiaInfo's gross margin to improve further to 37.1% in 2019F and to remain above 37% in 2020F and 2021F.

AsiaInfo's total OPEX, including R&D expenses, as a percentage of total turnover was about 31% in 2015 and 2016. R&D expenses are a major OPEX component, accounting for 13% of total turnover in 2015 and 2016. The OPEX drop in 2017 and 2018 was due to the scaling down of its SME business and refocusing of R&D expenses on growth areas. AsiaInfo's R&D expenses as a percentage of total turnover are expected to increase to 14.6% in 2019F owing to R&D for 5G and data-driven business. We expect AsiaInfo's R&D expenses as a percentage of turnover to come down to 13.7% in 2021F.

AsiaInfo's operating results have been distorted by non-operating items and non-cash items, such as large FX gains and losses, which are related to a US$-denominated privatization syndicated loan and share-based compensation. These items are expected to disappear owing to a reduction in US$-denominated loans and a drop in share-based compensation.

We expect AsiaInfo to report net profit to grow at a CAGR of 49.0% in 2018–2021F, given acceleration in turnover growth, margin improvement and tight cost control.

Figure 25: Assumptions

	2015	2016	2017	2018	2019F	2020F	2021F
Turnover (Rmbm)							
Software products and related services	3,996.7	4,170.8	4,541.5	4,852.2	5,390.5	6,324.2	7,369.7
Data-driven operation services	18.1	31.4	41.7	82.5	165.0	247.5	371.2
Others	260.5	312.5	241.7	257.3	283.0	311.4	342.5
Network security business	489.6	341.3	123.4	19.0	2.4	0.0	0.0
YoY Change (%)							
Software products and related services		4.4	8.9	6.8	11.1	17.3	16.5
Data-driven operation services		73.7	33.0	97.6	100.0	50.0	50.0
Others		20.0	(22.7)	6.5	10.0	10.0	10.0
Network security business		(30.3)	(63.8)	(84.6)	(87.2)	(100.0)	n.a.
Gross margin (%)	37.2	34.4	33.8	36.1	37.1	37.1	37.1
Net margin (%)	(2.2)	(4.4)	6.6	3.9	5.3	7.7	8.4
Cost (Rmbm)							
S,G&A	(828.7)	(887.7)	(885.6)	(841.2)	(868.3)	(833.3)	(963.0)
R&D Expenses	(33.49)	(629.60)	(636.61)	(430.25)	(584.68)	(853.96)	(944.36)
Financial Expenses	-	(6.1)	(93.9)	(84.0)	(70.6)	(49.9)	(58.9)
YoY Change (%)							
S,G&A		7.1	(0.2)	(5.0)	3.2	(4.0)	15.6
R&D Expenses		1,780.0	1.1	(32.4)	35.9	46.1	10.6
Financial Expenses		n.a.	n.a.	-	(15.9)	(29.3)	17.8

Turnover (Rmbm)	-	-	-	-	-	-	-	-	-
Telecom operators	-	-	-	4,144.0	4,314.0	4,645.0	5,042.6	5,533.7	6,452.3
Large enterprises	-	-	-	53.0	87.0	112.0	122.7	280.6	404.1
SME				78.0	113.0	68.0	26.7	26.7	26.7
			-						
Number of telecom operator customers	-	-	-	-	176	181	193	214	228	242
Number of large enterprise customers	-	-	-	-	23	26	28	38	49	59
Average turnver per telecom operator customer (Rmb m, RHS)	-	-	-	-	23.5	23.8	24.1	23.6	24.3	26.7
Average turnver per large enterprise customer (Rmb m, RHS)	-	-	-	-	2.3	3.7	4.7	5.2	5.7	6.9

SOURCES: CGIS RESEARCH, COMPANY DATA

Risks

The Company relies substantially on telecom operator customers, deriving a significant portion of its revenue from them. Although the company is expanding its non-telecom operator business, it still relies substantially on its telecom operator customers. This continued reliance means that factors that could affect demand from these customers for the Company's services could adversely affect its business, results of operations and financial condition. These factors could include, for example, a) the deepening of co-building and co-sharing agreements between China Telecom and China Unicom that may reduce their 5G CAPEX; b) the ability and willingness of each of these customers to fund CAPEX; and c) any move on their part to develop in-house capabilities to undertake services that the Company currently provides to them.

The growth of the telecommunications industry in China may be slower than expected. Demand for the Company's products and services depends on the level of activity in the telecommunications industry in China. Any slowdown in the growth of, or decline in, demand for telecommunications services provided by telecom operators may result in a reduction in demand for the Company's products and services. Any trend towards an increase in competition in the telecommunications industry in China may put downward pressure on prices for the Company's products and services, and consequently, on its revenue.

The potential for the Company to fail to meet its customers' requirements. Significant changes in customer requirements or preferences, the introduction of new software embodying new technologies, and the emergence of new industry standards and practices could lead to a rapid decline in sales volume for products and services with older technologies or standards and render certain products and services obsolete, and may require the Company to incur substantial unanticipated R&D and other costs. If the Company fails to timely and cost-effectively develop new software products and services and enhance its existing ones to meet the evolving requirements of existing and new customers, its business operations could be materially and adversely affected.

Increased market competition could result in price reductions, reduced margins and market share, and increased marketing and R&D expenditure, and therefore worse performance. China's telecom and non-telecom enterprise software product and related services markets are competitive. This competition is expected to intensify in the future, as existing competitors introduce new and more competitive offerings alongside their current products and services. New market entrants may also introduce products and services with competitive proprietary technologies, which could have a significant negative impact on demand for the Company's software products and services, and consequently, its business and results of operations. In addition, it is possible that competition in the form of new competitors or alliances, joint ventures or consolidation among existing competitors may result in a reduction in the Company's market share.

Revenue and customer orders are subject to seasonal fluctuations. The vast majority of the Company's revenue is recognized based on the percentage of project completion, and revenue is generally lower during the first half of the year, as the development process of the projects typically slows down during the first quarter of the year because of the Chinese New Year holidays. In addition, because of telecom operators' project management schedules, the Company generally receives a larger number of orders and experiences faster payment in the second half of the year.

Valuation

We initiate our coverage of AsiaInfo with an ADD rating and a target price of HK$11.91, based on a target 2020F P/E of 15x. Our target P/E is in line with the average of 14x for HK- and China-listed IT services names. This is supported by its earnings CAGR of 49.0% for 2018–2021E. AsiaInfo's peers include global software peers Amdocs & Tech Mahindra; A-share-listed peers Beijing Orient National, DCITS and Tianyuan; and HK-listed names ChinaSoft and DC Holdings.

Despite its relatively short listing history, AsiaInfo looks interesting, given its exposure to segments the market is focusing on: a) telecom operators, b) large enterprises, and c) data-driven business. We share the view that its high client concentration may create concerns, but telecom operators' business diversification offers business opportunities for AsiaInfo. AsiaInfo will also be a 5G late-cycle beneficiary in China.

Figure 26: Peer comparison

| Sector	Ticker	Company	Price	Market Cap	PE 2019F	PE 2020F	EV/EBITDA 2019F	EV/EBITDA 2020F	P/B 2018	P/B 2019F	ROE 2018	ROE 2019F	ROA 2018	ROA 2019F	Div yield 2018	Div yield 2019F	Share price 5D	1M	YTD
			Lcy	US$m	x	x	x	x	x	x	%	%	%	%	%	%	%	%	%
Operators	941 HK	China Mobile Ltd	66.05	172395.2	11.0	11.0	3.1	3.0	1.1	1.1	11.6	10.0	6.7	6.8	4.3	4.8	1.3	0.1	-12.3
	762 HK	China Unicom Hong Kong Ltd	8.32	32451.6	17.7	13.3	2.5	2.3	0.7	0.7	3.3	4.1	2.0	2.3	n.a.	2.3	-1.4	0.1	-0.5
	728 HK	China Telecom Corp Ltd-H	3.58	36933.7	11.8	11.1	3.2	3.1	0.8	0.7	6.3	6.4	3.1	3.5	7.3	3.6	-0.6	-1.1	-10.5
	6823 HK	Hkt Trust And Hkt Ltd-Ss	12.48	12045.6	18.2	17.5	10.5	10.3	2.6	2.5	12.8	13.9	5.3	5.3	5.5	5.6	0.6	-2.2	10.6
	315 HK	Smartone Telecommunications	6.92	988.7	12.6	13.7	4.3	4.2	1.5	1.5	13.1	11.8	6.4	7.8	5.6	6.0	3.6	-0.7	-20.3
	215 HK	Hutchison Telecomm Hong Kong	1.47	903.0	19.1	19.9	1.8	1.8	0.6	0.6	2.5	2.6	2.4	2.3	4.2	4.0	10.5	5.8	-33.9
	8 HK	Pccw Ltd	4.51	4438.0	42.5	33.7	7.0	6.8	2.2	2.3	4.9	5.7	0.9	1.0	7.0	7.1	1.3	3.2	0.0
	1883 HK	Citic Telecom International	2.85	1328.4	9.9	9.4	7.3	7.0	1.2	1.1	11.0	11.4	5.3	6.5	6.7	6.8	3.6	-3.1	3.6
	Average				17.9	16.2	4.9	4.8	1.3	1.3	8.2	8.2	4.0	4.4	5.8	5.0	2.4	0.3	-7.9
Infrastructure & Design	788 HK	China Tower Corp Ltd-H	1.71	38366.1	51.4	33.5	7.7	7.0	1.5	1.5	2.9	2.9	1.2	1.7	n.a.	1.0	-2.3	-8.1	15.5
	552 HK	China Communications Servi-H	4.48	3955.3	9.0	7.8	3.4	2.4	0.8	0.8	9.5	10.4	3.6	3.8	3.3	3.9	-1.5	-3.9	-30.5
	6168 HK	China U-Ton Holdings Ltd	0.29	77.9	n.a.	n.a.	n.a.	n.a.	4.8	n.a.	-92.1	n.a.	-20.4	n.a.	0.0	n.a.	20.3	-3.3	-67.8
	002929 CH	Runjian Co Ltd - A	27.08	844.6	20.8	16.4	n.a.	n.a.	2.2	n.a.	10.8	9.9	4.8	6.6	n.a.	n.a.	-2.8	-4.4	-17.1
	Average				27.1	19.3	4.9	4.5	2.3	1.1	-17.5	7.4	-2.7	4.0	1.6	2.4	3.4	-4.9	-25.0
Antenna and RF	COMM US	Commscope Holding Co Inc	11.40	2212.8	5.5	4.8	10.2	8.9	1.6	1.3	8.2	23.6	-2.6	3.8	0.0	0.0	6.1	-8.9	-30.4
	APH US	Amphenol Corp-Cl A	98.78	29381.9	27.6	24.9	17.1	15.9	7.1	7.4	30.1	26.4	12.0	11.0	0.9	0.9	4.0	3.9	21.9
	2342 HK	Comba Telecom Systems Holdin	1.77	559.5	28.5	12.8	23.4	9.7	1.3	1.2	-4.9	3.8	-1.0	1.2	0.6	0.5	-1.7	-2.2	37.2
	002792 CH	Tongyu Communication Inc-A	26.65	1272.1	63.5	31.8	38.3	21.9	4.5	4.4	2.3	5.8	1.8	3.7	n.a.	n.a.	-1.9	-4.1	30.6
	947 HK	Mobi Development Co Ltd	0.87	90.9	n.a.	n.a.	n.a.	n.a.	0.6	n.a.	1.4	n.a.	1.0	n.a.	6.5	n.a.	-4.4	-6.5	-18.7
	002446 CH	Guangdong Shenglu Telecomm-A	8.99	1137.9	42.8	30.0	27.6	18.7	2.2	2.1	4.5	5.0	2.8	n.a.	n.a.	n.a.	-5.7	-11.3	13.7
	QRVO US	Qorvo Inc	79.07	9313.2	15.4	13.1	10.7	5.8	2.2	2.1	-0.8	14.4	3.5	11.1	0.0	0.3	7.9	3.6	30.2
	SWKS US	Skyworks Solutions Inc	85.66	14708.1	13.9	13.6	9.3	9.0	3.6	3.7	22.5	26.2	19.3	20.1	1.8	1.8	6.1	5.8	27.8
	002194 CH	Wuhan Fingu Electronic Tec-A	21.56	1720.1	107.8	53.9	n.a.	n.a.	7.2	n.a.	12.1	n.a.	16.5	n.a.	n.a.	n.a.	-6.4	-13.7	240.1
	300134 CH	Shenzhen Tat Fook Technolo-A	17.22	1867.3	56.1	28.7	n.a.	n.a.	2.5	2.4	0.5	4.5	1.2	3.5	n.a.	0.0	-8.2	-12.4	83.2
	002384 CH	Suzhou Dongshan Precision-A	19.38	4399.1	21.6	15.8	10.6	8.5	3.5	3.2	10.0	15.1	3.4	4.4	n.a.	0.3	-3.9	-11.5	71.7
	002547 CH	Suzhou Chunxing Precision-A	8.90	1418.5	n.a.	n.a.	n.a.	n.a.	4.0	n.a.	1.5	n.a.	0.3	n.a.	n.a.	n.a.	-2.1	-14.2	68.2
	Average				38.3	22.9	18.4	12.3	3.3	3.1	7.3	13.9	4.9	7.4	1.6	0.5	-0.8	-6.0	47.9
Wireless system	Huawei																		
	763 HK	Zte Corp-H	20.70	17611.5	17.6	14.6	15.9	14.0	3.2	2.5	-21.9	15.7	2.1	3.1	0.0	1.4	-4.8	-4.8	39.9
	NOK US	Nokia Corp-Spon Adr	5.09	28710.3	21.6	12.7	9.7	7.3	n.a.	1.8	-2.2	5.5	-1.4	0.6	n.a.	4.0	3.7	-1.2	-12.5
	600198 CH	Datang Telecom Tech Co-A	10.14	1263.8	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	8.7	n.a.	0.0	n.a.	-5.4	-15.9	50.2
	Average				19.6	13.6	12.8	10.7	3.2	2.2	-12.0	10.6	3.1	1.9	0.0	2.7	-2.2	-7.3	25.8
Optical Fiber Cable	GLW US	Corning Inc	29.52	23051.2	17.2	15.2	9.4	8.8	2.1	2.0	7.8	11.9	5.6	5.1	2.6	2.8	6.1	4.6	-2.3
	6869 HK	Yangtze Optical Fibre And-H	12.56	2460.0	10.9	8.4	17.5	14.1	n.a.	1.0	22.2	9.0	n.a.	5.8	n.a.	2.9	-1.4	-5.4	-41.3
	600487 CH	Hengtong Optic-Electric Co-A	15.42	4147.5	12.7	11.3	13.7	10.7	2.2	2.0	22.0	16.1	5.7	6.1	n.a.	2.1	-1.5	-2.9	-9.6
	5801 JP	Furukawa Electric Co Ltd	2827.00	1835.3	11.7	10.2	6.8	6.3	0.8	0.8	12.9	6.7	3.5	3.5	n.a.	2.8	5.7	9.7	2.4
	600498 CH	Fiberhome Telecom Tech Co-A	27.19	4501.2	32.6	26.0	24.6	20.1	3.0	2.9	8.6	9.1	2.8	3.2	n.a.	1.3	-2.1	-5.2	-4.5
	unlisted	Reconstruction Capital Ii-B	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	000836 CH	Tianjin Futong Xinmao Sci-A	3.82	652.2	n.a.	n.a.	n.a.	n.a.	3.7	n.a.	4.3	n.a.	2.2	n.a.	n.a.	n.a.	-0.5	-2.8	-1.8
	PRY IM	Prysmian Spa	20.31	6039.6	12.5	10.8	8.3	7.9	2.4	2.2	7.1	17.5	2.3	4.4	n.a.	2.2	3.6	0.5	20.4
	5802 JP	Sumitomo Electric Industries	1415.50	10324.5	10.9	9.9	5.5	5.2	0.7	0.7	8.1	6.4	3.4	4.2	n.a.	3.4	5.6	0.2	-3.2
	600522 CH	Jiangsu Zhongtian Technolo-A	8.50	3682.2	11.1	n.a.	n.a.	n.a.	1.3	n.a.	11.4	n.a.	5.3	n.a.	n.a.	n.a.	-2.9	-3.1	4.3
	5803 JP	Fujikura Ltd	446.00	1212.3	14.9	10.6	6.5	6.1	0.6	0.6	8.7	3.9	-0.3	2.2	n.a.	2.2	6.2	8.3	2.1
	002491 CH	Tongding Interconnection I-A	7.18	1279.0	14.7	14.4	n.a.	n.a.	1.8	n.a.	11.6	9.0	2.5	n.a.	n.a.	n.a.	-2.7	-5.2	-8.9
	000070 CH	Shenzhen Sdg Info Co Ltd-A	11.80	1356.0	25.1	21.1	n.a.	n.a.	3.7	3.3	12.8	13.1	3.5	4.5	n.a.	n.a.	-1.8	-9.6	99.4
	600105 CH	Jiangsu Etern Co Ltd-A	3.88	682.8	n.a.	n.a.	n.a.	n.a.	1.7	n.a.	7.1	n.a.	2.4	n.a.	n.a.	n.a.	-3.2	-11.4	0.5
	300265 CH	Jiangsu Tongguang Electron-A	7.99	381.0	n.a.	n.a.	n.a.	n.a.	2.6	n.a.	3.8	n.a.	1.9	n.a.	n.a.	n.a.	-0.1	-4.5	-0.6
	1300 HK	Trigiant Group Ltd	1.40	319.7	n.a.	n.a.	n.a.	n.a.	0.7	n.a.	11.3	n.a.	7.8	n.a.	3.4	n.a.	-0.7	-2.8	33.3
	1617 HK	Nanfang Communication Holdin	4.39	626.8	n.a.	n.a.	n.a.	n.a.	5.3	n.a.	17.3	n.a.	7.9	n.a.	1.6	n.a.	-0.7	-0.5	-20.8
	Average				15.9	13.2	11.6	9.9	2.2	1.7	11.1	10.3	3.9	4.3	2.5	2.5	0.6	-1.9	4.3
Optical Networks Equipment	Huawei																		
	NOKIA FH	Nokia Oyj	4.79	29932.3	20.7	13.2	9.9	7.2	1.9	1.8	-2.2	9.5	-1.4	0.1	n.a.	4.3	6.2	3.7	-4.9
	CIEN US	Ciena Corp	37.20	5754.7	17.2	14.5	9.8	8.6	2.7	2.7	-17.0	16.5	6.4	9.0	0.0	0.0	-0.3	-8.0	9.7
	763 HK	Zte Corp-H	20.70	17611.5	17.6	14.6	15.9	14.0	3.2	2.5	-21.9	15.7	2.1	3.1	0.0	1.4	-4.8	-4.8	39.9
	600498 CH	Fiberhome Telecom Tech Co-A	27.19	4501.2	32.6	26.0	24.6	20.1	3.0	2.9	8.6	9.1	2.8	3.2	n.a.	1.3	-2.1	-5.2	-4.5
	Average				22.0	17.1	15.1	12.5	2.7	2.5	-8.1	12.7	2.5	3.9	0.0	1.7	-0.2	-3.6	10.1
IT Services	861 HK	Digital China Holdings Ltd	4.20	894.6	38.2	18.3	20.8	15.4	0.8	0.8	1.7	2.1	0.0	2.3	0.7	0.9	-6.7	-3.0	16.0
	1675 HK	Asiainfo Technologies Ltd	8.97	829.9	18.9	11.1	7.0	5.6	1.7	1.6	6.5	9.8	4.5	7.3	n.a.	2.1	5.0	10.2	-11.9
	596 HK	Inspur International Ltd	3.25	471.8	13.0	10.9	12.9	9.7	1.7	1.5	9.9	14.1	9.2	7.4	1.2	0.9	-5.8	-6.1	-4.1
	354 HK	Chinasoft International Ltd	3.45	1118.9	10.8	9.5	8.3	7.2	1.2	1.2	12.9	11.8	7.1	4.8	1.4	0.6	-0.3	-3.4	-10.8
	1782 HK	Vixtel Technologies Holdings	0.61	39.5	10.6	9.5	7.5	6.5	1.6	1.5	18.4	13.6	12.1	10.2	2.2	2.4	-3.2	-12.9	-36.3
	DOX US	Amdocs Ltd	66.25	9002.6	15.4	14.5	10.5	10.1	2.6	2.6	10.0	17.0	7.5	11.0	1.6	1.6	0.9	-0.7	13.1
	300166 CH	Beijing Orient National-A	13.04	1946.8	21.0	16.7	18.0	13.1	2.7	2.4	11.1	11.4	8.9	8.2	n.a.	0.5	2.4	-2.9	25.9
	000555 CH	Digital China Information -A	12.94	1761.4	33.0	26.7	n.a.	n.a.	2.5	2.4	0.9	7.1	-0.8	3.4	n.a.	n.a.	4.3	6.4	38.5
	300047 CH	Shenzhen Tianyuan Dic Info-A	8.02	722.7	18.1	14.3	12.3	9.8	1.7	1.5	7.4	8.4	4.8	4.4	n.a.	1.1	1.3	-10.5	15.6
	TECHM IB	Tech Mahindra Ltd	718.10	9721.0	14.9	13.2	10.5	9.3	3.3	2.8	21.5	19.6	13.4	12.2	n.a.	2.4	1.0	1.7	-0.4
	Average				18.5	14.3	12.2	10.0	2.0	1.8	10.7	11.3	6.5	7.1	1.4	1.5	-0.1	-2.1	4.6
	HSI Index																	4.4	0.2	3.9
	MXCN Index																	3.6	-0.2	9.7
	HSCEI Index																	3.6	0.8	4.6
	ChiNext Index																	-0.5	-1.2	32.6

SOURCES: CGIS RESEARCH, COMPANY DATA

Figure 27: AsiaInfo's 5G products
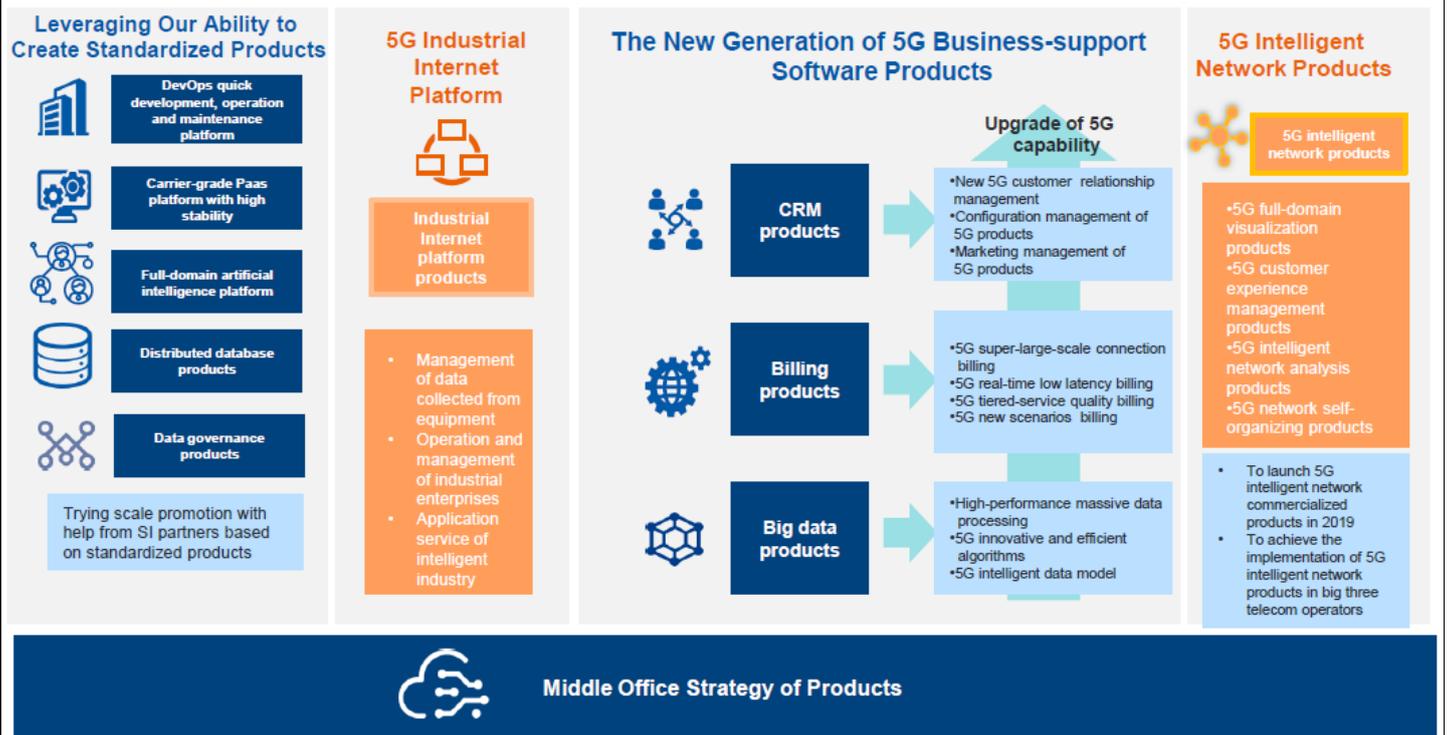
Figure 28: 5G Value chain
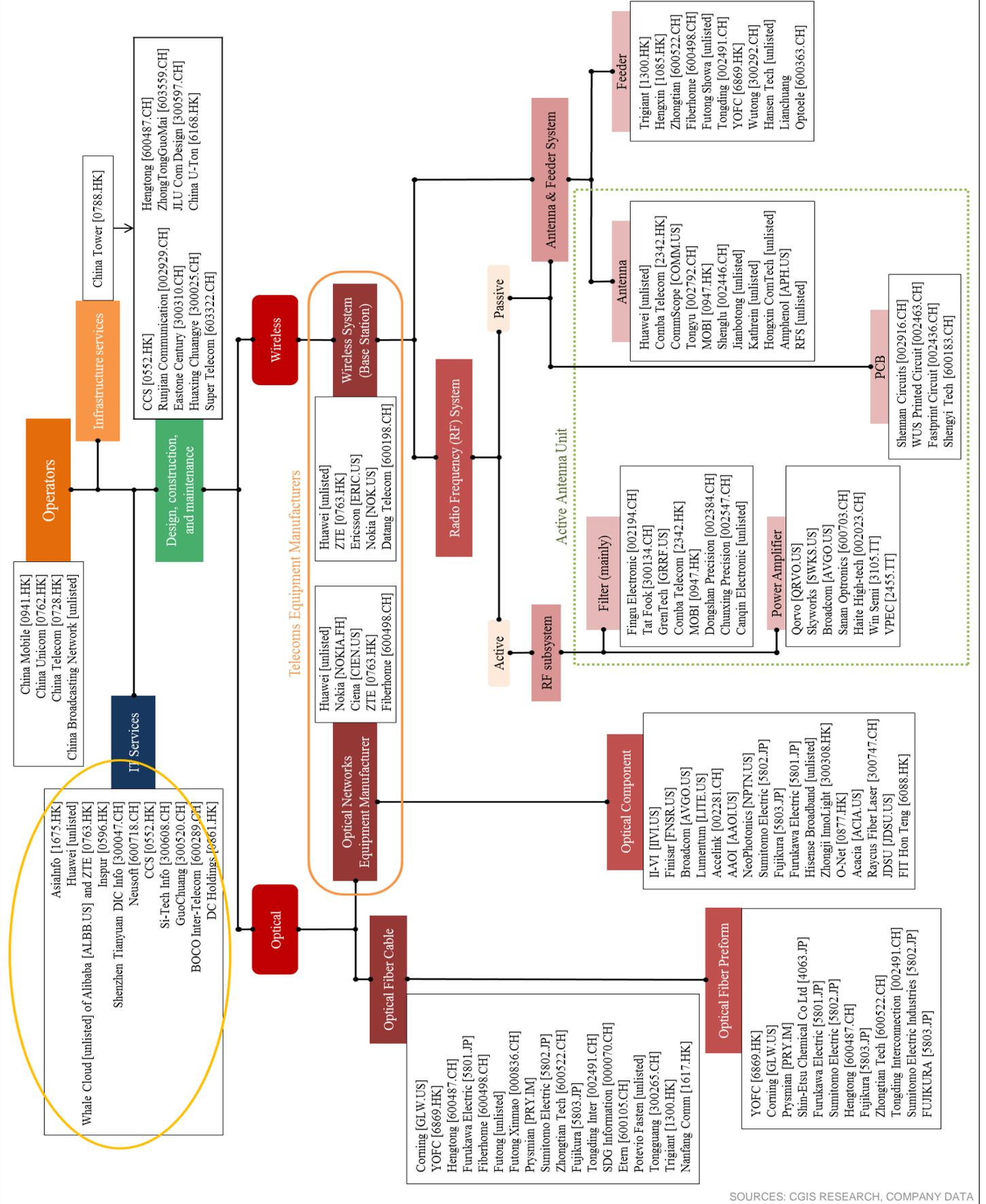
SOURCES: CGIS RESEARCH, COMPANY DATA

BY THE NUMBERS

P/BV vs ROE

Rolling P/BV (x) (lhs) — ROE (rhs)
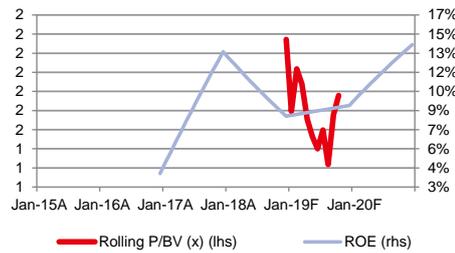
12-mth Fwd FD Normalised P/E vs FD Normalised EPS Growth

12-mth Fwd Rolling FD Normalised P/E (x) (lhs) — Diluted Normalised EPS Growth (rhs)
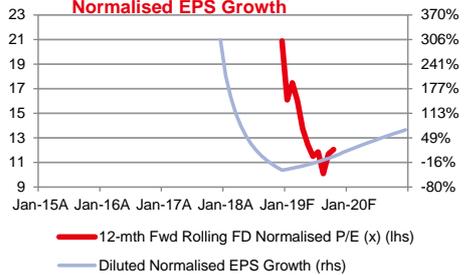
Profit & Loss

(Rmbm)	Dec-17A	Dec-18A	Dec-19F	Dec-20F	Dec-21F
Total Net Revenues	4,948	5,211	5,841	6,883	8,083
Gross Profit	1,670	1,883	2,170	2,557	3,001
Operating EBITDA	428	612	717	849	1,001
Depreciation And Amortisation	(73)	(156)	(270)	(70)	0
Operating EBIT	355	457	447	779	1,001
Financial Income/(Expense)	(65)	(44)	(35)	(37)	(37)
Pretax Income/(Loss) from Assoc.	0	(1)	(1)	(1)	(2)
Non-Operating Income/(Expense)	165	(45)	58	59	60
Profit Before Tax (pre-EI)	454	367	469	799	1,023
Exceptional Items	(48)	(55)			
Pre-tax Profit	407	312	469	799	1,023
Taxation	(89)	(109)	(160)	(272)	(348)
Exceptional Income - post-tax					
Profit After Tax	318	203	309	528	676
Minority Interests	11				
Preferred Dividends					
FX Gain/(Loss) - post tax					
Other Adjustments - post-tax					
Preference Dividends (Australia)					
Net Profit	329	203	309	528	676
Normalised Net Profit	366	258	309	528	676
Fully Diluted Normalised Profit	377	258	309	528	676

Cash Flow

(Rmbm)	Dec-17A	Dec-18A	Dec-19F	Dec-20F	Dec-21F
EBITDA	428.0	612.2	717.2	849.1	1,001.4
Cash Flow from Invt. & Assoc.					
Change In Working Capital	31.8	8.4	23.6	(99.6)	(267.4)
(Incr)/Decr in Total Provisions	55.3	39.0	39.0	39.0	39.0
Other Non-Cash (Income)/Expense	(20.0)	227.9	(38.6)	(32.7)	(22.4)
Other Operating Cashflow	71.5	(212.4)	(222.3)	(19.2)	54.2
Net Interest (Paid)/Received	(65.0)	(43.7)	(35.1)	(37.3)	(36.6)
Tax Paid	(56.2)	(91.7)	(134.3)	(228.8)	(292.8)
Cashflow From Operations	445.4	539.6	349.4	470.5	475.5
Capex	(10.3)	(66.6)	(30.6)	(33.0)	(35.5)
Disposals Of FAs/subsidiaries					
Acq. Of Subsidiaries/investments					
Other Investing Cashflow	(73.4)	(738.0)	33.3	12.2	(7.4)
Cash Flow From Investing	(83.7)	(804.6)	2.6	(20.8)	(42.9)
Debt Raised/(repaid)	(419.7)	68.3	(1,168.4)	133.3	65.5
Proceeds From Issue Of Shares	(4.5)	773.8	0.0	0.0	0.0
Shares Repurchased					
Dividends Paid	0.0	0.0	0.0	(123.7)	(158.3)
Preferred Dividends					
Other Financing Cashflow	(45.3)	(200.8)	0.0	0.0	0.0
Cash Flow From Financing	(469.5)	641.2	(1,168.4)	9.6	(92.8)
Total Cash Generated	(107.8)	376.2	(816.4)	459.3	339.8
Free Cashflow To Equity	(58.0)	(196.7)	(816.4)	583.0	498.1
Free Cashflow To Firm	445.7	(194.4)	402.0	508.6	495.8

SOURCES: CGIS RESEARCH, COMPANY DATA, BLOOMBERG

BY THE NUMBERS… cont'd

Balance Sheet

(Rmbm)	Dec-17A	Dec-18A	Dec-19F	Dec-20F	Dec-21F
Total Cash And Equivalents	1,988	2,303	1,487	1,946	2,286
Total Debtors	2,697	2,446	2,506	3,054	3,587
Inventories	7	0	0	0	0
Total Other Current Assets	256	19	22	25	29
Total Current Assets	**4,947**	**4,768**	**4,014**	**5,025**	**5,901**
Fixed Assets	263	301	303	305	307
Total Investments	1,120	997	1,011	1,026	1,042
Intangible Assets	1,932	1,932	1,932	1,932	1,932
Total Other Non-Current Assets	0	0	0	0	0
Total Non-current Assets	**3,315**	**3,230**	**3,246**	**3,263**	**3,282**
Short-term Debt	1,155	1,915	747	880	946
Current Portion of Long-Term Debt					
Total Creditors	2,891	2,445	2,532	2,984	3,253
Other Current Liabilities	439	274	296	321	348
Total Current Liabilities	**4,485**	**4,634**	**3,575**	**4,185**	**4,547**
Total Long-term Debt	593				
Hybrid Debt - Debt Component					
Total Other Non-Current Liabilities	15	0	0	0	0
Total Non-current Liabilities	**607**	**0**	**0**	**0**	**0**
Total Provisions	131	128	140	154	170
Total Liabilities	**5,223**	**4,762**	**3,716**	**4,339**	**4,717**
Shareholders' Equity	3,019	3,236	3,545	3,949	4,466
Minority Interests	20	0	0	0	0
Total Equity	**3,039**	**3,236**	**3,545**	**3,949**	**4,466**

Key Ratios

	Dec-17A	Dec-18A	Dec-19F	Dec-20F	Dec-21F
Revenue Growth	1.9%	5.3%	12.1%	17.8%	17.4%
Operating EBITDA Growth	133%	43%	17%	18%	18%
Operating EBITDA Margin	8.7%	11.7%	12.3%	12.3%	12.4%
Net Cash Per Share (Rmb)	0.38	0.54	1.02	1.47	1.85
BVPS (Rmb)	4.84	4.53	4.89	5.45	6.17
Gross Interest Cover	4.22	6.47	8.95	13.24	15.84
Effective Tax Rate	21.8%	34.9%	34.0%	34.0%	34.0%
Net Dividend Payout Ratio	NA	NA	40.0%	30.0%	30.0%
Accounts Receivables Days	197.7	180.1	154.7	147.8	149.9
Inventory Days	0.52	0.39	0.00	0.00	0.00
Accounts Payables Days	324.5	292.6	247.4	233.3	223.9
ROIC (%)	21.0%	25.0%	22.6%	40.3%	49.8%
ROCE (%)	7.6%	9.5%	9.5%	17.0%	19.5%
Return On Average Assets	5.16%	3.72%	4.51%	7.27%	8.15%

Appendix

Profiles of directors and senior management

Figure 29: Profiles of selected members of directors and senior management

Member	Positions		Profiles
Dr. TIAN Suning	Chairman	Executive Director	Dr. TIAN co-founded the Group in 1994. He has over 20 years of experience in software products, IT services and software solutions, and is primarily responsible for the overall strategic planning and business direction of the Group.
Mr. GAO Nianshu	CEO		Mr. GAO has over 20 years of experience in senior management in large telecommunications companies. He served as the general manager of both the data department and the market operations department of China Mobile Communications Corporation between September 2005 and July 2016.
Mr. DING Jian			Mr. DING has over 15 years of experience in investment in the telecommunications, media and technology industries and is primarily responsible for formulating the business plans, strategies and major decisions of the Group. He served as the chairman of the board of AsiaInfo-Linkage, Inc. between April 2003 and July 2010, and has also served as a co-chairman since July 2010.
Mr. ZHANG Yichen	Non-executive Director		Mr. ZHANG joined the Group in January 2014. He has over 30 years of experience in the financial industry and is primarily responsible for providing professional opinions and judgments to the Board.
Mr. XIN Yuesheng			Mr. XIN joined the Group in August 2016. He has over 26 years of experience in finance and investment and is primarily responsible for providing professional opinions and judgments to the Board.
Mr. ZHANG Liyang			Mr. ZHANG joined the Group in January 2018. He is responsible for providing professional opinions and judgments to the Board. He has over 10 years of experience in business strategy and finance.
Dr. GAO Jack Qunyao	Independent Non-executive Director		Dr. GAO has extensive experience in IT, media, entertainment and venture capital. He has been an adjunct professor of the business school of The Chinese University of Hong Kong since 2011.
Dr. ZHANG Ya-Qin			Dr. ZHANG has extensive experience in the technology and business operations of the wireless and satellite communications, security, networking and digital video segments.
Mr. GE Ming			Mr. GE has extensive experience in the field of auditing and advisory services and has assisted in the listing of various Chinese companies on the Stock Exchange.
Ms. HUANG Ying	CFO	Senior vice president	Ms. HUANG joined the Group in April 2017 and is primarily responsible for the management of the finance, tax, auditing and legal matters of the Group. Ms. HUANG has over 20 years of experience in financial management in the telecommunications industry, and has over 10 years of experience in senior management roles.
Mr. CHEN Wu	General manager of the business development and government affairs center of the Group		Mr. CHEN joined the Group in April 2011 and is primarily responsible for the overall management of business development and government affairs. He has over 15 years of experience in business development and dealing with government affairs, and has over 10 years of experience in senior management roles. He served as the director of telecommunications division of Cisco Systems (China) Networking Technology Co., Ltd. from August 2007 to April 2011.
Mr. LIANG Bin	General manager of the business division for China Mobile of the Group	Vice president	Mr. LIANG is primarily responsible for the overall operations management of the business division for China Mobile. He has over 20 years of experience in the IT and telecommunications industries, and over 15 years of experience in middle and senior management roles. He served as the president of the business division for China Telecom, chairman and president of the cloud information division, vice president of the China Unicom division, deputy general manager of the cable division, and general manager of the wireless division of the Group from August 2002 to December 2016.
Ms. SUN Mingjie	General manager of the Group's operations management center		Ms. SUN is primarily responsible for the overall management of the operations management center. She has over 20 years of experience in the IT and telecommunications industries, and over 10 years of experience in operations management and middle and senior management roles. She served as vice president and senior director of the business management center, director of engineering of the northern district of the business division for China Mobile, and various other positions in the Group from July 1996 to October 2016.
Dr. OUYANG Ye	CTO		Dr. OUYANG joined the Group in July 2018 and is primarily responsible for the research, development, and innovation of the Group's products and technologies. He has over 10 years of distinguished experience in technology research, development, and management in the telecommunications industry. He has been a Verizon Associate Fellow in Verizon since March 2016 (a Fellow title is Verizon's highest commendation for technical excellence and indicates a top-tier scientist of Verizon). He is one of only 48 Fellows among Verizon's 170,000 employees globally.

SOURCES: CGIS RESEARCH, COMPANY DATA

Company history

Year	Description
Figure 30: Key milestones in AsiaInfo's development	
1993	Dr. TIAN Suning and Mr. DING Jian, together with certain other individuals, founded AsiaInfo Holdings and operated the business mainly as an internet content provider.
1995	AsiaInfo China was incorporated under the laws of the China and AsiaInfo Holdings' major business commenced operations in China. Subsequently, AsiaInfo Holdings designed and undertook numerous landmark projects, including China's first commercial internet national backbone network, ChinaNet, China's first national broadband IP network, CNCNet, China's first mobile IP backbone network, and the world's then largest VoIP network, playing an instrumental role in the establishment and historic development of China's national information infrastructure.
1997	AsiaInfo began to provide BSS/OSS services to China Mobile, China Telecom and China Unicom.
2000	AsiaInfo Holdings was listed on the NASDAQ on March 3, 2000, making it among the first batch of Chinese high-technology companies to be listed on the NASDAQ.
2003	AsiaInfo was incorporated in the BVI on July 15, 2003.
2010	AsiaInfo Holdings merged with Linkage and was renamed AsiaInfo-Linkage, Inc. AsiaInfo Nanjing became part of AsiaInfo, making AsiaInfo the largest provider of telecom software products and related services in China.
2014	AsiaInfo Holdings was delisted from the NASDAQ on January 15, 2014, pursuant to its privatization and was renamed AsiaInfo Holdings, LLC. CITIC Capital Entities, AsiaInfo's controlling shareholder before listing, became the single largest shareholder of AsiaInfo Holdings after completion of the privatization.
2015	With years of experience accumulated in technology and customer relations, AsiaInfo began to launch data-driven operation services, IoT platforms and IoT industry application solutions for telecom operators and their government and enterprise customers, representing a key milestone of the development of AsiaInfo's new business focus.
2017	AsiaInfo developed the integrated CRM system for China Post, representing another key milestone in AsiaInfo's expansion in the large enterprise market.

SOURCES: CGIS RESEARCH, COMPANY DATA