DIGITIMES Research: China Smartphone AP Tracker – 3Q 2018

China smartphone AP shipments

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Introduction

Based on surveys and analyses conducted by Digitimes Research in China in September 2018, smartphone application processor (AP) shipments to China surged 13.9% sequentially in third-quarter 2018 thanks to high season effects. However, as vendors became conservative on orders amid uncertainty in market demand in the fourth quarter, third-quarter growth fell short of the level seen in the corresponding period of 2017, down 2.2% on a yearly basis. Looking forward into fourth-quarter 2018, weak downstream demand will likely result in a 4.6% on-quarter decline in smartphone AP shipments to China but on-year growth can be expected due to a low base period in fourth-quarter 2017.

With weakening demand in their domestic China market in 2018, smartphone vendors including Huawei, Xiaomi, Oppo and BBK have been all exerting efforts toward overseas markets. Despite rising US-China trade tensions, they have all made progress in India and Eastern Europe, a major force driving smartphone AP shipments to China vendors. Huawei has reaped the largest benefit, which in turn has shored up shipments from Hisilicon.

Emerging applications such as 3D sensing and under-display fingerprint solutions have yet to spur smartphone sales, making little contribution to smartphone AP shipments, as their technologies and supply chains are still not mature enough.

According to Digitimes Research's observations, smartphone processors with AI accelerators will still have a low penetration in the China market (excluding Apple) in fourth-quarter 2018 as AI accelerators will add to AP costs and prices while bringing insignificant benefits to end users. In terms of process technologies, the market is seeing an obvious shift with the share of the 28nm node on a continuing decline.

In fourth-quarter 2018, MediaTek plans to launch P70, which however comes with no major enhancements to P60, so it may not be able to effectively help MediaTek gain market share and will make little impact on Qualcomm. In response, Qualcomm will introduce S670, S675 and S710 to the market and will continue to see its AP shipments on the rise as it enjoys an already high penetration among leading China-based smartphone vendors.

With Qualcomm's flagship processors debuting soon in fourth-quarter 2018, Digitimes Research expects that smartphones based on Qualcomm's 7nm processors will enter the market in first-half 2019, which will further boost the share of 7nm processors among smartphone AP shipments.

Key factors affecting China smartphone AP shipments

Supply side: 4Q18

Materials and components

Silicon wafers for semiconductor production remain in tight supply, with rising prices affecting IC costs.

With an obvious shift to more advanced process nodes, more 28nm capacity becomes available, allowing IC vendors to improve cost structures of entry-level processors and introduce upgrade versions, thereby boosting shipments to emerging markets.

Smartphone processors are moving fast toward more advanced nodes in 2018. However, TSMC’s 7nm and 12nm lines are running near full capacity, which will be a disadvantage for growth in shipments of mid-range and high-end phones.

Upstream suppliers

Qualcomm plans to launch three mid- and high-end processors - S670, S675 and S710, targeting different price ranges. S710 is being used in 11 phone models marketed by Samsung, Xiaomi, Oppo, BBK, Nokia and Meizu.

MediaTek's new P70, only a slight improvement from P60 in SoC and GPU clock rates, can hardly help boost MediaTek's market share. P70 supports Cat.7 communication, rather than Cat.12 as previously anticipated.

P70's SoC clock rate is increased by 0.1GHz. Its GPU speed is increased by 100MHz with the same number of cores and the same Mali G72 architecture as P60. It is expected P70 will take over P60 to be the mainstream smartphone AP in first-half 2019, rather than expand into a new price range.

With Google's Android policy to make smartphone platforms more lightweight, Android Go enables larger profit margins for developers. Aiming to reduce hardware requirements on smartphones running Android systems and slim down pre-loaded programs, Android Go running on smartphones only needs 1GB RAM, instead of 3GB-4GB RAM, to support Google services without a hitch. The decrease in costs will favor 4G upgrades in emerging markets and spur shipment growth of entry-level AP.

Table 1: Key factors affecting China smartphone AP shipments in 4Q18: Supply side

Factor	Item	Analysis	Influence on shipments
Materials and components	Wafer	Supply of silicon wafers for semiconductor production remains tight.	↓ ★★
	Foundry capacity	Foundries can offer more 28nm capacity as smartphone AP process moves toward miniaturization. This will favor entry-level AP in terms of costs and upgrades.	↑ ★★
		TSMC's 7nm and 12nm lines are running at full capacity, which will limit shipments of mid-range and high-end AP.	↓ ★★
Upstream suppliers	Qualcomm	Qualcomm puts S670, S675 and S710 on the market, targeting different market segments.	↑ ★★★
	MediaTek	P70 only provides minor improvements from P60, which may offer little help to MediaTek's market operation.	↓ ★★
	Google	Android Go imposes lower requirements on smartphone hardware, which reduces development costs for entry-level phones and accelerates 4G upgrades in emerging markets.	↑ ★★

Note: The more stars, the higher the influence. ↓ indicates negative influence; ↑ indicates positive influence.
Source: Digitimes Research, October 2018

Demand side: 4Q18

China's currency weakens against the US dollar amid rising US-China trade tensions and US interest rates. Medium and small vendors have difficulty absorbing the exchange loss as they purchase components or design services in US dollars. This also adds to China-based system integrators' costs. System integrators plan to transfer the increase in costs due to exchange loss to consumers (i.e. higher end device prices) in the fourth quarter, which may impact phone sales.

China-based vendors originally targeted to penetrate into the US market in 2018 but have encountered setbacks due to political intervention. Putting their plans toward the US market on hold, China-based vendors now target Southeast Asia, South Asia and Eastern Europe with their entry-level and mainstream smartphones, which will spur demand for entry-level and mainstream AP.

Table 2: Key factors affecting China smartphone AP shipments in 4Q18: Demand side

Factor	Item	Analysis	Influence on shipments
Market trends	US-China trade tensions	With the US dollar on the rise amid US-China trade tension, vendors are holding back on component orders.	↓ ★
	Vendors' overseas expansion	China-based vendors are aggressively expanding overseas, boosting demand for smartphone AP in China.	↑ ★★

Note 1: The more stars, the higher the influence. ↓ indicates negative influence; ↑ indicates positive influence.
Note 2: AP specs for 4G feature phones have come close to those for smartphones starting 2017, so they are considered smartphone APs in this report.
Source: Digitimes Research, October 2018

China smartphone AP

Smartphone AP shipments to China surged 13.9% on quarter, totaling 226 million units in third-quarter 2018.

In second-quarter 2018, smartphone vendors successfully depleted inventory accumulated in the prior quarter in preparation for India government's import duty hike on mobile phones. In third-quarter 2018, the market enjoyed high season effects with downstream vendors ramping up efforts to meet their whole-year target.

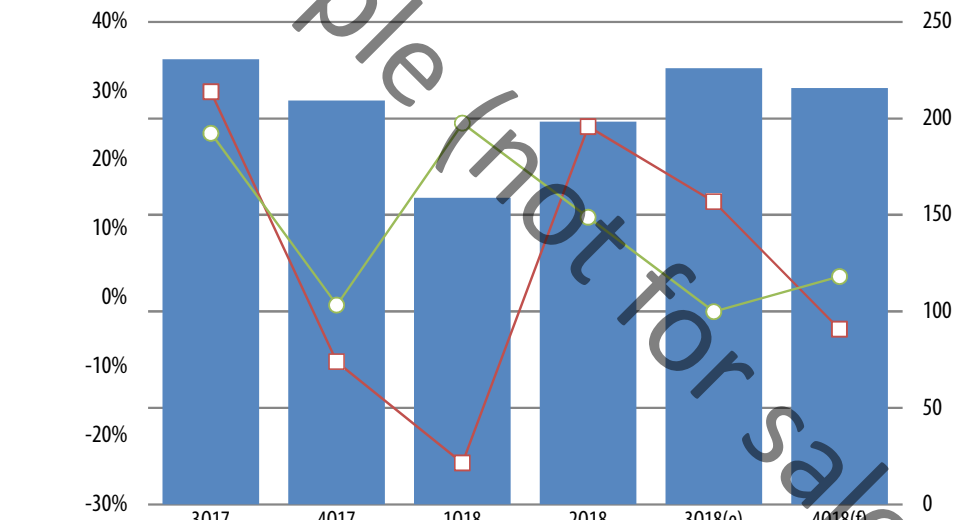
Amid uncertainty in downstream market demand, smartphone vendors were more conservative toward inventory preparation in the third quarter, so the sequential growth of 13.9% still fell below the sequential growth of 30.1% seen in third-quarter 2017.

On a year-over-year basis, smartphone AP shipments dipped 2.2% in third-quarter 2018 due to a high base period in third-quarter 2017, during which smartphone vendors were ramping up inventory ahead of China's 19th CPC National Congress and National Day Golden Week.

Smartphone AP shipments to China are expected to come to 216 million units in fourth-quarter 2018, slipping 4.6% sequentially due to weak downstream demand.

Total 2018 smartphone AP shipments to China are estimated to reach 799 million units. Overseas expansion efforts have allowed China-based vendors to gain ground in India, Europe, Eastern Europe and Russia, which is expected to boost 2018 smartphone AP shipments to China by 7.3%.

Chart 1: China smartphone AP shipments, 3Q17-4Q18 (m units)



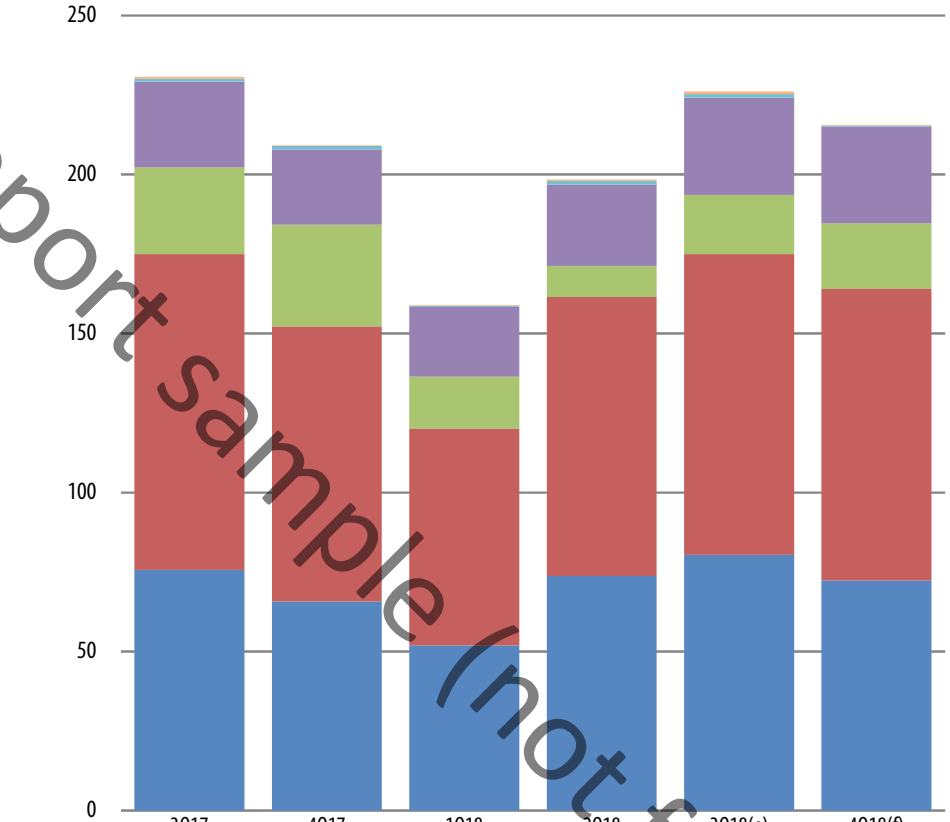
	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Shipments	230.7	209.2	159.0	198.4	226.0	215.6
Q/Q	29.8%	-9.3%	-24.0%	24.8%	13.9%	-4.6%
Y/Y	23.8%	-1.1%	25.3%	11.6%	-2.0%	3.1%

Source: Digitimes Research, October 2018

Shipments breakdown

Shipments by supplier

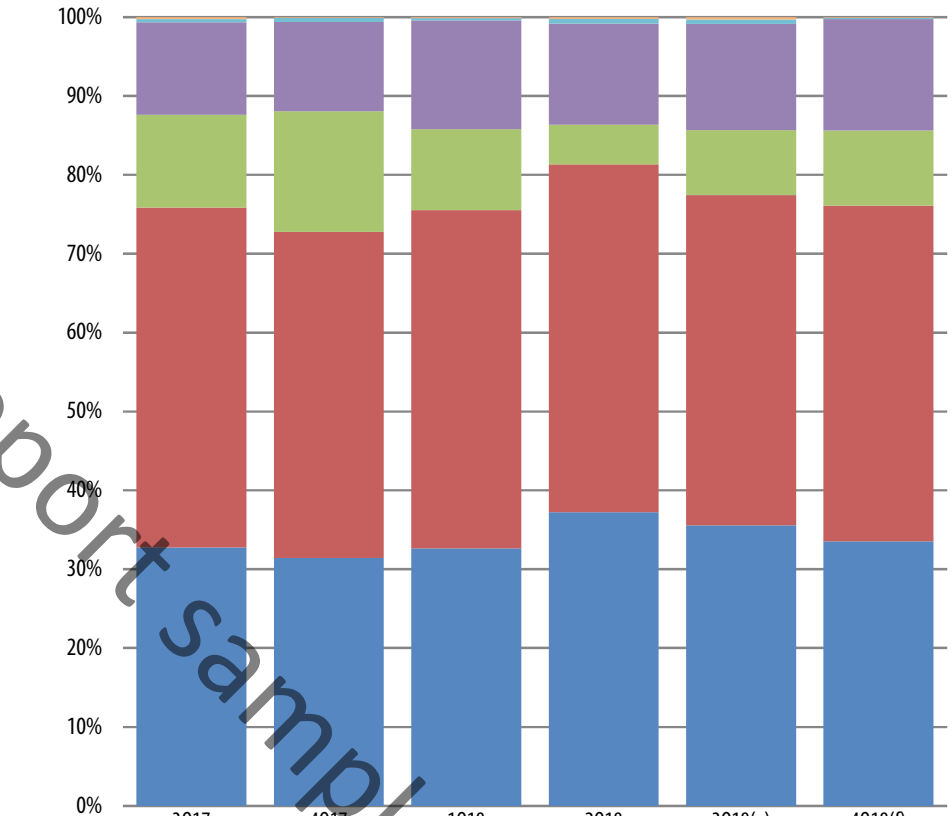
Chart 2: Shipments by supplier, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Others	0.6	0.2	0.2	0.4	0.7	0.2
Samsung	0.9	1.1	0.5	1.2	1.2	0.3
Hisilicon	27.0	23.7	21.9	25.5	30.5	30.5
Spreadtrum	27.2	32.0	16.3	9.9	18.6	20.6
Qualcomm	99.4	86.5	68.2	87.6	94.6	91.7
Mediatek	75.6	65.7	51.9	73.8	80.4	72.3

Source: Digitimes Research, October 2018

Chart 3: Shipment share by supplier, 3Q17-4Q18



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Others	0.3%	0.1%	0.1%	0.2%	0.3%	0.1%
Samsung	0.4%	0.5%	0.3%	0.6%	0.5%	0.1%
Hisilicon	11.7%	11.3%	13.8%	12.9%	13.5%	14.1%
Spreadtrum	11.8%	15.3%	10.3%	5.0%	8.2%	9.6%
Qualcomm	43.1%	41.3%	42.9%	44.2%	41.9%	42.5%
Mediatek	32.8%	31.4%	32.6%	37.2%	35.6%	33.5%

Source: Digitimes Research, October 2018

Shipments by architecture

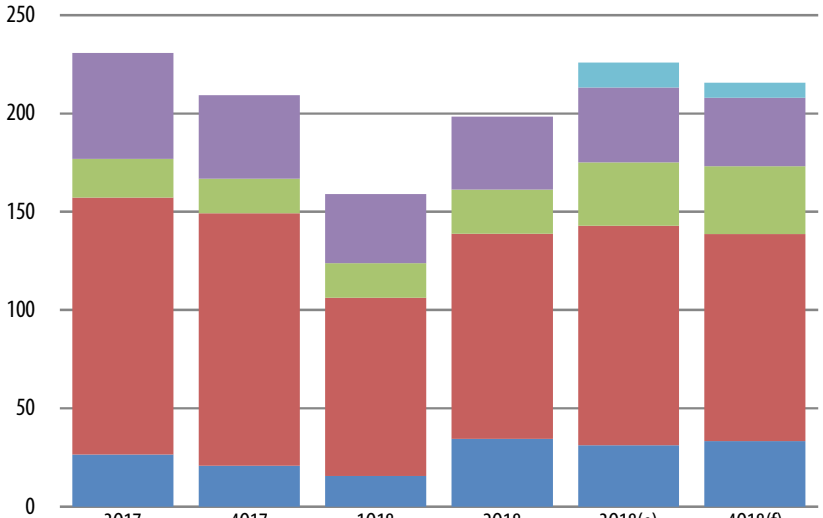
Cortex-A53 will remain the mainstream smartphone AP architecture in China in fourth-quarter 2018. The share of Cortex-A53 dropped below the 50% mark in third-quarter 2018. Its share is expected to go from 61.5% in fourth-quarter 2017 to 48.8% in fourth-quarter 2018.

The share of in-house-developed architectures will expand gradually to reach 16% in fourth-quarter 2018, growing at a rate faster than the estimate (14.9%) given in the previous report (released in July). Qualcomm has increased the use of its own Kryo architecture among its S600 and S700 series, including mid-range and high-end processors as well as mainstream models such as S660, S636 and S632. S710 sales have outperformed expectation.

With the China market experiencing an obvious upgrade in consumer spending, smartphone prices are on the rise and consumers demand better spec for entry-level AP. As a result, the share of Cortex-A7 is on the decline. The share of Cortex-A7 will likely go from 22.1% in first-quarter 2018 to 16.2% in fourth-quarter 2018.

Skipping Cortex-A75, Hisilicon went straight for Cortex-A76. The share of Cortex-A76 is expected to reach 3.5% in fourth-quarter 2018. Hisilicon is currently the only vendor adopting the Cortex-A76 architecture.

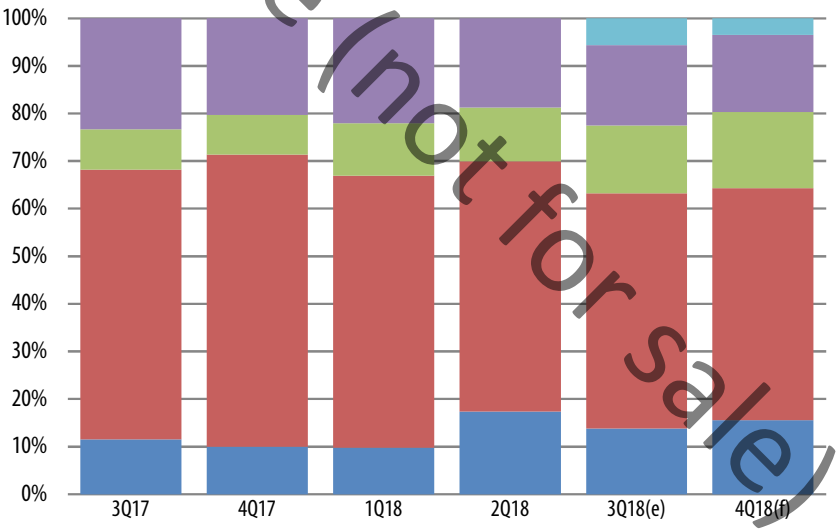
Chart 4: Shipments by architecture, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Cortex-A76	0.0	0.0	0.0	0.0	12.8	7.7
Cortex-A7	53.8	42.5	35.1	37.2	38.1	34.8
Kryo	19.6	17.4	17.5	22.4	32.2	34.5
Cortex-A53	130.8	128.4	90.8	104.4	111.7	105.2
Cortex-A57/A72/A73	26.5	20.9	15.6	34.4	31.2	33.4

Source: Digitimes Research, October 2018

Chart 5: Shipment share by architecture, 3Q17-4Q18



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Cortex-A75	0.0%	0.0%	0.0%	0.0%	5.7%	3.5%
Cortex-A7	23.3%	20.3%	22.1%	18.8%	16.9%	16.1%
Kryo	8.5%	8.3%	11.0%	11.3%	14.2%	16.0%
Cortex-A53	56.7%	61.4%	57.1%	52.6%	49.4%	48.8%
Cortex-A57/A72/A73	11.5%	10.0%	9.8%	17.3%	13.8%	15.5%

Source: Digitimes Research, October 2018

Shipments by manufacturing process

In third-quarter 2018, Hisilicon launched its Kirin 980, manufactured on TSMC's 7nm node, in sync with Huawei's Mate series. The share of 7nm processors will likely come to 3.8% in fourth-quarter 2018, mainly contributed by Hisilicon, followed by Qualcomm.

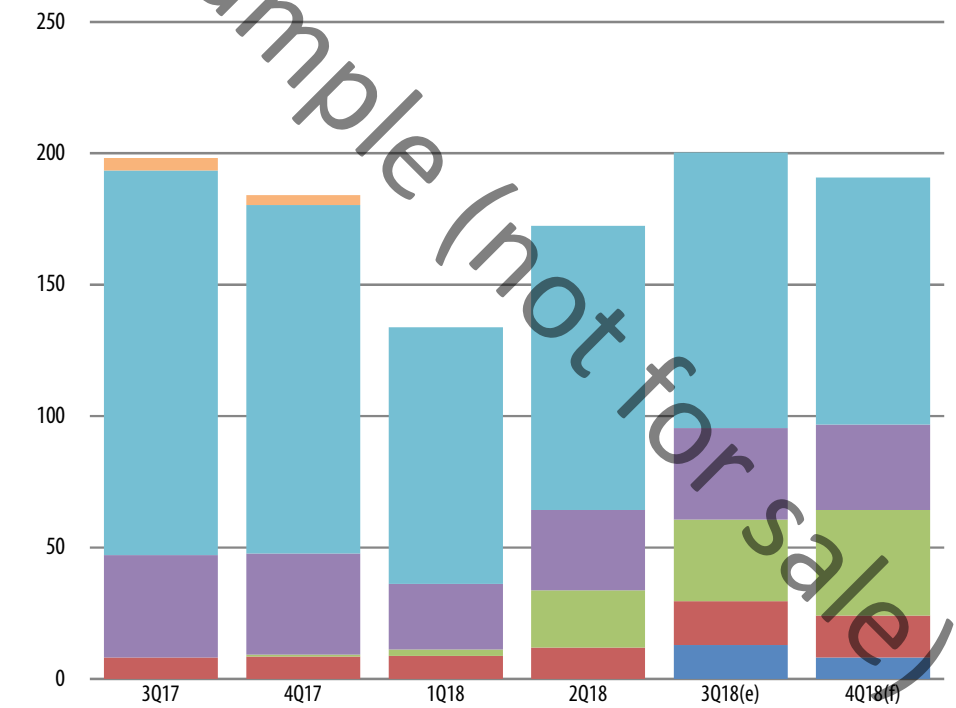
With vendors having already stocked up 7nm processors in third-quarter 2018, shipments of 7nm APs will drop in the fourth quarter, resulting in a 1.9pp drop for the segment's share.

Qualcomm's and Samsung's 7nm processors (including equivalent process nodes) will enter mass production later than Huawei's, likely to be available in fourth-quarter 2018. Smartphones using Qualcomm's and Samsung's 7nm processors (including equivalent process nodes) are expected to debut in first-quarter 2019, slightly later than Huawei phones.

The China market is seeing a growing number of 12nm smartphone AP, mainly contributed by MediaTek and Hisilicon. The share of 12nm processors will expand to 18.6% in fourth-quarter 2018, up 18.3pp from the corresponding period of 2017, surpassing 14nm processors and only second to 28nm processors.

28nm processors are definitely getting replaced with their share on the decline since third-quarter 2017, falling below 50% in third-quarter 2018 and further sliding to 43.6% in fourth-quarter 2018.

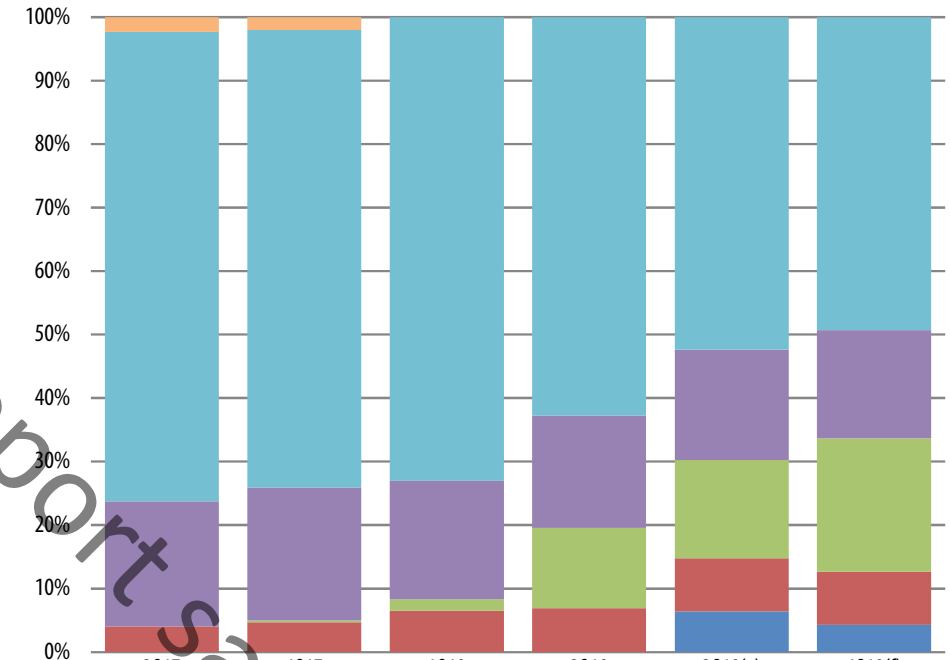
Chart 6: Shipments by manufacturing process, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
>28nm	4.6	3.8	0.0	0.0	0.0	0.0
28nm	146.5	132.6	97.6	108.1	104.9	94.0
14nm	39.0	38.5	25.0	30.6	34.8	32.6
12nm	0.0	0.6	2.4	21.8	31.0	40.1
10nm	8.1	8.6	8.7	11.9	16.7	16.0
7nm	0.0	0.0	0.0	0.0	12.9	8.2

Source: Digitimes Research, October 2018

Chart 7: Shipment share by manufacturing process, 3Q17-4Q18



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
>28nm	2.0%	1.8%	0.0%	0.0%	0.0%	0.0%
28nm	63.5%	63.4%	61.4%	54.5%	46.4%	43.6%
14nm	16.9%	18.4%	15.7%	15.4%	15.4%	15.1%
12nm	0.0%	0.3%	1.5%	11.0%	13.7%	18.6%
10nm	3.5%	4.1%	5.5%	6.0%	7.4%	7.4%
7nm	0.0%	0.0%	0.0%	0.0%	5.7%	3.8%

Source: Digitimes Research, October 2018

Shipments of AI-supported APs

Smartphone chips with special-purpose AI processing units implementing heterogeneous computing or employing neural network processing units (NPU) to support deep learning inference tasks on smartphones still lack specific applications and add to smartphone costs, so their penetration is showing flat growth. Their penetration reached 26.9% in third-quarter 2018, up 1.9pp, thanks to Hisilico's Kirin 980.

Aside from Hisilicon, Qualcomm will also make increasing contribution to the penetration of smartphone AP with AI accelerators in fourth-quarter 2018. However, volume shipments will likely come in first-half 2019. Furthermore, the use of NPU will add to smartphone AP costs and prices, so customers may be less willing to incorporate them. As a result, the share of smartphone AP with AI accelerators will drop to 20.8%, the first decline ever. (In the discussion of this report, Apple processors are not included in smartphone AP shipments to China.)

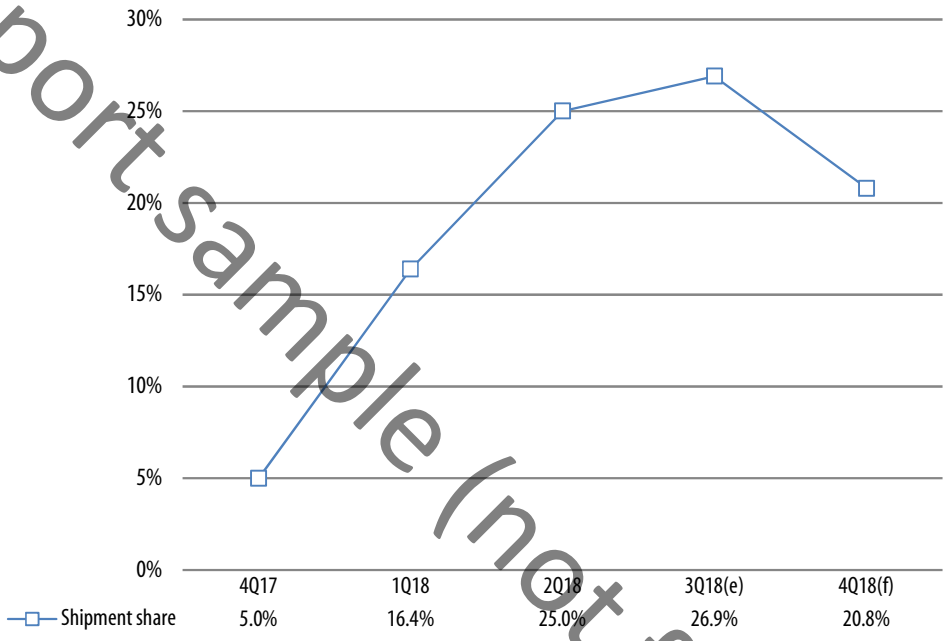
IC designers and smartphone vendors have different demands and designs for smartphone AP with NPU.

Apple's processors use NPU for Face ID. A12 employs an 8-core NPU. On the other hand, Qualcomm and MediaTek make use of heterogeneous computing to handle AI tasks to meet diverse customer requirements. Heterogeneous computing combines graphics and image processing units such as DSP, ISP and GPU computing in parallel to process AI tasks so as to accommodate a variety of evolving algorithms and AI applications.

Digitimes Research thinks Qualcomm's next-generation chips will still adopt heterogeneous computing carried out by its unique Hexagon DSP to handle AI applications. However, Qualcomm's R&D on NPU is also underway. Different from Hisilicon processors used exclusively by Huawei phones and Apple processors used exclusively by iPhones, Qualcomm's chips have to support wide-ranging customer requirements with respect to AI computing, fast-evolving algorithms and cost considerations. Moreover, Qualcomm has to also take into account the increase in AP costs and prices if NPU is incorporated in its smartphone chips.

In a similar situation to Qualcomm's, MediaTek is nevertheless even more cost sensitive. Digitimes Research thinks MediaTek has no plan to include NPU in its AP SoC to launch in first-half of 2019. As indicated in the previous report (released in July), MediaTek's P70 employs APU to handle AI tasks, instead of independent NPU.

Chart 8: Shipment share of AI-supported APs, 4Q17-4Q18 (m units)



Source: Digitimes Research, October 2018

Supplier analysis

MediaTek

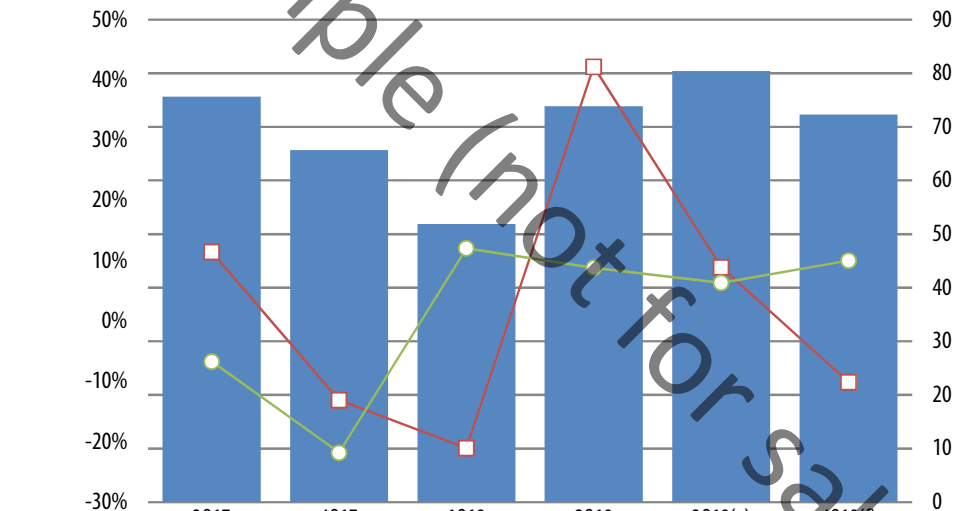
Thanks to increasing shipments of its new P60, P22 and A22 processors in third-quarter 2018, MediaTek was able to deliver an 8.9% sequential growth in third-quarter 2018 shipments. MediaTek shipped a total of 80.4 million processors in third-quarter 2018, accounting for a 35.6% share of the China market. MediaTek is estimated to ship 72.3 million processors in fourth-quarter 2018 with its market share down to 33.5% in China.

Affected by Unisoc (Spreadtrum) releasing new processors targeting the entry-level segment and MediaTek's major customers suffering weak growth, MediaTek's market share has been dropping from the 37.2% recorded in second-quarter 2018.

With orders returning from Oppo and BBK in second-quarter 2018, MediaTek's third-quarter shipments increased 6.3% from a year ago. For the fourth quarter, MediaTek can expect a 10% on-year growth but on a quarter-over-quarter basis, shipments will drop 10.1% amid bleak outlook for customer demand.

MediaTek is estimated to show a 9% growth in AP shipments to China in 2018, with total shipments reaching 278 million units and representing a 34.8% market share. MediaTek's market share was 34.3% in 2017.

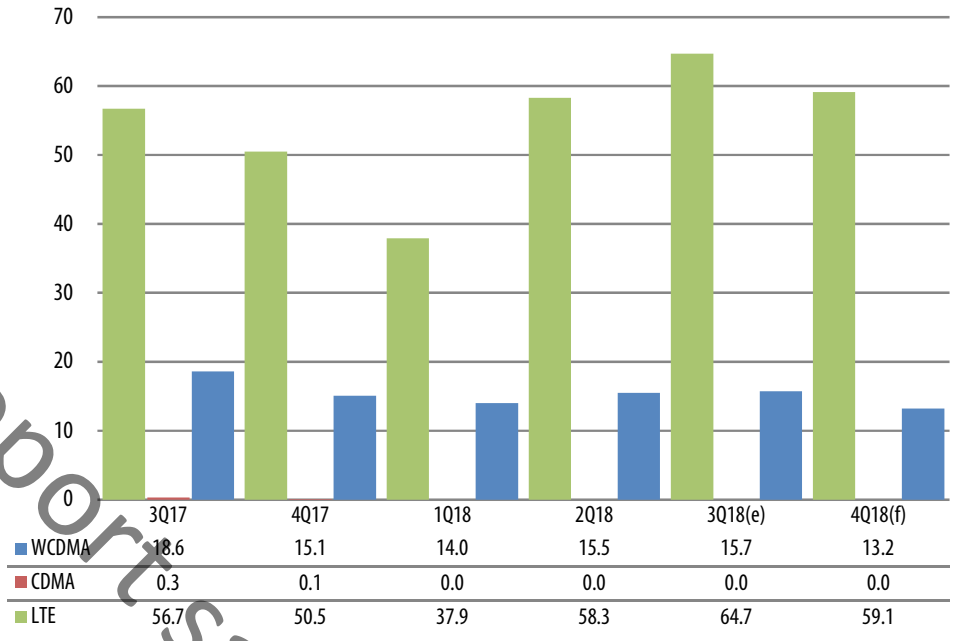
Chart 9: MediaTek smartphone AP shipments, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Shipments	75.6	65.7	51.9	73.8	80.4	72.3
Q/Q	11.5%	-13.1%	-21.0%	42.2%	8.9%	-10.1%
Y/Y	-6.7%	-21.8%	12.1%	8.8%	6.3%	10.0%

Source: Digitimes Research, October 2018

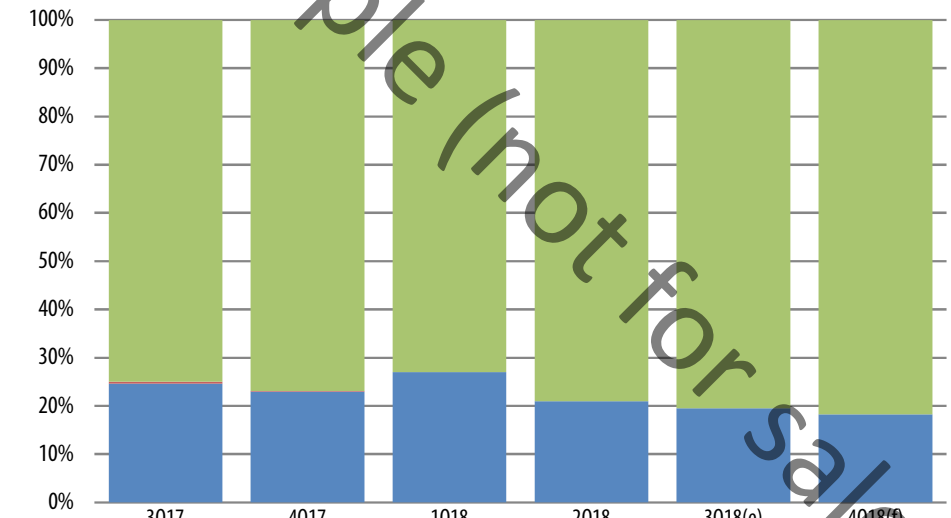
Chart 10: MediaTek shipments by baseband type, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
WCDMA	18.6	15.1	14.0	15.5	15.7	13.2
CDMA	0.3	0.1	0.0	0.0	0.0	0.0
LTE	56.7	50.5	37.9	58.3	64.7	59.1

Source: Digitimes Research, October 2018

Chart 11: MediaTek shipment share by baseband type, 3Q17-4Q18



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
LTE	75.0%	76.9%	73.0%	79.0%	80.5%	81.7%
CDMA	0.4%	0.2%	0.0%	0.0%	0.0%	0.0%
WCDMA	24.6%	23.0%	27.0%	21.0%	19.5%	18.3%

Source: Digitimes Research, October 2018

Thanks to outstanding P60 sales in third-quarter 2018, the share of Cortex-A57 and above architectures among MediaTek's AP shipments to China rose to 27.5%, up from the prior quarter.

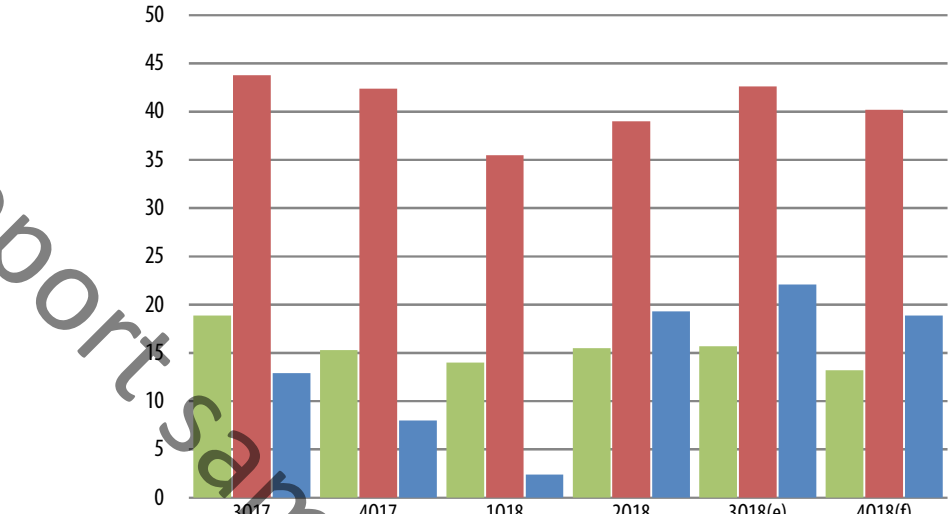
In third-quarter 2018, the share of Cortex-A53 reversed the downward trend and showed an increase to 53%, boosted by the launch of new P22 and A22 processors.

The category of Cortex-A57 and above architectures includes Cortex-A75 and Cortex-A76, neither of which are specified in the chart. Their share exhibited weak growth due to the lack of high-end models in MediaTek's product mix.

MediaTek's plan to market the flagship X series in first-half 2020 may buoy the share of high-end architectures.

As MediaTek's major customers will focus efforts on mainstream and entry-level phones in fourth-quarter 2018, the share of Cortex-A53 will keep going on an upward trend to reach 55.6%.

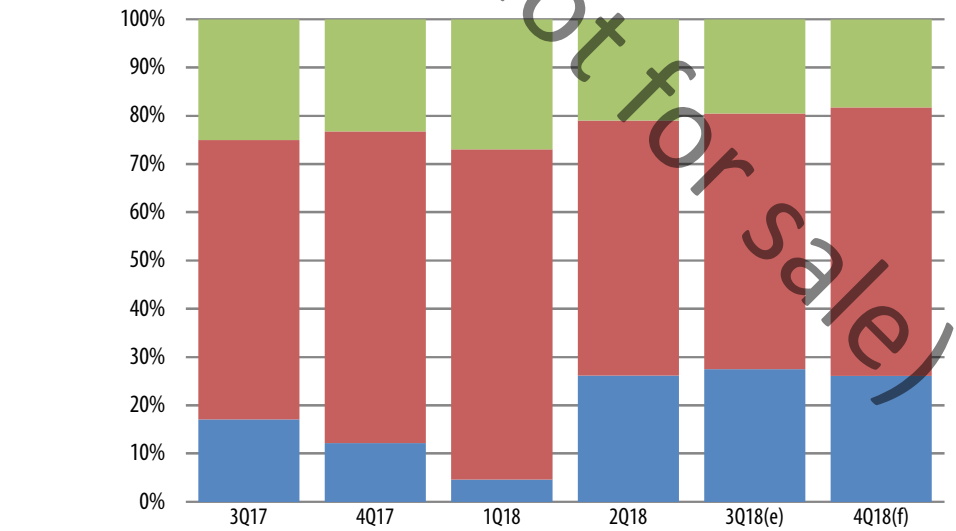
Chart 12: MediaTek shipments by architecture, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Cortex-A57/A72/A73	12.9	8.0	2.4	19.3	22.1	18.9
Cortex-A53	43.8	42.4	35.5	39.0	42.6	40.2
Cortex-A7	18.9	15.3	14.0	15.5	15.7	13.2

Source: Digitimes Research, October 2018

Chart 13: MediaTek shipment share by architecture, 3Q17-4Q18



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Cortex-A7	25.0%	23.3%	27.0%	21.0%	19.5%	18.3%
Cortex-A53	57.9%	64.5%	68.4%	52.8%	53.0%	55.6%
Cortex-A57/A72/A73	17.1%	12.2%	4.6%	26.2%	27.5%	26.1%

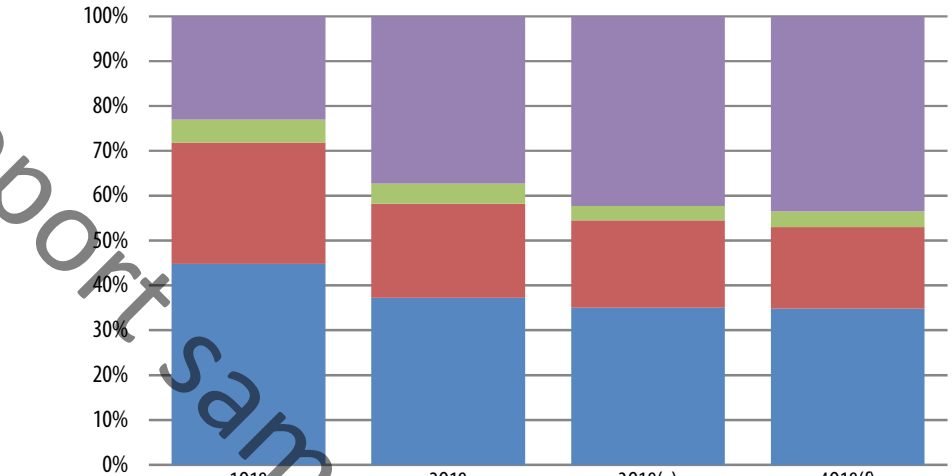
Source: Digitimes Research, October 2018

With MediaTek ramping up marketing efforts toward its Helio series in 2018, the share of Helio processors is rapidly rising to become its major growth driver. The P series and A series together accounted for 42.3% of MediaTek's third-quarter 2018 shipments.

P70 will enter the market in fourth-quarter 2018. With little difference from P60, P70 will take over P60 and its share will increase at a slower rate to come to 43.5%.

Under the influence of the shrinking white-box phone market, the share of the Helio series has exceeded that of MediaTek's growth driver 673X series, which was 35% in third-quarter 2018, 7.3pp lower than the share of the Helio series. The share of the 673X series will further edge down to 34.8% in fourth-quarter 2018 but it can hold above the 30% level as China-based vendors target overseas markets with low-cost phones.

Chart 14: MediaTek shipment share by product line, 1Q18-4Q18



	1Q18	2Q18	3Q18(e)	4Q18(f)
Helio A/P series	23.0%	37.3%	42.3%	43.5%
MT675X	5.2%	4.5%	3.2%	3.5%
MT65XX/56XX	27.0%	21.0%	19.5%	18.2%
MT673X	44.8%	37.2%	35.0%	34.8%

Source: Digitimes Research, October 2018

Qualcomm

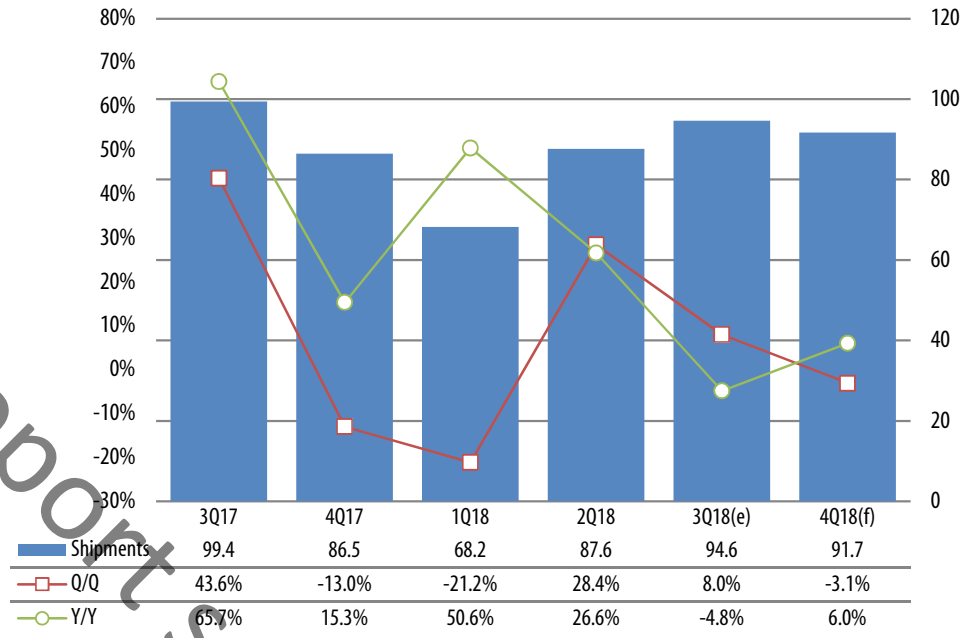
Thanks to the third-quarter high season for smartphone sales, Qualcomm's AP shipments grew 8% sequentially even though Oppo, BBK and Xiaomi had shifted some orders to MediaTek. Qualcomm's third-quarter 2018 shipments totaled 94.6 million units, down 4.8% on year, due to loss of orders.

With new competitive products coming on the market in fourth-quarter 2018, Qualcomm can expect to recover lost ground with its market share reaching 42.5%, up 1.2pp from the corresponding period of 2017. Its AP shipments are estimated to increase 6% on year but decrease 3.1% on quarter amid weakening market demand.

Qualcomm will ship a total of 340 million smartphone AP to China in 2018, surging 13.9% on year. Its share in terms of whole-year shipments will top 42.8%, mainly driven by the growth in China-based smartphone vendors' overseas sales. Qualcomm's performance is mainly buoyed by rising AP demand by China-based smartphone vendors' success in overseas expansions.

Accounting for slightly over 10% of Qualcomm's AP shipments to China, Reliance 4G feature phones continue to contribute to Qualcomm's AP shipments, becoming a new growth driver for Qualcomm.

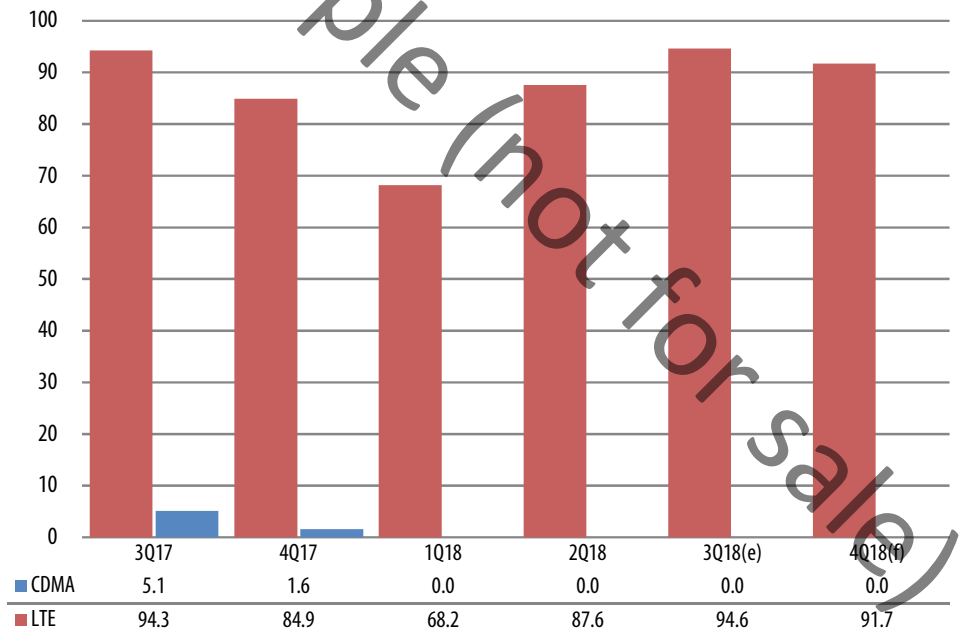
Chart 15: Qualcomm smartphone AP shipments, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Shipments	99.4	86.5	68.2	87.6	94.6	91.7
Q/Q	43.6%	-13.0%	-21.2%	28.4%	8.0%	-3.1%
Y/Y	65.7%	15.3%	50.6%	26.6%	-4.8%	6.0%

Source: Digitimes Research, October 2018

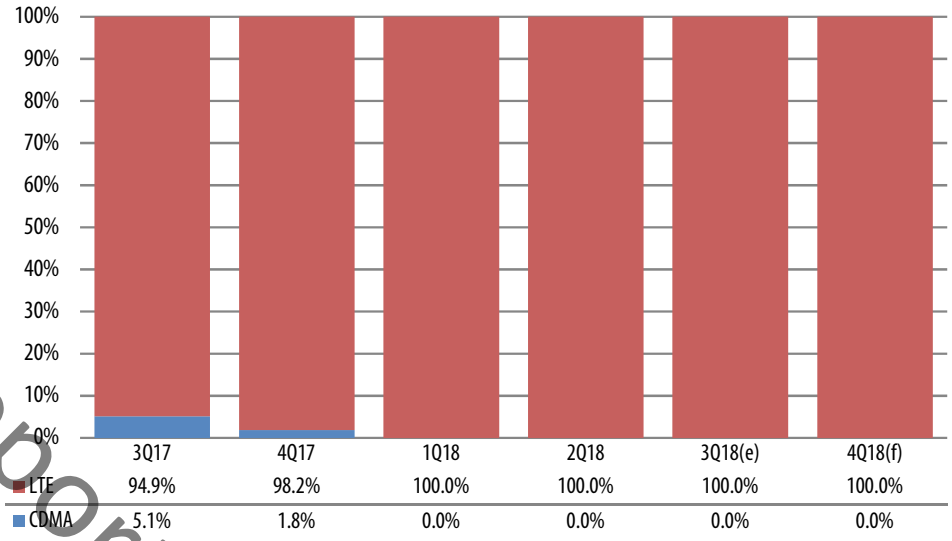
Chart 16: Qualcomm shipments by baseband type, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
CDMA	5.1	1.6	0.0	0.0	0.0	0.0
LTE	94.3	84.9	68.2	87.6	94.6	91.7

Source: Digitimes Research, October 2018

Chart 17: Qualcomm shipment share by baseband type, 3Q17-4Q18



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
LTE	94.9%	98.2%	100.0%	100.0%	100.0%	100.0%
CDMA	5.1%	1.8%	0.0%	0.0%	0.0%	0.0%

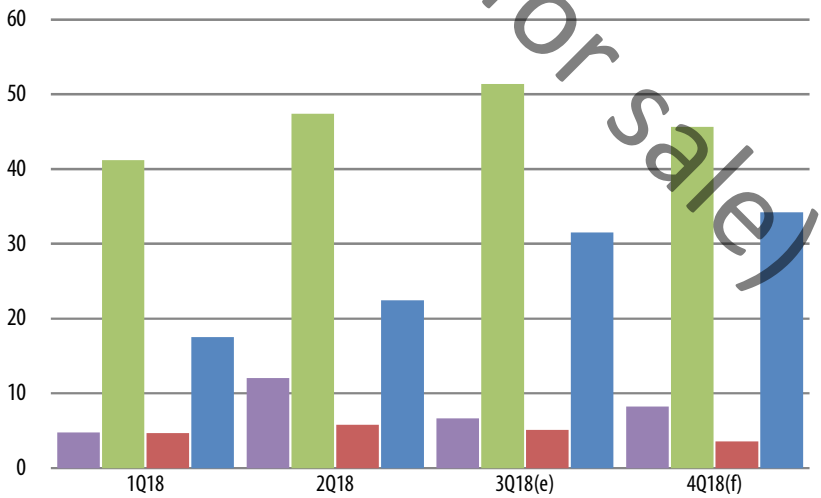
Source: Digitimes Research, October 2018

Several models of Qualcomm's S600 series are already based on the Kryo architecture. New Kryo-based S710 processors launched in second-quarter 2018 are performing better than expected. As a result, the share of in-house-developed architecture among Qualcomm's AP shipments exceeded 30% in third-quarter 2018 in line with the forecast given in the previous report (released in July) and it is estimated to further expand to 37.3%, setting another record high, in fourth-quarter 2018.

Qualcomm switched to the Kryo architecture for its S600 series, resulting in an expanding share of its own architecture and a rapidly shrinking share of the Cortex-A53 architecture, which accounts for a major portion but is estimated to go on a steep decline from 60.4% in first-quarter 2018 to 49.8% in fourth-quarter 2018.

Benefitting from rising demand for 4G feature phones, the share of Cortex-A7 will bounce back by 2pp in the fourth quarter to come to 9%.

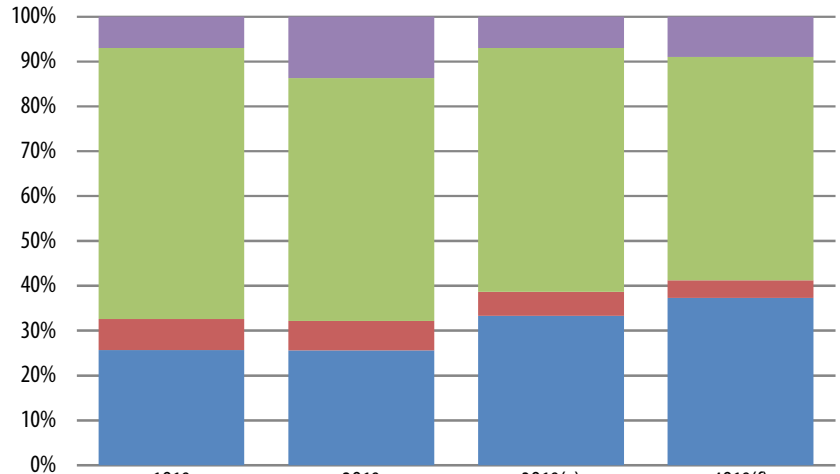
Chart 18: Qualcomm shipments by architecture, 1Q18-4Q18 (m units)



	1Q18	2Q18	3Q18(e)	4Q18(f)
Kryo	17.5	22.4	31.5	34.2
Cortex-A57/A72/A73	4.7	5.8	5.1	3.6
Cortex-A53	41.2	47.4	51.4	45.7
Cortex-A7	4.8	12.0	6.6	8.3

Source: Digitimes Research, October 2018

Chart 19: Qualcomm shipment share by architecture, 1Q18-4Q18



	1Q18	2Q18	3Q18(e)	4Q18(f)
Cortex-A7	7.0%	13.7%	7.0%	9.0%
Cortex-A53	60.4%	54.1%	54.3%	49.8%
Cortex-A57/A72/A73	6.9%	6.6%	5.4%	3.9%
Kryo	25.7%	25.6%	33.3%	37.3%

Source: Digitimes Research, October 2018

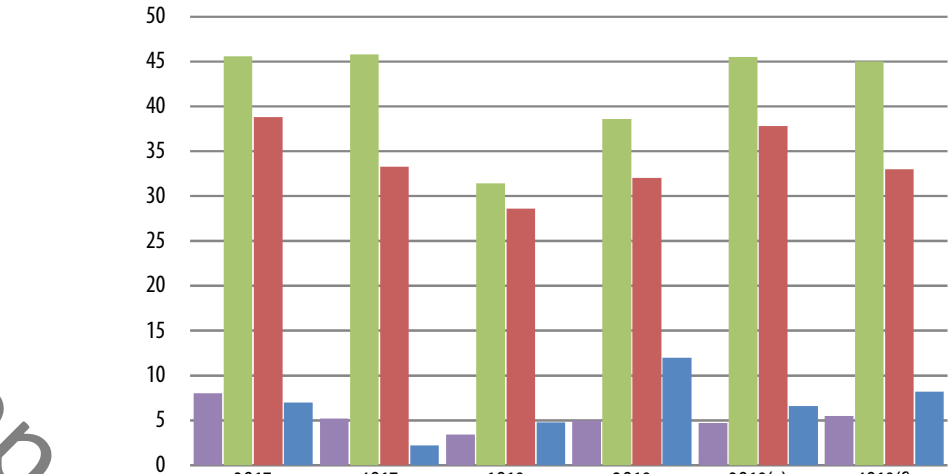
As even basic smartphones come with higher and higher spec, the share of S600 series among Qualcomm's AP shipments to China has been rising in 2018, becoming the major force driving shipment performance. The share of S600/S700 series will come close to 50% in fourth-quarter 2018.

The share of S800 series will fall between 5% and 6% in 2018 amid weak shipment growth of flagship and high-end phones.

Thanks to the flourishing 4G feature phone market, the share of S200 series was estimated to temporarily edge up in the second and third quarter of 2018 in the previous report (released in July). However, as fluctuations in exchange rates affect component prices, actual deliveries will be made over the next few quarters. The share of S200 series will likely increase 2pp to 9% in fourth-quarter 2018.

The cost structures of entry-level smartphone AP have little room for optimization and it takes longer and longer for new versions to come out. With more 28nm capacity becoming available and foundry prices falling, IC designers can take the opportunity to introduce upgraded products for this segment.

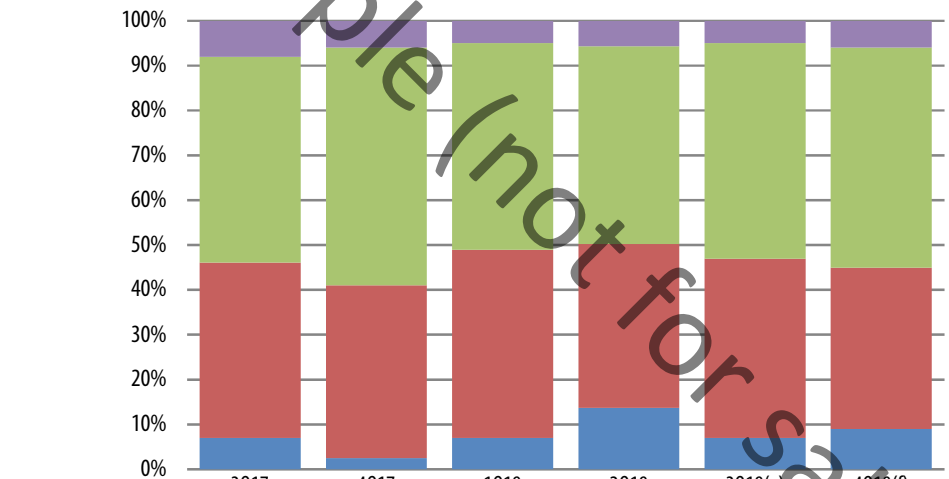
Chart 20: Qualcomm shipments by product line, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Snapdragon 200	7.0	2.2	4.8	12.0	6.6	8.2
Snapdragon 400	38.8	33.3	28.6	32.0	37.8	33.0
Snapdragon 600/700	45.6	45.8	31.4	38.6	45.5	45.0
Snapdragon 800	8.0	5.2	3.4	5.0	4.7	5.5

Source: Digitimes Research, October 2018

Chart 21: Qualcomm shipment share by product line, 3Q17-4Q18



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Snapdragon 800	8.0%	6.0%	5.0%	5.7%	5.0%	6.0%
Snapdragon 600/700	45.9%	52.9%	46.0%	44.1%	48.1%	49.1%
Snapdragon 400	39.0%	38.5%	41.9%	36.5%	40.0%	36.0%
Snapdragon 200	7.0%	2.5%	7.0%	13.7%	7.0%	8.9%

Source: Digitimes Research, October 2018

Spreadtrum (Unisoc)

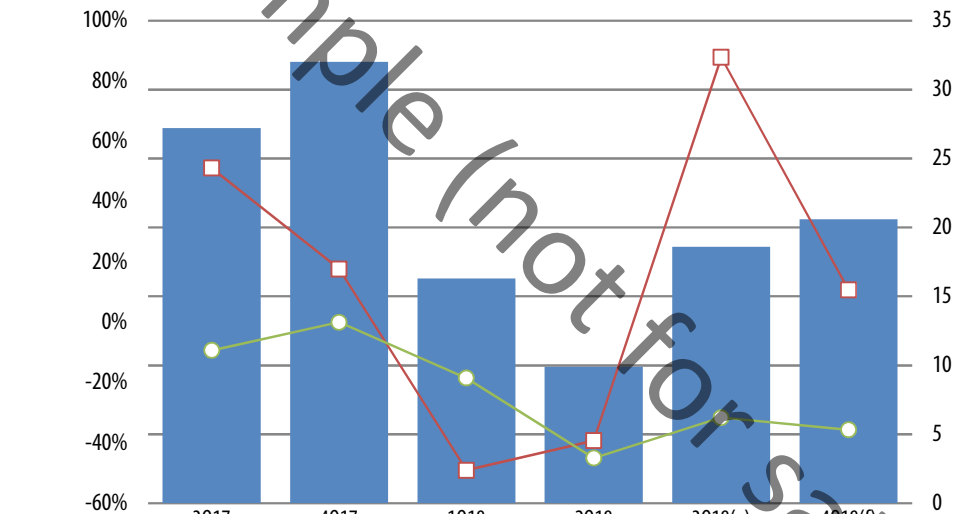
Unisoc shipped a total of 18.6 million smartphone processors in third-quarter 2018, soaring 87.9% on quarter and representing a 6.7% market share. Unisoc's shipments to China dipped below the 10 million unit level in second-quarter 2018. However, by launching new processors with compelling cost structures, upgrading its S100 series, offering processors at prices lower than those of competitions in the same class by US$0.5 to US$1, and working with China Mobile to market new A5 phones, Unisoc raised its market share to 8.2% in third-quarter 2018, up 3.2pp from the level seen in the prior quarter.

Unisoc can expect to see its shipments surge 10.8% sequentially in fourth-quarter 2018, driven by growth of second-generation 4G feature phones. Its 9820E processors will likely start to make contribution to shipments in the fourth quarter.

Unisoc is estimated to ship a total of 65.4 million smartphone processors to the China market in 2018, representing an 8.2% market share, down 4.9pp compared to 2017. The decline can be attributed to the shrinking 3G segment, which is also quickly being eroded by 4G feature phones. Although Unisoc has successfully penetrated into the 4G feature phone segment, its share in the segment is only half of Qualcomm's.

With tightening CMS certification, the white-box segment is rapidly on the decline. White-box vendors are looking to switch to other products or even shut down business, which has a significant impact on Unisoc mainly targeting this segment.

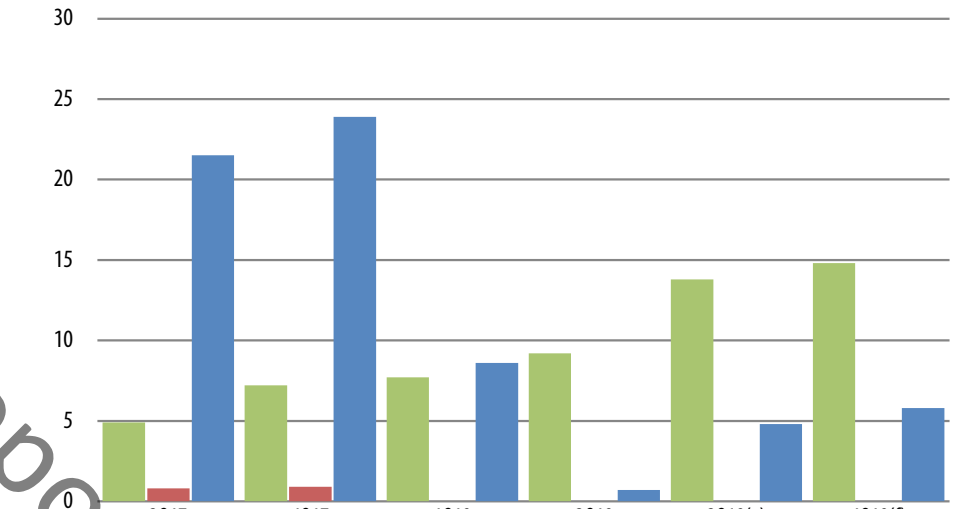
Chart 22: Spreadtrum smartphone AP shipments, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Shipments	27.2	32.0	16.3	9.9	18.6	20.6
Q/Q	51.1%	17.6%	-49.1%	-39.3%	87.9%	10.8%
Y/Y	-9.3%	0.0%	-18.5%	-45.0%	-31.6%	-35.6%

Source: Digitimes Research, October 2018

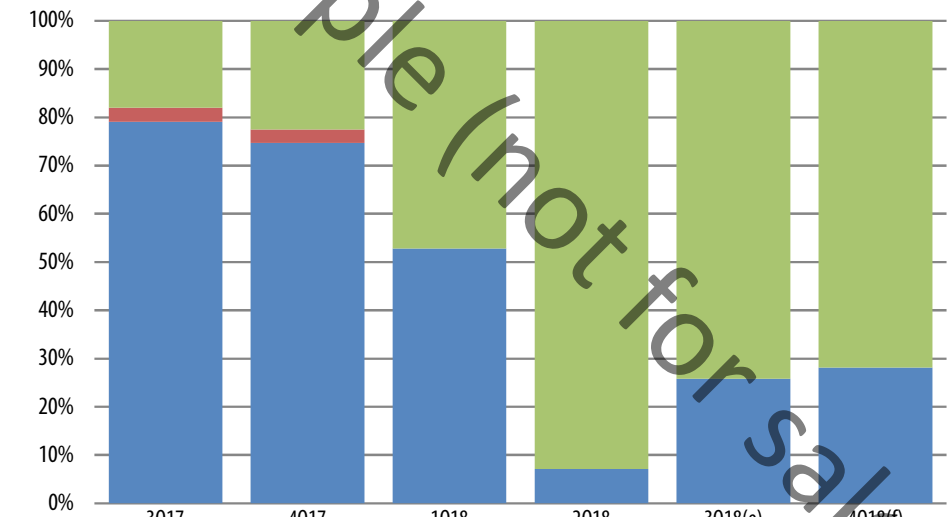
Chart 23: Spreadtrum shipments by baseband type, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
WCDMA	21.5	23.9	8.6	0.7	4.8	5.8
EDGE	0.8	0.9	0.0	0.0	0.0	0.0
LTE	4.9	7.2	7.7	9.2	13.8	14.8

Source: Digitimes Research, October 2018

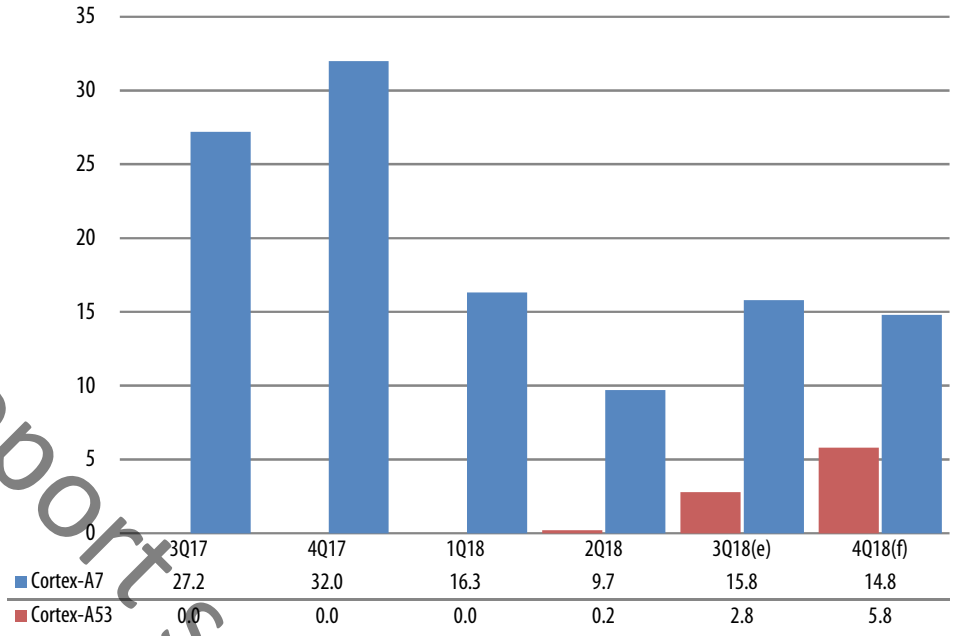
Chart 24: Spreadtrum shipment share by baseband type, 3Q17-4Q18



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
LTE	18.0%	22.5%	47.2%	92.9%	74.2%	71.8%
EDGE	2.9%	2.8%	0.0%	0.0%	0.0%	0.0%
WCDMA	79.0%	74.7%	52.8%	7.1%	25.8%	28.2%

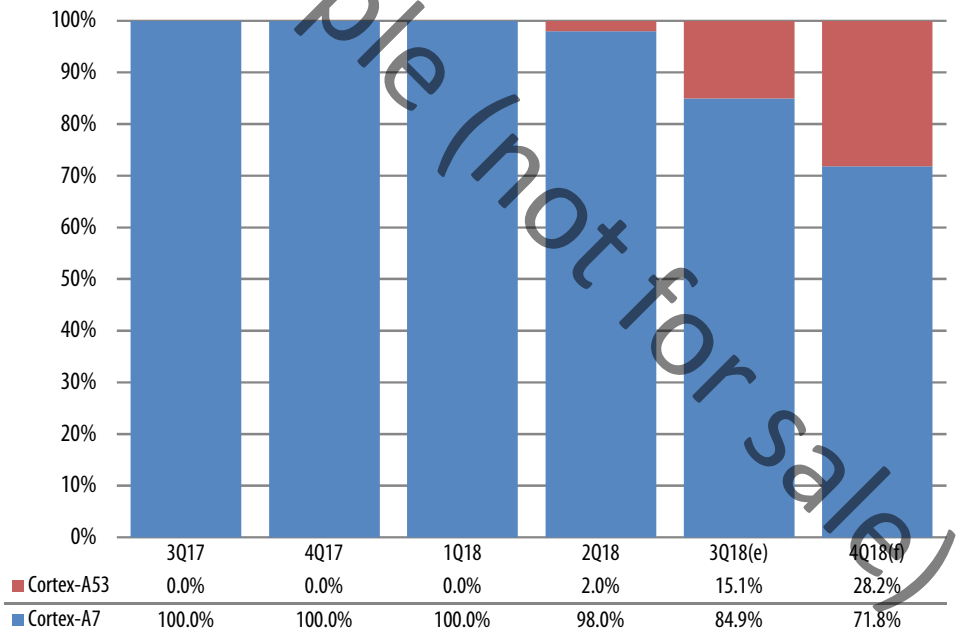
Source: Digitimes Research, October 2018

Chart 25: Spreadtrum shipments by architecture, 3Q17-4Q18 (m units)



Source: Digitimes Research, October 2018

Chart 26: Spreadtrum shipment share by architecture, 3Q17-4Q18

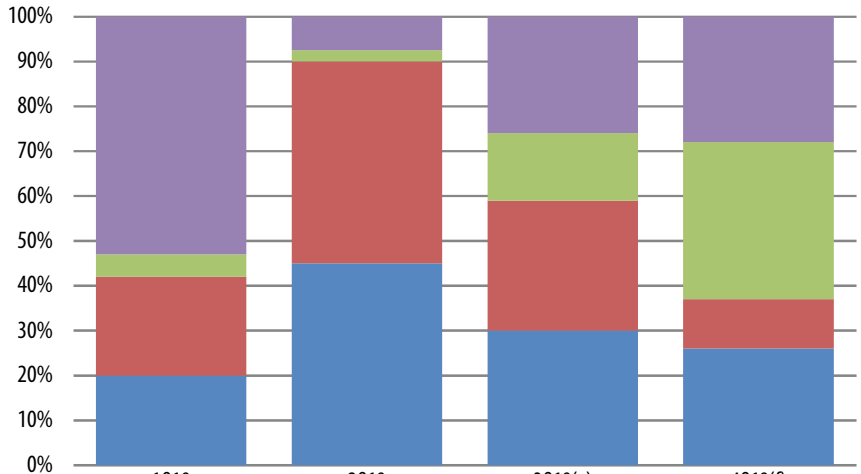


Source: Digitimes Research, October 2018

Amid uncertainties of customers' product roadmaps, Unisoc's product portfolios are quite different from quarter to quarter in 2018.

The 982X series performed below expectation due to poor software compatibility. However, with the improved version released in the third quarter, the 982X series can begin to contribute to shipments in fourth-quarter 2018. The share of the 982X series is estimated to reach 35% in the fourth quarter, causing the share of the S100 series to come to 63%.

Chart 27: Spreadtrum shipment share by product line, 1Q18-4Q18



	1Q18	2Q18	3Q18(e)	4Q18(f)
(S100)773X	53.0%	7.5%	26.0%	28.0%
(S100)982X	5.0%	2.5%	15.0%	35.0%
(S300)983X	22.0%	45.0%	29.0%	11.0%
(S300)986X/985X	20.0%	45.0%	30.0%	26.0%

Source: Digitimes Research, October 2018

Hisilicon

As forecast in the previous report (released in July), Hisilicon debuted 7nm processors in third-quarter 2018 ahead of Apple's product launch. Since then, 7nm processors have been making contributions to Hisilicon's AP shipments.

Apple will no longer hog 7nm capacity beginning fourth-quarter 2018, which will be shared by Hisilicon and Qualcomm.

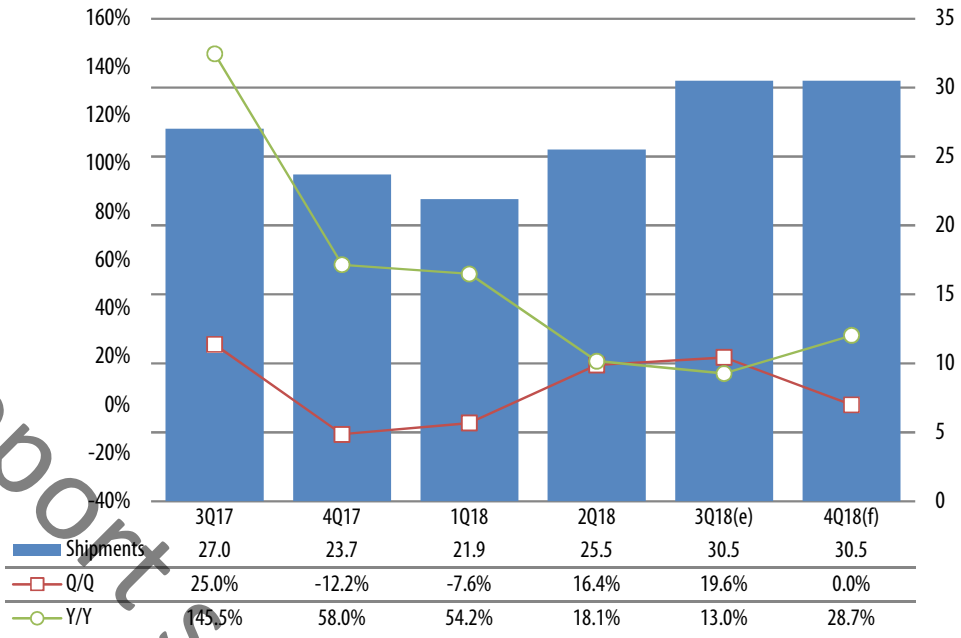
Benefitting from Huawei's successful overseas expansion and sales of new flagship phones, Hisilicon will enjoy a 28.7% on-year growth in smartphone AP shipments in the fourth quarter.

Hisilicon is expected to ship a total of 108.4 million processors to the China market in 2018, its market share reaching 13.6%, up 2pp from the level seen in 2017 to surpass Unisoc.

Hisilicon can expect continuingly rising AP shipments as Hisilicon processors account for a large share of those Huawei uses (exceeding 60% in high seasons) and Huawei's shipments keep setting new records.

Hisilicon's shipments will surge 25.3% on year in 2018, higher than the growth exhibited by Qualcomm and MediaTek.

Chart 28: Hisilicon smartphone AP shipments, 3Q17-4Q18 (m units)



	3Q17	4Q17	1Q18	2Q18	3Q18(e)	4Q18(f)
Shipments	27.0	23.7	21.9	25.5	30.5	30.5
Q/Q	25.0%	-12.2%	-7.6%	16.4%	19.6%	0.0%
Y/Y	145.5%	58.0%	54.2%	18.1%	13.0%	28.7%

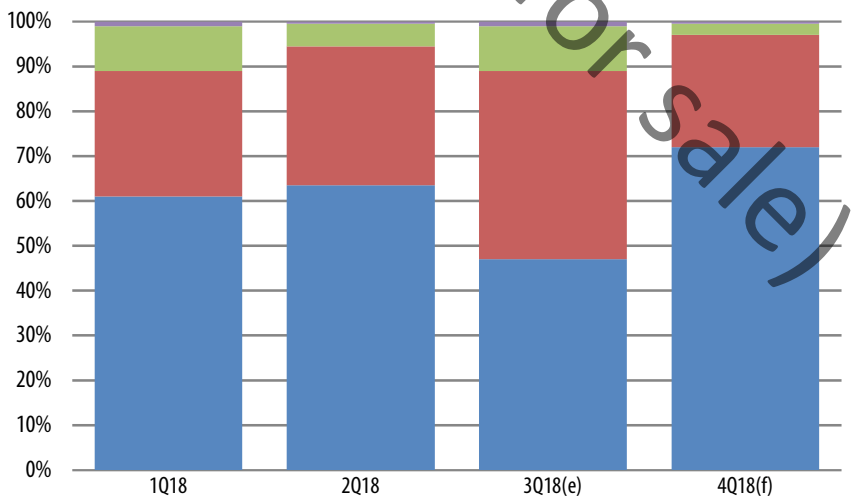
Source: Digitimes Research, October 2018

Huawei's new flagship Mate phones entered the market around late third-quarter and early fourth-quarter 2018, which spurred growth of the share of the Kirin 900 series among Hisilicon's processors.

Flagship Kirin 900 processors accounted for a 42% share of third-quarter 2018 shipments, breaking through the 40% mark. The whole Kirin 900 series took a combined share of 53% among third-quarter 2018 shipments, above the 50% level.

Shipments for 7nm flagship Kirin processors will come down from their peak level with their share declining to 25% in fourth-quarter 2018. Adding other Kirin 900 processors, the share of the Kirin 900 series will drop to 28% in the fourth quarter.

Chart 29: Hisilicon shipment share by product line, 1Q18-4Q18



	1Q18	2Q18	3Q18(e)	4Q18(f)
Other Kirin 900	1.0%	0.5%	1.0%	0.5%
Older-gen Kirin 900	10.0%	5.0%	10.0%	2.5%
Kirin 900 flagship	28.0%	31.0%	42.0%	25.0%
Kirin 600/700	61.0%	63.5%	47.0%	72.0%

Source: Digitimes Research, October 2018