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QUICK REPORT
TECHNOLOGY TREND ANALYSIS

Apple's Next Move

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Apple, Inc. saw its first revenue decline in 13 years, with its Q1 2016 earnings report, announced on April 26, including sales revenue of USD 50.557 billion: a YoY decrease of roughly 13%. The company saw plummeting iPhone sales, which account for around 65% of its revenue, with the slump in demand for iPads and Macs also making an impact.

Although the smartphone market continues to grow, growth in the developed markets of Japan, the US, and the EU—accounting for roughly 70% of Apple's sales in Q1 2015—is slowing down. The question of whether the company can capture a share of growth in emerging markets seems to be the key to its future, but competition from leaders in those markets, such as China's Xiaomi Inc., is intensifying. To continue growing, Apple must continue to release new technologies and services to maintain and expand the share of its existing businesses, including smartphones, tablets, and PCs. Otherwise, it must develop new businesses, such as the Apple Watch, which has continued to sell poorly since its launch last year.

This study looks at Apple's patent applications using our panoramic analysis tool, TechRadar, to aid in concluding whether the company has new technologies that it can introduce into the market in the near future. Our conclusions will spotlight the latest technologies that Apple is focused on, while providing a review of the changes that have occurred in the company's technological focus.

Changes to Apple's Technological Focus

The patent applications we analyzed include approximately 15,000 unexamined patent applications in the US, submitted by Apple as either the applicant or the patent rights holder, from 2001 to April 13, 2016.

According to the panoramic patent chart created by TechRadar, in roughly the past 15 years, Apple has accumulated patents for technologies in regions related especially to touch screens and connectors (Figure 1). We believe that the concentration of technologies in these regions is against a backdrop of the fact that one of the selling points of the iPhone is its touch screen, which provides its overwhelmingly solid ease of

use, and the fact that the company has its own connector standards, such as Thunderbolt.

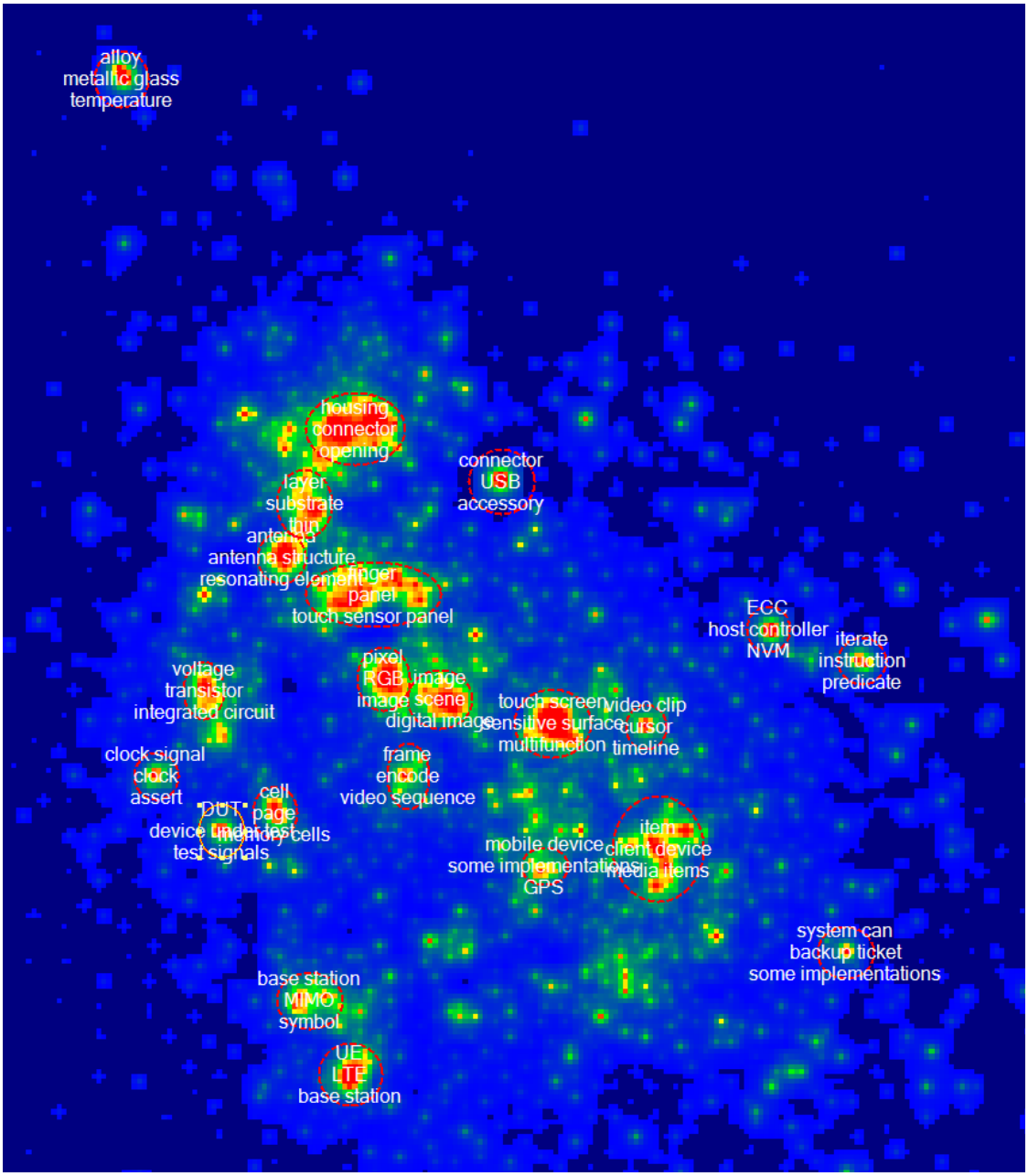

Figure 1 - Apple's Panoramic Patent Chart

The number of the company's unexamined patent applications in the US continually trended upward from 2001 to 2014 (Figure 2). This increase in technology development can be seen as a byproduct of the company's growth, but the trend reversed in 2015, and it is possible that the company's technology development has shrunk in recent years.

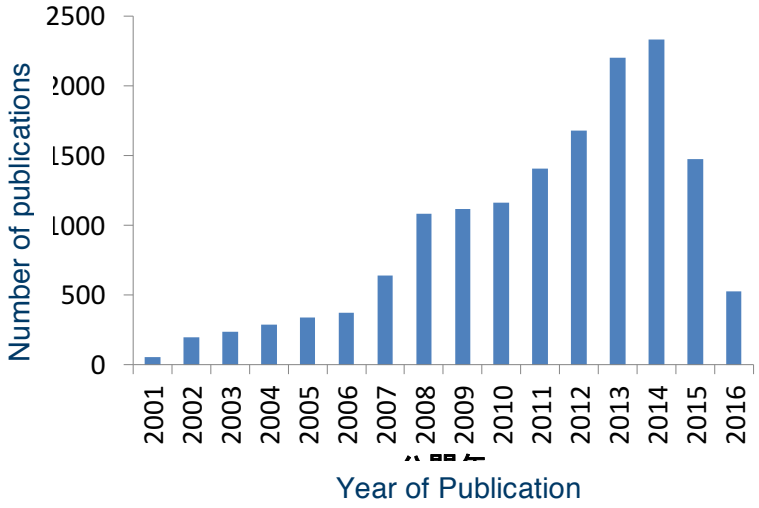

Figure 2 - Apple's unexamined patent applications in the US (2016 values are through mid-April)

In order to look back at which regions Apple focused on in its companywide technological development over the years, we look to the distribution of technologies on the panoramic patent chart by period, which shows that the company mainly focused on technologies related to storage media from 2001 to 2004 (Figure 3). Apple announced the iPod during this period, and its storage media evolved from hard disks to flash memory.

From 2005 to 2008, and especially in 2007 and 2008, there was a rapid increase in the number of the company's unexamined patent applications, with a simultaneous upsurge in its active technology regions (Figure 4). The company was remarkably active in regions related to data management and touch screens. The activity in these technological regions can be attributed to the company's release of the iPhone in 2007.

Again from 2009 to 2012, the company was active in several technology regions, but its activity in the regions related to cameras and connectors is especially notable (Figure 5). This is entering the period when the 3G-compatible iPhone became popular, and it is also when video compatibility was added. In addition, the Thunderbolt specifications were issued during this period, which can be considered a backdrop to the technology development in these regions.

Since 2013, the company has been particularly active in regions related to LTE and glass (Figure 6), with LTE being popularized during this period. Furthermore, with the screen and back surface having been made of glass since 2010's iPhone 4, the company has been active in developing glass technologies to respond to the need for improved durability.

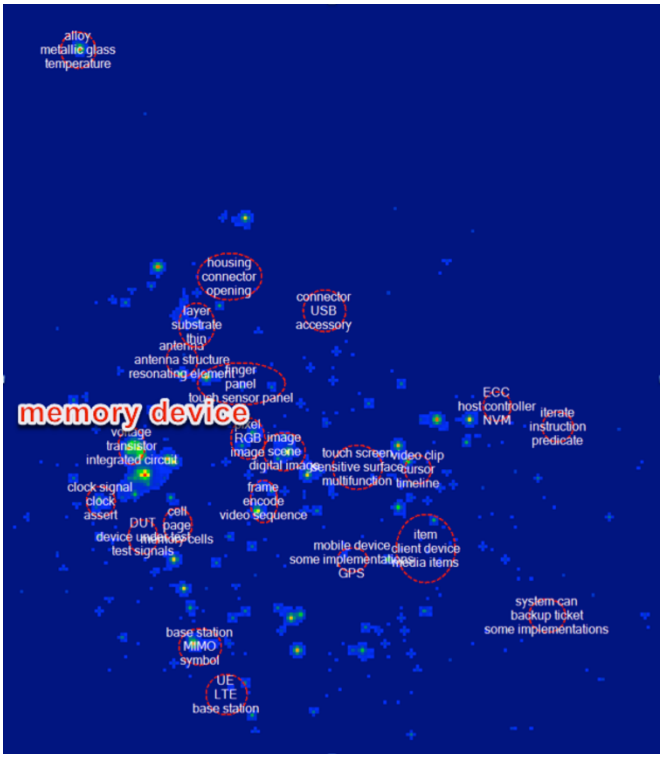

Figure 3 - Apple's Panoramic Patent Chart

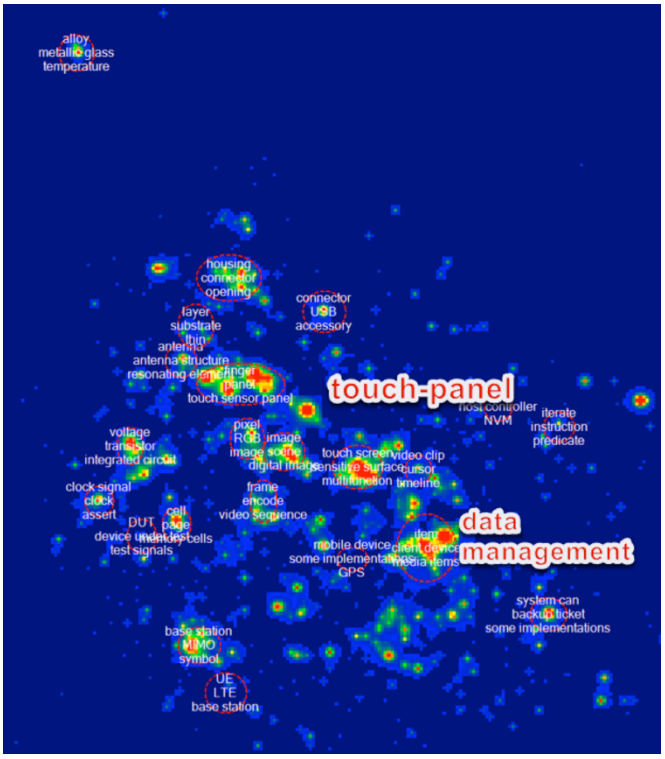

Figure 4 – Apple's Panoramic Chart (2005-2008)

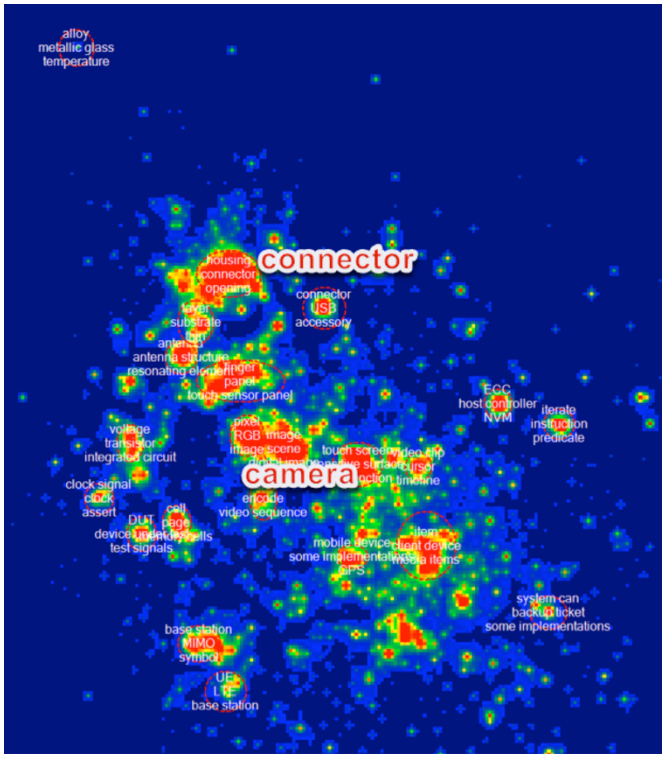

Figure 5 - Apple's Panoramic Patent Chart (2009-2012)

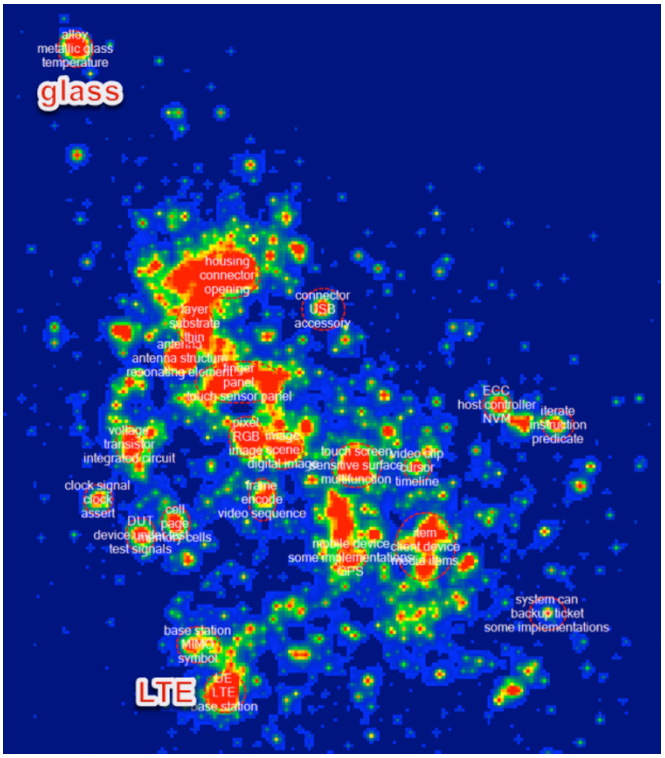

Figure 6 - Apple's Panoramic Patent Chart (2013-2016)

Apple's Latest Technology Commitment

Now, in order to understand Apple's latest focus on technology, we can see that it is particularly active in several regions by looking at its unexamined patent applications for 2016 on the panoramic patent chart (Figure 7).

Figure 4 - Apple's Panoramic Patent Chart (2016)

The first prominent region is related to calculating calorie consumption. This region contains many applications related to functions for calculating calorie consumption on the Apple Watch, including US20160058371A1 *Sensor Fusion Approach to Energy Expenditure Estimation*. We believe the active development of technologies related to similar functions is for the Apple Watch, as is the case with other wearable devices. We expect that the Apple Watch will bring about a certain level of interest in developing technologies related to stored data, along with an interest in optimizing devices used in the distribution of goods.

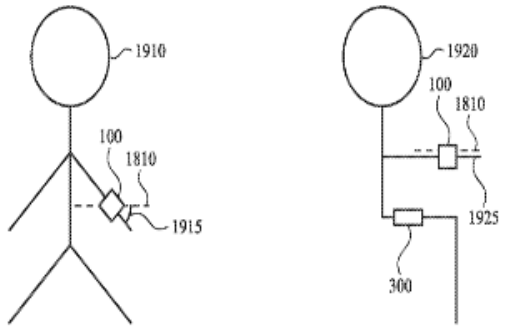

FIG. 19A FIG. 19B

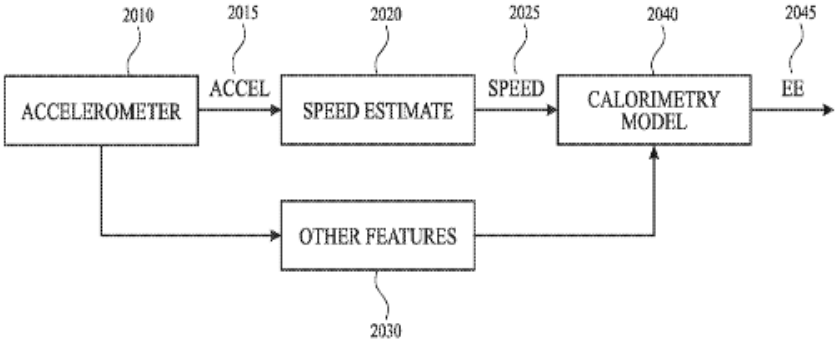

Figure 8 - Drawing from the Patent Application Related to Apple Watch's Calorie Consumption Meter

Moreover, the touch screen region is also active with Apple Watch-related technologies, such as US20160062598A1 *Multi-Dimensional Object Rearran*gement, which is for Apple Watch's touch screen. We believe this technology was developed against the backdrop of a need for user interface ingenuity due to the touch screen being significantly smaller than that of the iPhone or the iPad.

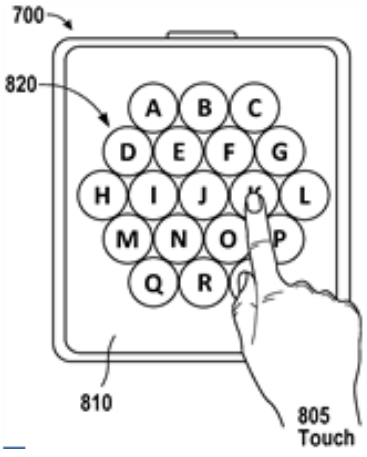

Figure 9 - Drawing from the Patent Application Related to Apple Watch's User Interface

In the region for wireless battery charging, we found technologies for sharing power wirelessly between devices, as well as technology for wirelessly charging devices such as the iPhone and the Apple Watch. US20160094076A1 *Inductive Charging Between*

Electronic Devices is one of these applications, and from its drawings, we can deduce that Apple imagines scenarios such as wirelessly charging an iPhone from an iPad (Figure 10) or a Mac.

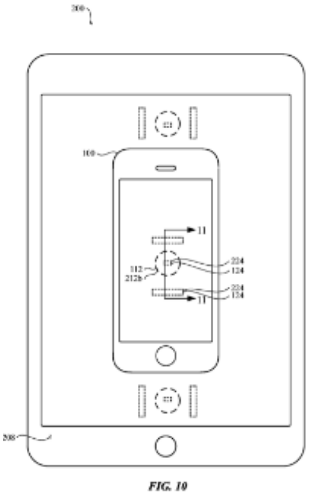

Figure 10 - Drawing from the Patent Application Related to Wireless Charging Between Devices

In the haptic region, we see applications such as US20160063828A1 *Semantic Framework for Variable Haptic Output,* which is related to haptic devices that output sensory data via the touch screen. 3D Touch, which was equipped on the iPhone 6s and 6s Plus released in 2015, is one example of haptic technology that provides feedback in the form of vibration in response to pressure applied to the touch screen. There is research on all sides of the haptic area for technologies through which the touch screen provides a sense of touching the surface of the physical object that is projected onto the screen. It is likely that Apple will release devices equipped with such technologies in the near future.

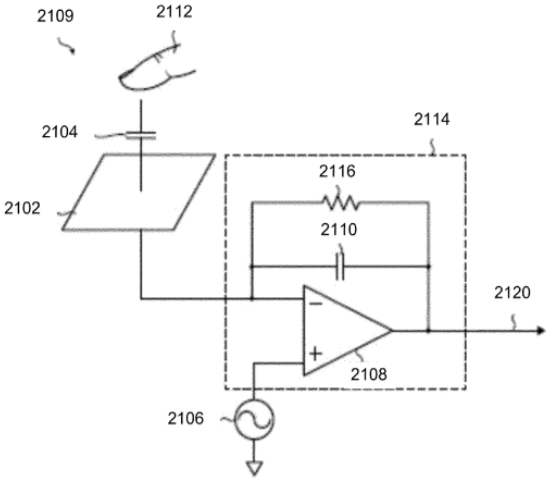

Figure 11 - Drawing from the Patent Application Related to Haptic Devices

Conclusion

We analyzed Apple's patent applications to find its next step after its first decrease in revenue in 13 years. We concluded that the company's patent application activity coincided with its increasing sales. We also found that its technology developments included ties to the market introduction of the iPod, iPhone, and other products; compatibility with the spread of LTE in recent years; and glass meant to improve the iPhone's durability. Furthermore, from the unexamined patent applications submitted since the beginning of 2016, we encountered technologies related to functions for the Apple Watch, which was released last year, including a calorie consumption meter, as well as its latest technologies, such as wireless charging between devices and haptic devices. It is likely that these technologies will be included in devices such as the iPhone in the future, and we expect Apple's products to remain competitive.

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