

WHERE THE MARKET IS NOW

The semiconductor industry develops computer chips that control all of the world's electronic devices. PCs, mobile phones and even modern washing machines have some form of computer chip providing their intelligence. Each generation of chip is smarter than its predecessor, enabling more capable and more efficient consumer and embedded products.

Overview of a semiconductor

A semiconductor, or silicon chip is the electronic controller that manages many of the digital devices that we use every day. Computers, mobile phones, televisions, washing machines and cars all can contain many silicon chips. Also many enterprise and industrial applications are made smarter and more efficient by silicon chips, from sensors to servers.

In 2012, about 650 billion silicon chips were manufactured. Of these about 27 billion contained a processor. The processor is the brain of the chip, and controls not just the operation of the chip, but also the operation of the product that chip goes into.

ARM processor designs were in about 8.7 billion chips, a 32% market share. The remaining market share mainly consists of our customers' own processor designs. ARM gains share when our customers outsource their processor design.

Disaggregated industry

The semiconductor industry has disaggregated into specialist companies that focus on each stage in the creation, design and manufacture of a silicon chip (see diagram below). This allows each company to invest and innovate in an area where they can add the most expertise in the value chain.

Some companies specialise in designing the chip; other companies specialise in designing critical IP components within the design; others in building the tools needed to manufacture the chips; others in the chip fabrication; and others in developing software, such as operating systems and apps. All of these companies work closely together as a single ecosystem of partners. Each collaborates with the others as if they were a single organisation.

In 2012, there were over 1,000 companies in ARM's Connected Community®. ARM shares knowledge, experience and innovations with these companies, enabling greater collaboration.

Where ARM fits within the industry

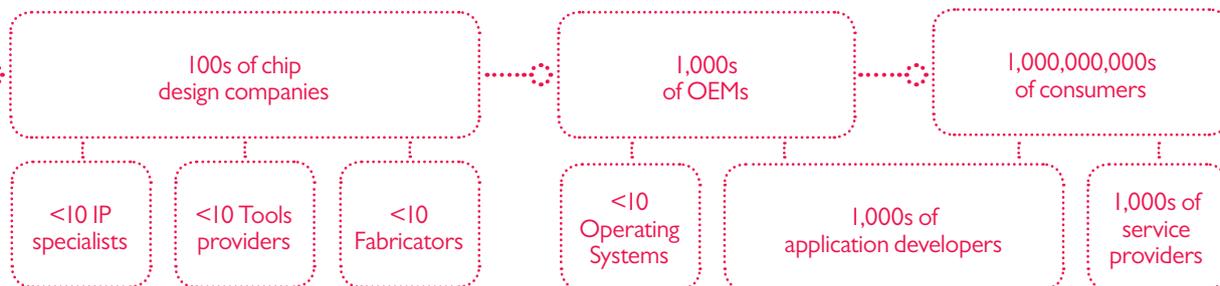
ARM is the global leader in the design of semiconductor IP components that form some of the critical elements within System-on-Chip designs. ARM is best known for its family of processor designs that are used in a range of applications from mobile phones to car braking systems.

There are a handful of other IP component designers that mainly specialise in complementary areas. Their IP can often be found alongside an ARM processor in the same chip design.

ARM works closely with the semiconductor ecosystem to ensure that its technology works well with other companies' products, and that a silicon chip designer can quickly build a low-power and high-performance chip, and an OEM can create complex programs using a combination of third-party and in-house operating systems and applications.

As silicon chip designs become more complex it is expected that the semiconductor industry will continue to license semiconductor IP. As the global leader, ARM is well-positioned to benefit from this trend.

Our disaggregated industry



Mobile computing in 2017

3 billion

Analysts forecast that the market for mobile computers, including smartphones and tablets, will nearly double over the next five years, to about 3 billion devices.

WHERE THE MARKET IS HEADING

Trends within the semiconductor industry and its marketplace are bringing new opportunities and new competitive threats.

Mobile computing – connecting us to each other, and our data

Mobile phones have been getting smarter and more capable. No longer just connecting us via telephone calls and text messages, smartphones can now send email, browse the internet and allow us to engage with our friends on social networking sites. Meanwhile PCs have been getting smaller and lighter, with a longer battery life, and better connectivity. The mobile phone and PC markets are converging, enabling us to connect more easily to each other, and to our personal and workplace data. This convergence is bringing new opportunities and threats for the industry.

In October 2012 Microsoft launched their Windows 8 operating system. Previous versions of this operating system were targeted at the PC market and only supported the x86 architecture. Microsoft Windows 8 extended the market for their Operating System to include other consumer electronics such as tablets and digital TVs, and also included support for chips based on the ARM architecture.

This enables ARM-based chips to enter the PC market, including laptops and desktop PCs, but also enables companies making chips for PCs to more effectively compete in the mobile market.

Read more on page **24**

Internet of Things – connecting billions of smart sensors

Advances in manufacturing technology are enabling the creation of new low-cost smart sensors. These devices usually combine three main elements:

- one or more environmental sensors (temperature, pressure, yaw, pitch etc.);
- a smart computer to process the data gathered by the sensor; and
- a wireless radio to connect the smart sensor to the internet.

Data gathered from these sensors can then be collated anywhere in the world enabling remote monitoring of the sensors such as:

- **Industrial automation** where factory equipment in a region can be monitored from a head office
- **Home automation** where appliances in the home can be monitored and controlled by the home owner wherever they are

Collectively these technologies are referred to as the “Internet of Things”. These smart sensors need to be very low-cost (the chips within them often cost less than \$1) but they could be deployed in very high volume.

Read more on page **28**

Efficient networking – moving more data, without using more energy

With mobile computing connecting us to each other, and increased machine-to-machine communications between smart sensors, it is forecasted that internet traffic will increase 18 fold between 2011 and 2016*. As IT and communications equipment is already using an increasing proportion of the world’s energy, such an increase is not sustainable.

Network operators and data centre managers are now looking for lower power technology to better transport, distribute, analyse and store data across the internet. This is leading to increased levels of experimentation and innovation as companies try to cope with increased demand for data throughput, without having to increase the energy required.

ARM technology-based System-on-Chip designs are well placed to provide lower power options for enterprise applications such as servers and networking equipment.

Read more on page **32**

* Cisco Visual Networking Index Feb 2012.