

Evolving landscape of technology deals: Semiconductor Industry

Device deal trends

Technology Institute

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At a glance

Explaining the unique
dynamics underlying
the increase in deals
in the semiconductor
device industry



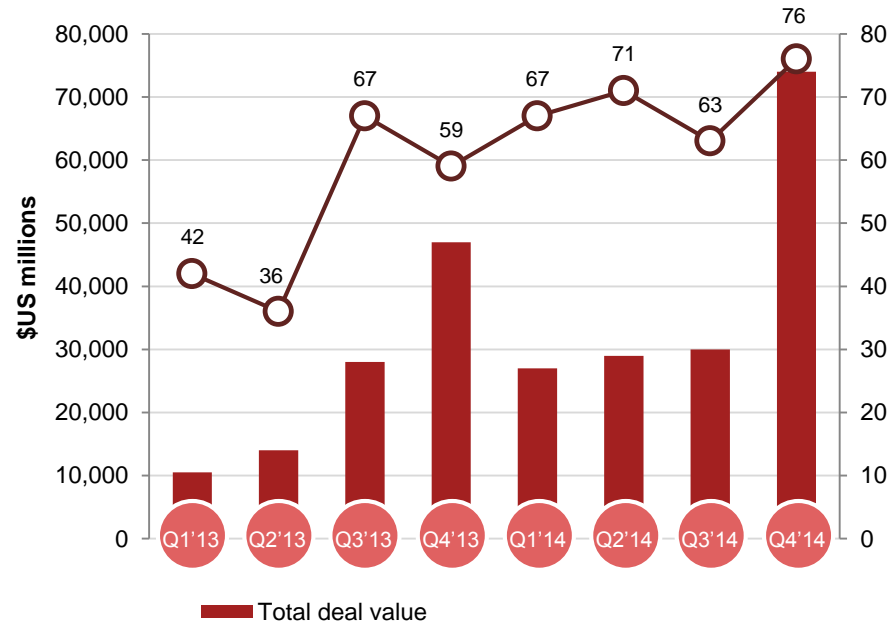
Executive summary

The recent explosion in M&A activity in the semiconductor industry follows a larger trend of increased deals in the overall Technology sector. Many of the factors affecting the overall Technology Sector such as maturing markets and associated revenue-ASP stresses have also come into play in the semiconductor sector. But a closer look shows that the specific M&A route chosen by the semiconductor companies involved in transactions varies based on three key factors: market segment focus, the growth rate of the market segment and the size of the company. These three key factors determine whether the underlying factor is a desire to access new markets/customers, increase bargaining power in existing markets or a need to close technology/product portfolio gaps. We expect specific kinds of M&A activity to continue to occur in 2015 in each of the key semiconductor market verticals: Automotive, Industrial, Consumer, Computing and Communications due to the influence of the above identified three factors. Semiconductor companies should try to take advantage of the unique dynamics existing currently and explore opportunities to transform their businesses through inorganic means where possible.

Section 1: US Tech sector M&A trends

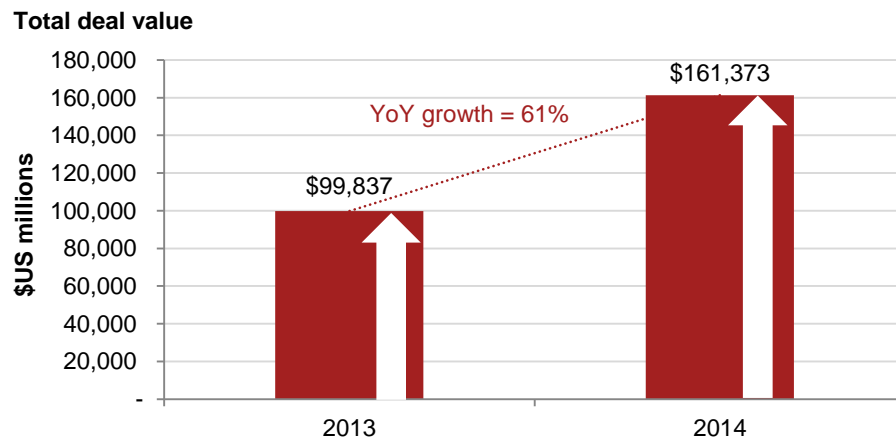
After a 2013 filled with volatility as businesses slowly rebuilt their confidence, the US Tech M&A market picked up steam in 2014. The total deal value in 2014 reached \$161B, up 61% YOY from \$100B in 2013. 2014 was also a very strong year in terms of deal volume. A total of 277 transactions were announced in 2014, a 36% increase from 2013.

Chart 1: Quarterly deal volume and total deal value



Source: Thomson Reuters

Chart 2: 2013 vs. 2014 total deal value



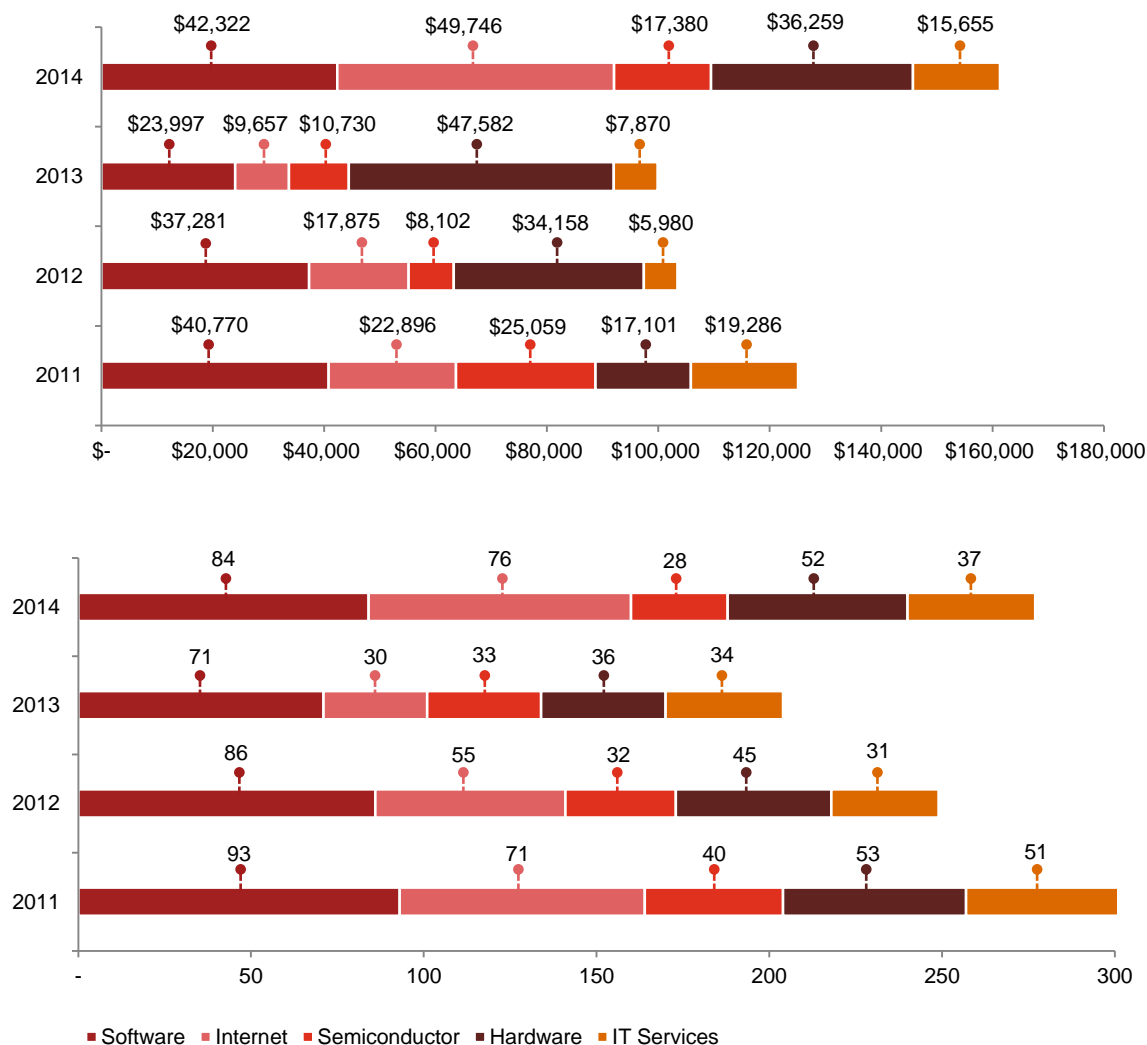
Source: Thomson Reuters

M&A trends across major tech sectors

Over the past four years, among the five major tech sectors (Software, Internet, Semiconductors, Hardware and IT Services), the Software sector and the Internet sector continue to account for a majority of the deal volume. The total deal value of each sector increased dramatically in the past year except the Hardware

sector which saw a YOY decrease. The volume of semiconductor transactions remained stable in the past four years but the deal value increased significantly in 2014. Larger transactions (over \$1B) happened in each of the five sectors with the Hardware sector and Software sector leading the way with their top 5 deals associated with over \$2B in transaction value.

Chart 3: Annual deals by sector



Source: Thomson Reuters



Key drivers for Tech sector M&A activities in 2014

From a broader perspective, the improved macroeconomic situation, build-up of cash reserves, the availability of cheap credit and reasonably healthy valuations are among the economic drivers behind the increased deal volume in the Tech Sector in 2014. Additionally, two specific factors unique to the Tech sector also contributed to the surge in deal volume in 2014.

Ongoing transformative technology megatrends

In the past five years there have been 131 technology “mega deals” with a collective value of \$388 billion.¹ 40% of these deals were driven by ongoing trends in capabilities expansion, such as, the explosion in mobile devices, the advent of cloud and SaaS based software delivery, Big Data, the increasing commoditization of hardware, and are fundamentally changing the landscape of the technology industry. Leading Tech companies are trying to not only keep pace with the impact of these trends on their businesses but also take advantage of them to create competitive differentiation by going after strategic acquisitions that transform their business. According to a recent survey of technology company executives, over 60% of the deals in the last three years are transformational versus 44% in 2011.²

Maturing or shrinking core markets:

It has become abundantly clear that companies engaged in markets that are associated with the above identified megatrends are the ones with significant growth prospects in the near future. In other mature or maturing markets, the pressure to sustain profit margins has encouraged consolidation among key players and also led to the formation of partnerships and alliances to gain access to new markets, customers or technologies. Over 82% of Technology companies stated this was a “very important” deal objective, but less than 47% actually achieved this goal.³ The maturing of markets has also had the opposite effect of making companies breaking up or spinning off key business units in an attempt to increase focus and resources in areas which are growing. The developments at large companies like eBay, HP, JDSU and Symantec, all announcing plans to split their enterprises are clear examples of this trend. Traditional high tech industries ranging from semiconductors to networking equipment to storage have entered a mature phase with diminished growth rates. As a result, many large Technology Sector companies are finding themselves in a mature market that has a shrinking or stable TAM.

¹ Let's Megadeal: Seven strategies for managing the unique challenges of large technology acquisitions

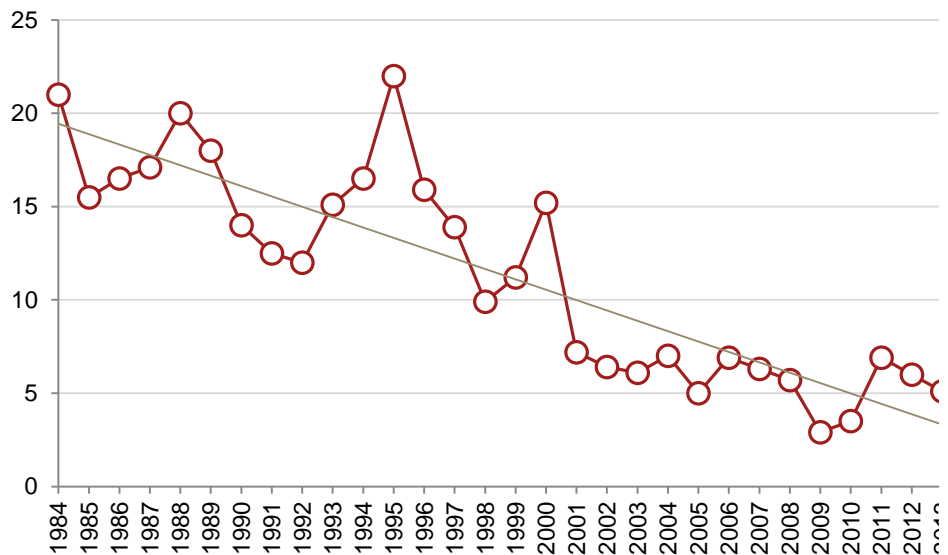
^{2,3} PwC 2014 M&A Integration Survey: Looking beyond the here and now

Section 2: Semiconductor M&A trends in 2014

The semiconductor industry in particular is in the midst of a period of major re-alignment. The unique factors driving M&A activity in the overall Technology sector are particularly visible in this industry. As observed in the larger Tech Sector, both the quest to improve profitability and form cross-value chain ecosystem partnerships has spurred consolidation in the semiconductor industry.

The semiconductor industry in chart 4 shows the 10-year rolling average for semiconductor growth rates, along with a trend line. As is obvious from the figure, long-term growth has declined from around 15% annually, prior to the year 2000, to around 5% today. Gartner expects this low-single-digit growth rate for the industry to continue for the foreseeable future.

Chart 4: Semiconductor 10-year growth rate and trend line, worldwide, 1984-2013



Note: Percentage Growth for each year is based on a rolling average of the previous 10 years.

Source: Gartner, Forecast Overview: Semiconductors, Worldwide 2014 Update, 30 July 2014



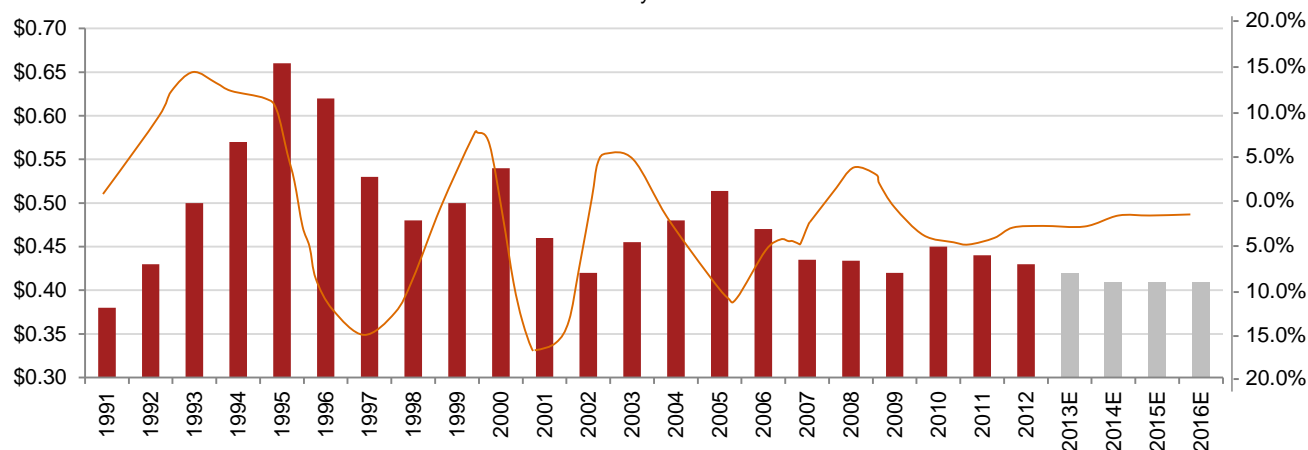
The overall profitability in the semiconductor industry is also expected to decrease significantly in the future. ASPs are smaller and decreasing in many of the major

end segment/applications that are driving adoption of semiconductor chips e.g. wearables, hand-held mobile devices.

Chart 5 shows the ASP and Volume trends for the different devices in the semiconductor industry.

Chart 5: ASP trends for semiconductor devices

See more stable ASP trends. Declines in memory should subside



Source: SIA and RBC Capital Markets, 2015 Semiconductor Outlook.

Besides the squeeze from ASP and Volumes, as shown in chart 6, the cost of product development from design, process and fabrication perspectives have also increased significantly due to several factors. Though the larger shift towards commoditization of hardware and

increase in value of software is not directly evident all across the semiconductor industry, the influence of the emerging megatrends has had an impact on semiconductor industry product development and offerings.

Chart 6: Key operational challenges faced by the semiconductor industry



*Morgan stanley estimate of the cost increase in shift from 65nm to 20 nm

Source: PwC analysis

The increasing requirement for offering enhanced value added services to be competitive has led to a situation where many semiconductor chipmakers are more frequently required to co-develop hardware and software solutions thereby increasing the complexity and thus development costs.

Recent requirements to establish ecosystem partnerships with players across the value chain has required time/commitment and also led to higher costs for chipmakers. This necessity to form ecosystem partnerships is especially apparent in the markets related to the emerging “Internet of Things (IoT)” phenomenon.

A review of the major semiconductor industry deals of 2014-15 shows that there were a variety of underlying reasons as shown in chart 7. This is also further supported by our survey results that the top two “very important” deal objectives for Tech companies were “access to new brands, technologies or products” (82%) and “access to new markets” (77%).⁴

Chart 7: Key semiconductor deals in 2014-15, impacted market segments and major reasons underlying deal

Deal	Market segment	Major reason(s)
Intel-Altera	Computer	Technology/Portfolio gap closure Access to new markets/customers
NXP-Freescale	Automotive Consumer Analog and Mixed Signal	Access to new markets/customers Technology/Portfolio gap closure
Avago-Broadcom	Communications (Mobile and IoT) Analog and Mixed Signal	Access to new markets/customers Technology/Portfolio gap closure
Infineon-IRT	Power Electronics	Access to new markets/customers Technology/Portfolio gap closure
Intel-Axxia	Networking	Access to new markets/customers Technology/Portfolio gap closure
ADI-Hittite	Analog and Mixed Signal	Technology/Portfolio gap closure Increased Market Power to Drive Pricing Advantages
Cirrus-Wolfson	Analog and Mixed Signal	Access to new markets/customers
RFMD-Triquant	Communications (Mobile)	Increased Market Power to Drive Pricing Advantages
Qualcomm-CSR	Communications (IoT)	Access to new markets/customers Technology/Portfolio gap closure
Cypress-Spansion	Communications (IoT) Consumer Automotive	Access to new markets/customers Increased Market Power to Drive Pricing Advantages

Source: PwC analysis

⁴ PwC 2014 M&A Integration Survey: Looking beyond the here and now

Analysis for some of the deals listed in chart 7 show that the underlying themes clearly align with the major reasons listed in the chart.

The Intel-Altera deal is expected to help Intel move from its declining PC business into more profitable, complementary markets. The acquisition is also well aligned with Intel's growth strategy and is expected to not only accelerate FPGA transition to Intel fabs but also expand their IP portfolio enable a new class of products to meet customer needs in data center and IoT market segments.

The Infineon-IRT deal is expected to help boost the market position of the combined company in power management, improve their roadmap into next-generation devices, create manufacturing synergies, strengthen their position in automotive and electronics, and give them access to some unique customer relationships. Cypress and Spansion have leadership positions in specialty memory, SRAM and NOR Flash. Spansion, after its purchase of Fujitsu's Microcontroller assets in 2013, has also obtained a leading position in the automotive MCU space. The combined entity is expected to now have the scale and product depth to compete effectively in the embedded markets such as automotive and industrial.

The merger of RFMD and Triquint will expand the new company Qorvo's RF product portfolio to cover a wider frequency spectrum and consolidate their market position in the mobile, infrastructure and defense/aerospace industries. Intel acquired Axxia to boost its position in the networking switch business. The networking switch products that are currently in the market use either an ARM or PowerPC based processors. With this acquisition, Intel aims to get access to new customers for its x86 architecture based products.

Qualcomm announced that it will buy UK based Cambridge Silicon Radio for \$2.5 billion. CSR was one of the pioneers in Bluetooth technology for machine-to-machine communication. It is growing in areas like automotive and wearable devices. Its chips are used in products such as portable audio speakers and Apple-owned Beats headphones. With this acquisition, Qualcomm plans to strengthen its position in providing critical solutions for the "Internet of Things" market.



Key drivers for semiconductor industry M&A activities in 2014:

The unique dynamics in the semiconductor industry from an M&A perspective can be understood by looking

more closely at the market size growth rates of the major segments: Automotive, Industrial, Communications, Computer, and Consumer. The expected growth rates of these market segments for 2014-2019F are shown in chart 8.

Chart 8: Growth trends for analog device sales in different market segments

<i>Market segment</i>	<i>5 Yr growth rate (2014-2019F)</i>	<i>Type of market</i>
Automotive	+11.2%	Growing
Industrial	+7.3%	
Communications	+7.2%	
Computer	+0.8%	Slowing
Consumer	+0.4%	

Source: The McClean Report 2015, IC Insights



Automotive, Industrial and Communications segments will likely grow at a significant clip in the near future. Consumer and Computer segments are expected to slow down. Both the growing and slowing market segments have shown significant M&A activity but the underlying reasons are different.

Growing semiconductor market segments:

Segments like Automotive, Communications, and Industrial are poised for significant growth in the near future.

From the incorporation of increasingly sophisticated controlling electronics in automobiles to the advent of connected cars and connected devices, the increase in semiconductor content in automobiles and smart appliances has and will likely continue to explode over the next few years. Similarly, in the traditional Industrial segments, the advent of more advanced control and monitoring equipment and the Industrial IoT phenomenon has driven an upsurge in semiconductor adoption in that sector.

The high growth rate in these segments has caused a large number of semiconductor chipmakers to focus on these segments leading to considerable jockeying for position and competitive advantage. Given the large number of applications in these growing segments, no semiconductor company has been able to dominate either the Automotive, Communications, or Industrial segments both from a product capability or market share perspective. The fragmentation of market share and the inability to address a comprehensive range of applications has diminished the market power of semiconductor companies while working with these customers.

Due to all of these reasons, four factors have created conditions ripe for consolidation in the Automotive, Communications, and Industrial segments:

1. Technology/portfolio gap closure
2. Access to new markets and/or customers
3. Resource augmentation (to enable scaling)
4. Increased market power

The size and scale of the companies involved influence whether an acquisition of a smaller competitor or a “merger of equals” takes place. As shown in chart 9, a distinct relationship exists between the size of the company, the type of acquisition event and the underlying factors.

Slowing semiconductor market segments

The Consumer and Computer segments which historically have led the way in adoption of semiconductor devices show all the classic signs of a maturing market with low to negative growth rates over the next 5 years. Apart from being associated with a high degree of cyclicity, these markets are associated with a stable set of customers with set buying patterns who look at most semiconductor chips as commodity components. The jockeying for position and competitive advantage is even more pronounced in the slowing market segments. As in the growing segments, no semiconductor company has been able to dominate the Consumer or Computing segments both from a product capability or market share perspective. Predictably, this has led to a situation where a large number of

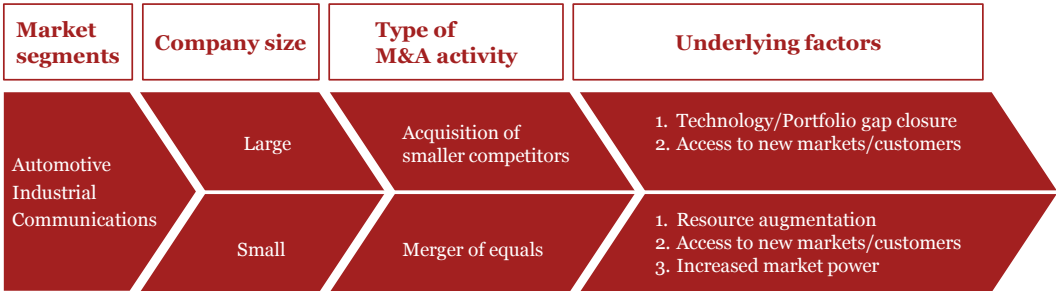
chipmakers focus on a limited set of applications creating pricing and profitability pressures and leading to situations ideal for consolidation.

As shown in chart 10, the same underlying factors and size factors come into play in determining the type of M&A activity that occurs though the factors seem to be common across companies of all sizes. One key difference is that in the case of the slowing market segments, larger players tend to focus on deals that help to acquire a more comprehensive product portfolio, with an eye on **increasing** market share and power and using that to commandeer better pricing.

Impact of the “Internet of Things” on semiconductor M&A trends

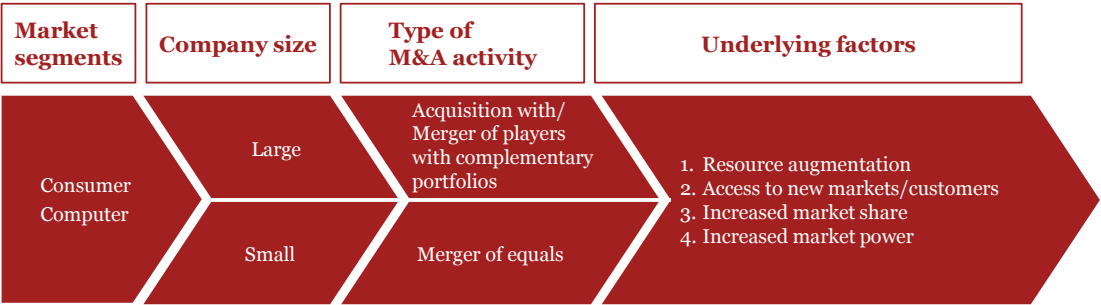
IoT represents a collection of opportunities that will have an impact across all segment market segments. Semiconductor companies, who look at IoT as a potential inflection point they can leverage for increasing their revenue growth, function as enablers of services and technologies in the over all IoT stack by providing types of core enabling chip products: microprocessors, microcontrollers, wireless and sensors/actuators.

Chart 9: M&A trends among growing semiconductor market segments



Source: PwC analysis

Chart 10: M&A Trends Among Growing Semiconductor Market Segments





Source: PwC analysis

Many semiconductor companies are beginning to embrace IoT to drive new revenue and growth models. As part of their efforts to establish and expand their footprint in the IoT ecosystem, semiconductor companies are looking to partner with companies across the ecosystem to develop joint Go-to-Market strategies and create IoT specific platforms and

solutions. The key to such efforts will be the ability to offer a comprehensive portfolio of products that encompass the four core enabling chip products listed above. As Chart 11 shows, many of the major semiconductor chipmakers involved in the IoT space do not have a comprehensive portfolio of products thus increasing the chances for potential M&A.

Chart 11: M&A trends among slowing semiconductor market segments

	Computing			Connectivity							Sensing
Companies	Processors	MCUs		Wireless							
		8-bit	32-bit	Cell	Wi-Fi	Blue T	GPS	RFID	NFC	Zigbee	
Intel											
Texas Instruments											
STM											
NXP											
Freescale											
Analog Devices											
Maxim											
Microchip											
Atmel											
Linear Tech											
Semtech											
Silicon Labs											
IDT											

 Present in portfolio
 Portfolio gaps

Source: PwC analysis

Section 3: What to expect in 2015 and options for semiconductor companies

The profitability and growth challenges that confronted semiconductor companies during 2014 will likely continue to drive significant M&A activity in the semiconductor segments. Semiconductor chipmakers focused on addressing applications in the slowing market segments will especially be on the lookout for opportunities to increase their market share and power with an eye on reducing pricing pressures and increasing profitability. In the growing market segments, opportunistic mergers and acquisitions to gain access to new technology, markets or customers will provide the impetus for deals to happen. The analog and mixed signal market which has multiple players focused on niche applications within the Automotive and Industry space could continue to be the main arena for M&A activities to occur in 2015.

The Internet of Things will likely continue to provide an opportunity for expanding their revenues again primarily in the Automotive and Industrial segments. Since many of the potential customers in these two growing segments would prefer to obtain an end-to-end portfolio of core enabling chip products from one source rather than make “best of breed” decisions, semiconductor chip makers targeting these segments for Internet of Things applications would definitely look to close any gaps in their existing product portfolio. We expect these portfolio gap closures to be made primarily through inorganic, acquisitive methods given the longer time and more expensive effort associated with building product organically in-house.



Section 4: How should semiconductor companies take advantage of the current boom in M&A activities?

Semiconductor companies should carry out a strategic review of their options to determine business value drivers, compare these with key competitors and establish a comprehensive list of strategic imperatives e.g. scaling the company, entering new markets, closing portfolio gaps, increasing market share and power, augment resources. Based on the defined imperatives, companies should identify potential merger or transformational acquisition opportunities and estimate possible returns from a potential deal. Companies should also conduct review of their existing portfolio and identify growth/rationalization opportunities with an eye on divesting non-core products and focusing on core opportunities.

Semiconductor companies should remember that pursuing business growth through inorganic (M&A) methods is an attractive but inherently risky option. Though both mergers (of similar sized companies) and acquisitions (of smaller companies) come with their pre-and post-deal integration and synergy achievement challenges, mergers of equals are typically more risky due to culture mismatch between organizations and a struggle for influence between the two companies.

Decision-making, especially at the mid-management level, is confused and slows down in such cases. Achieving consensus on operational considerations such as product development and portfolio management processes, customer account coverage and in rationalizing R&D and manufacturing footprints becomes very difficult.

Successful M&A integration and deal synergies will require a focused effort that involves identification and execution on value drivers and business risks. In fact, only 35% of tech companies achieved their operational goals.⁵ The value drivers impacting the success of a deal will range across a large number of focus areas such as: organization structure, executive communications, governance, roadmaps, product development/R&D, sales & marketing, operations and supply chain, People and Change Management (HR), IT capabilities, Finance and Tax. Building deal specific transition and integration blueprints for each of the identified value drivers will be a key factor in enabling success.

⁵ PwC 2014 M&A Integration Survey: Looking beyond the here and now

PwC can help

There are unique dynamics underlying the increase in deals in the semiconductor device industry. Is your business prepared? For a deeper discussion on PwC's Semiconductor deals, please contact one of our leaders:

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Let's talk

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