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THE INDUSTRIAL INTERNET OF THINGS

MAKING FACTORIES "SMART" FOR THE *NEXT* INDUSTRIAL REVOLUTION

Tesla multi-function robots. Source: nytimes.com

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Spring 2017

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Executive Summary

When Jeff Immelt, CEO of General Electric, the 125-year-old industrial giant, declares that all new hires must be able to "code" (i.e. write software code); when GE's advertising emphasizes the transition from "things" to software (a father gives his son a heavy hammer and the son struggles to explain to his parents he'll be a *programmer* at GE); it is a pretty clear sign of a meaningful and fundamental change in the world of manufacturing. GE has gone "all in" on Predix, the industrial automation software platform that it has spent billions to develop (and continues to bolster through acquisition). In essence, GE is pursuing a complete and total reinvention of itself, going as far as the relocation of its global headquarters from Fairfield, Connecticut, to Boston, Massachusetts. Immelt has stated his ambition to become one of the world's top ten software firms with sales of programs and services worth $15bn as early as 2020.

Siemens, the German industrial giant, is also reinventing itself, having introduced its "Mindsphere" platform, which it characterizes as an "open IoT operating system," essentially a PaaS (Platform as a Service) dedicated to recording and analyzing large volumes of production data.

These are just two examples of the combinations now occurring between two historically separate fields of automation – operating technology ("OT") and information technology ("IT").

As *the Economist* has noted, "the first tends to be organized in vertical, industry- specific silos, such as machine tools and medical equipment. The second typically comes in horizontal, widely used layers, such as computer operating systems. Bringing it all together could go badly wrong."[1]

Getting it *right,* however, could fuel the next major wave of industrial growth and profitability. This report examines the way current technological developments are creating an important inflection point at the intersection of these two specialties, leading us to the fourth

[1] "Siemens and General Electric Gear Up For the Internet of Things," *Economist,* 12/3/2016

industrial revolution, or "Industry 4.0," which is an important element of the so-called "Industrial Internet of Things" ("IIoT").

Industry 4.0

Germany may have been the first to coin the term "Industry 4.0" ("Industrie 4.0" in German), now being used to describe this new phase of the industrial revolution, in which existing factory automation is being integrated with IT networks and systems.

A further illustration of the transition in focus from hardware to software is Cisco Systems, which has begun to emphasize software in its IoT strategy, acquiring Jasper for IoT connectivity management in 2016 and now AppDynamics to add a robust application performance management capability to its overall offering.

We'll take a look at some of the different approaches being taken to address the opportunities and the challenges created by the new technologies; specifically, the implications of IIoT for manufacturing practices and business models. We'll look at the ways in which market participants are reacting either in terms of restructuring the way they run themselves or acquiring new technologies and assets to tackle their markets in a fundamentally different fashion, or in many cases both. We believe that fundamentally we are witnessing a process of *digitization*, a powerful force that has already touched almost every aspect of life, and one that is now making its presence deeply felt in new ways in industry and manufacturing.

We'll also be looking at some exciting new entrants, who are bringing entirely new ways of thinking about and competing in these markets.

We'll then examine some of the more interesting transactions that have taken place as companies attempt to position themselves strategically in this new competitive arena.

Finally, we'll identify interesting public and private companies that are active in this space, and a few of the more noteworthy recent fundings that have taken place.

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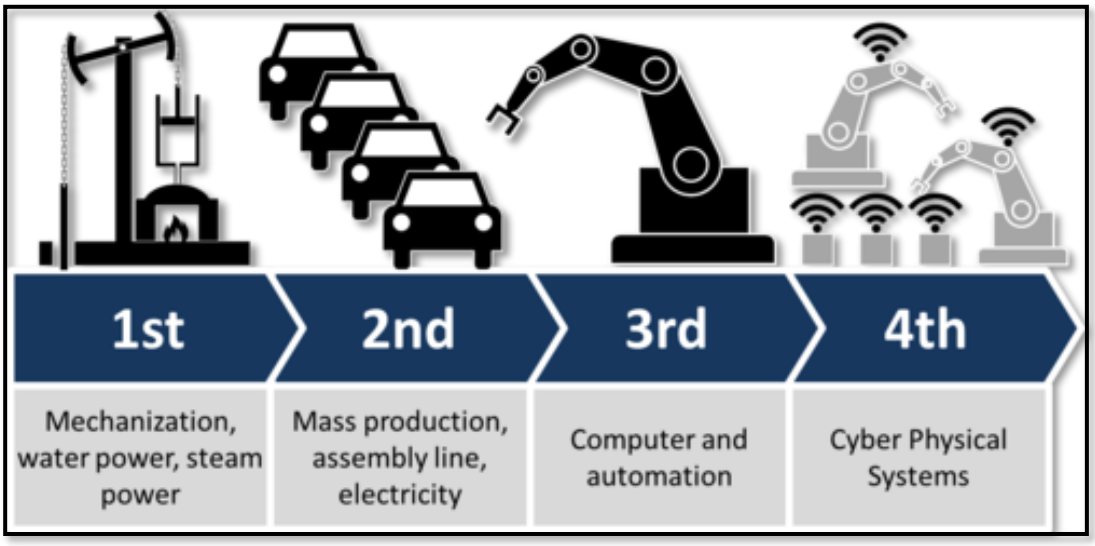
We would also like to thank Monica Mariani and Alexander Johnson (WCP), and Neil Blecherman (Neil Blecherman Associates) for their assistance and valuable input.

1. Digitization

The Industrial Internet of Things (IIoT) is a term now being used to describe the interconnection of industrial manufacturing and process equipment using IoT technologies. Sometimes referred to as "Industry 4.0," it essentially represents the application of the latest advanced digital information technologies to industrial activities. The term *Industry 4.0* derives from the belief that this is the next (i.e. fourth) major disruption in the manufacturing value chain. The first industrial revolution arose from the introduction of steam power, the second replaced steam with electricity, and the third involved automating tooling equipment and putting robots on the assembly line. *(See Fig. 1, below)*

Figure 1: Industry 4.0



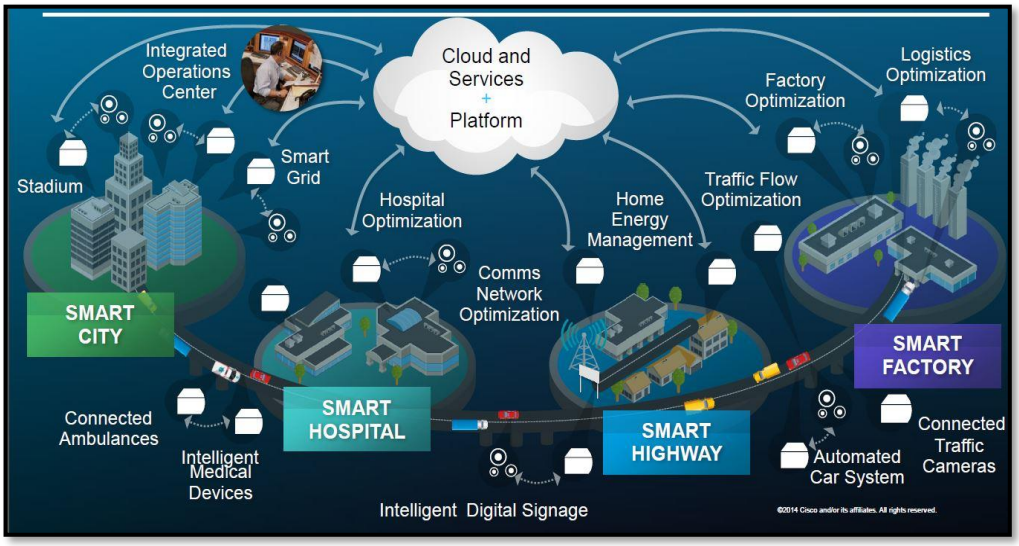
Source: *Christoph Roser*

Just as we have seen already with the music industry, book and newspaper publishing, and long and short form video (TV and movie industry), the capabilities of digital technologies (what we are choosing broadly to call "digitization"), have proven to be extremely disruptive to existing business models, and in most cases have facilitated the creation of entirely new businesses employing these new technologies in new and different ways and at different points of the value chain.

Digital technologies have, in fact, also disrupted the computer and data processing industries themselves. Witness the impact of virtualization technologies — applied in the data center, first to servers (dramatically increasing CPU utilization and reducing the need for new servers), then to networking (virtual routing and switching, network function virtualization), and finally on storage (storage virtualization), all being combined into "cloud" computing, which is revolutionizing the way we use information technology. In fact, the term now being used is "hyper-converged infrastructure," referring to the combination of all of these functions in one integrated, cloud-supported system. The use of these advanced technologies is dramatically changing the entire IT landscape.

The application of digitization technology to the rest of our physical world will be equally disruptive, we believe. Sectors we expect to experience dramatic change include manufacturing, transportation (including autos, trucks, airplanes and trains, and logistics generally), retail, energy (both traditional extractive industries such as oil and gas as well as electrical power generation and distribution), utilities, "smart buildings," and government/smart cities, to name a few.

Figure 2: Digitization Across Multiple Sectors



Source: *Cisco*

Our focus in this report, however, is industrial and manufacturing IoT technologies and the impact of digitization on these sectors. Various terms are used to describe this phenomenon - "cyber-physical systems," "digital-to-physical conversion," etc. In general, there are four types of technologies that will come into play as we enter the next industrial revolution:

- Data, compute, and connectivity (including "Big Data," IoT/Machine to Machine (M2M), and Cloud)
- Analytics and Artificial Intelligence (AI) — including machine learning and advanced analytics applied to large datasets
- Human-machine interaction (UI, touchscreens, virtual reality, augmented reality)
- Digital <—> analog/physical conversion — the interface between the digital and physical realms; includes 3D printing and additive manufacturing, advanced 3D scanning, advanced robotics, and energy storage and harvesting (i.e. conversion of physical to electrical and back).

Of course, as we will explore in more depth later on, security in the very broadest sense will be absolutely essential if these technologies are going to deliver on their promise without exposing us to disastrous vulnerabilities. Not only must there be robust security to prevent system compromise by unauthorized intruders, but these systems must also guard against possible corruption of data and applications, which could lead to life threatening circumstances if critical systems are crippled or halted outright.

Some of these technologies are already in use in industry and other applications, while others are more "bleeding edge," in the sense that they are either not yet developed into products, or they are being used by early adopters willing to tolerate the risks of experimental or "beta" offerings. A number of forces are in play to drive this latest wave of change. Japanese innovations in the last decades of the 20th century brought "just in time" manufacturing and "lean production" techniques to increase manufacturing efficiency and competitiveness. Additional savings were obtained by outsourcing and offshoring of lower-skilled labor, but the economic advantages of doing this have decreased of late as wages have risen in the lower cost countries and shipping costs have increased. A drive for increased efficiency has thus intersected with rapidly declining costs of the various elements of IIoT technology and the arrival of highly sophisticated networking and data manipulation technologies. At the same time, reducing time to market and being flexible and responsive to demand are critical for competitiveness in today's marketplace.

Ultimately, digitization is about the ability to manage, control, monitor, and understand the physical universe in a digital realm. Once digital information is created (=data), it can be transported, centralized, and analyzed for insights around increased efficiency, better capacity utilization, etc. Moreover, once in the digital realm, information can easily be aggregated, replicated and relocated as necessary, dramatically simplifying the management and operation of complex manufacturing processes. This digitization of the physical world (and the closely related discipline of translating back and forth between digital and physical) is transformational in terms of the capabilities it opens up for analyzing existing processes, making them more efficient, and devising new ones.

The convenience and heightened flexibility is both its strength and its weakness, however, for without robust and reliable security as an integral part of design and implementation these innovations will expose critical systems and infrastructure to attack and compromise. We must proceed with due caution.

2. Evolution of IIoT/Industry 4.0

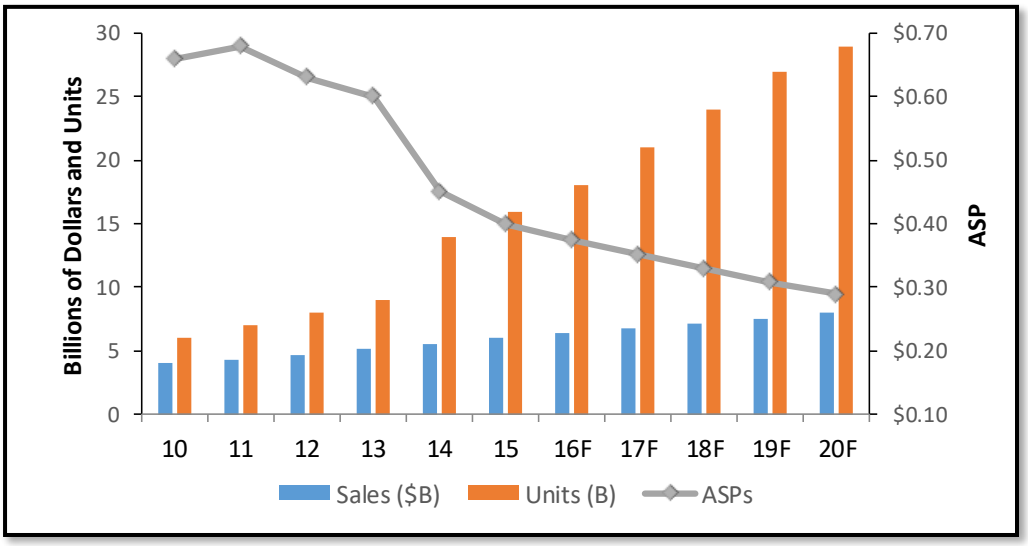
Fundamentally, the IIoT begins with sensors, which acquire analog information and convert it to digital form. Process industries, in particular, have used a variety of sensors for decades, but the arrival of ubiquitous computing power and data networking has dramatically increased the possibilities for using sensors in industrial automation. The change began with the transition in the 1990s from analog to digital sensors. These digital sensors were capable of transmitting data to on-site or remote servers for storage and analysis, but they still required wiring for communications and power, so retrofitting existing installations has generally been cost prohibitive.

New sensor technology allows the use of battery power and wireless communications using a plethora of protocols, allowing the placement of new sensors in multiple new locations. Dramatically lower costs across the entire information technology stack, from components to whole systems, have now made the extensive use of sensors in both existing and new locations economically feasible. As shown in Figure 3, below, unit sales have grown impressively, but declining ASPs have held sales growth to a more modest rate. We expect the trend of increasing adoption offset by lower ASPs to continue.

The next significant development is the aggregation of all of this sensor data to automate formerly manual processes (sensor plus actuator) or to predict equipment failure. Beyond that lies the opportunity to optimize business practices using new insights gained from sensor data and applied analytics. Much of this technology lies relatively invisibly in embedded systems. According to Germany Trade and Invest, "more than 98 percent of all processors produced worldwide are deployed in regulator, control, and monitor functions in devices for all facets of daily life.[2]"

[2] "Industrie 4.0: Smart Manufacturing for the Future, *Germany Trade and Invest,*" July 2014, p.7

Figure 3: Adoption of Sensors/IT in Process or Manufacturing



Source: *IC Insights*

Industry 4.0 – add lots of sensors, accumulate LOTS of data, use computer analytics to process the data, save money and/or increase sales.

While the implications of this new technology will be somewhat different for process-oriented industries than for pure manufacturing plants, the fundamental principle is the same — add a lot more sensor technology, accumulate a vast amount of data, use computer analytics to process this data for actionable conclusions, save money by reducing operational cost and/or make money by increasing sales.

Germany has already recognized the potential for using new IT technology in connection with its existing recognized manufacturing expertise. Describing Industry 4.0, the German government has passed a "High Tech Strategy Action Plan" in 2012 which references Industry 4.0 as one of ten "Future Projects" as part of its overall industrial policy for the nation, and clearly articulates its ambition to play a leading role in Industry 4.0 technologies and what it calls "cyber-physical systems." In their framework, the evolution progresses from embedded systems (e.g. airbag) to connected or networked embedded systems (e.g. autonomous aviation), then cyber-physical systems (e.g. intelligent networked road junction), and eventually culminating in an

"Internet of Things, Data and Services," the elements of a true "Smart City." [3]

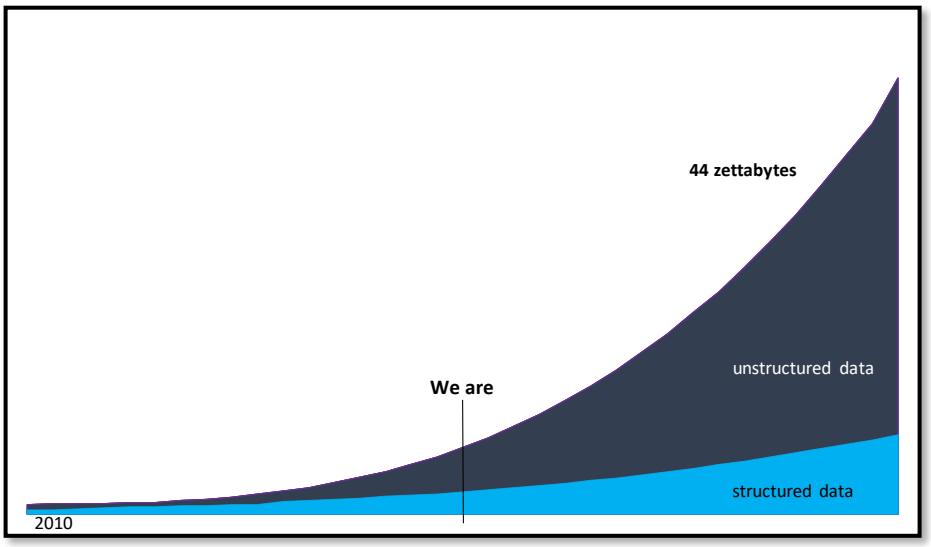
Within that broad understanding, however, there is room for quite a bit of experimentation. For example, where will storage and compute resources be located? Will all the data be transmitted from very inexpensive sensors (using very little power), with little or no compute or storage on-board, straight to a centralized analytics location? Will processing power be used at the site of data acquisition to do a preliminary sift of the data so that only useful data is transmitted onward, saving bandwidth? Can the sensor be connected with an actuator or robotic device and thereby create a "self-healing" type of system? Will there need to be two systems, one essentially like a human reflex (nerve to spinal cord to reflex action) and the other involving a more complicated process of recognition and assessment (e.g. Artificial Intelligence)? And so forth.

What about security? The security problem begins at the moment of digitization — security in the sense of data integrity as well as security in the sense of malicious interference.

It is already apparent that our ability to collect (and store) data exceeds our ability to analyze and understand it, and that "unstructured" data is the real challenge. "Structured" data resides in highly organized, traditional computer databases, controlled, and easily searchable by computer algorithm. "Unstructured" data is, essentially, everything else that is captured as data by computer systems, and most of the data flowing from what we call IoT and IIoT falls into this latter category. *(Fig. 4).*

[3] *Ibid*, p. 8

Figure 4: Data is Approaching Exponentially and Demands New Approaches



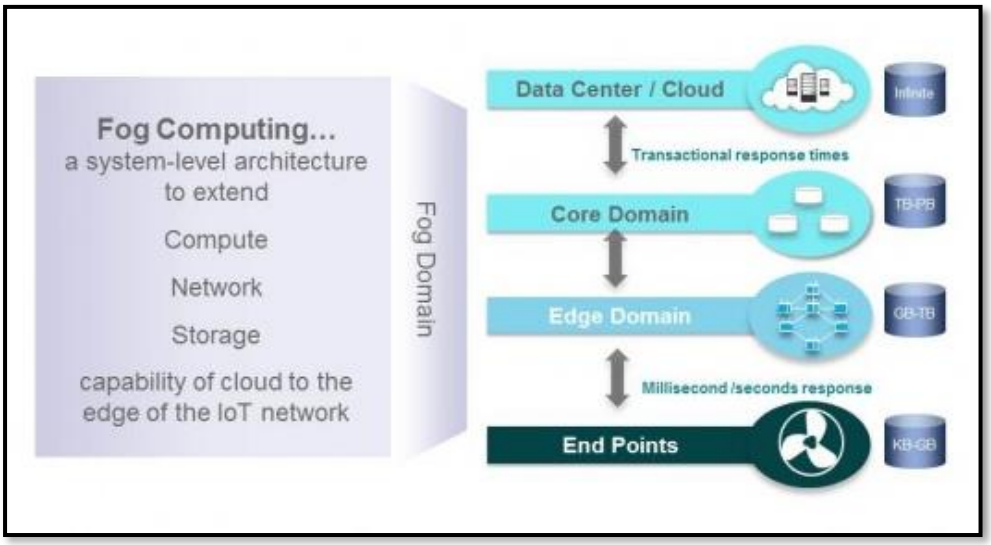
Source: *IBM*

There will be significant opportunities for companies willing to tackle the challenge of analyzing all of the data already being collected, to say nothing of the avalanche of additional data that will come from implementation of IIoT technologies in factories and fields. According to the Industrial Internet Consortium, "in a typical factory, more than 99% of data is discarded without attempting to derive insight due to high storage and transport costs, a situation they refer to as "excess data, insufficient insight."[4]

Cisco has already coined the term "fog computing," to describe an intermediate, or "fog" layer of processing between the "ground" (.i.e. the sensor doing primary data acquisition) and the "cloud" the ultimate server/storage/compute infrastructure located in a centralized remote location. For data-intensive or remote locations, the "fog" model can reduce bandwidth requirements and enhance overall economics. Cisco's acquisition of Parstream last year is an example of this. For additional information on the Parstream acquisition, please see Section 8: Selected M&A Transactions.

[4] "Smart Factory Applications in Discrete Manufacturing, An Industrial Internet Consortium White Paper," *Smart Factory Task Group, Industrial Internet Consortium*, version 1.0, 20170222, p. 30.

Figure 5: Fog Computing



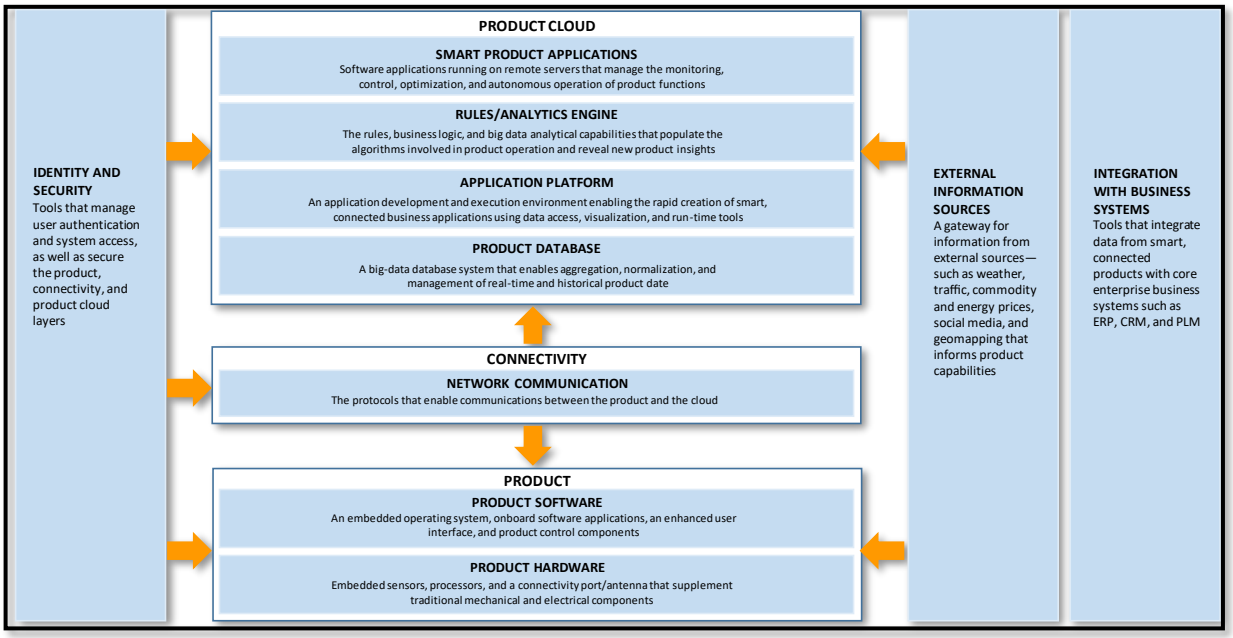
Source: *Cisco*

We believe the real value add in IIoT will come from four primary areas:

1) Sophisticated supply chain management — linking information from the entire supply chain into a comprehensive view of the entire system, enabling tighter inventory and quality control;
2) Increased operational efficiency for existing processes — reduction of waste, downtime and so forth, essentially better process automation, including predictive maintenance and just-in-time techniques;
3) The enablement of entirely new business models (more on this below), for example those enabling the conversion of a product sale to a service sale, or a one-time transaction to an ongoing service relationship, as well as increased ability for mass customization and reduction in the number of different physical manifestations of a product by controlling features through remotely programmable software;
4) Sophisticated software analytics that allow managers to sift out the actionable information from the enormous flow of raw data.

A helpful illustration of the overall technology "stack" as it relates to IIoT was provided by Porter and Heppelmann in their article "How Smart Connected Products Are Transforming Companies"[5].

Figure 6: IIoT Stack of Technologies



Source: *Harvard Business Review*

[5] "How Smart, Connected Products Are Transforming Companies," *Harvard Business Review,* October 2015, p. 7.

3. The Merging of IT and OT

OT, or "operational technology," is a term used to describe the use of computer processing technology to detect or cause changes in physical processes by controlling physical devices such as valves, pumps, etc. A variety of specialized technologies have been deployed in the field of industrial automation, including PLCs (Programmable Logic Controllers), SCADA (Supervisory Control and Data Acquisition), DCS (Distributed Control Systems), and CNC (Computer Numeric Control). These have typically been used in dedicated vertical applications, isolated to the specific location in which they are installed, often running proprietary protocols, and locally controlled.

In contrast, historically, Information Technology (IT) has been deployed in administration and management functions such as ERP (Enterprise Resource Planning), HRM (Human Resource Management), CRM (Customer Relationship Management), MES (Manufacturing Execution Systems) etc. Thus, the term OT has been used to describe the use of specific IT technology in the so-called "non-carpeted areas," the industrial control systems as distinct from management IT functions.

There are significant and important cultural differences between IT and OT that make merging these historically separate disciplines potentially challenging.

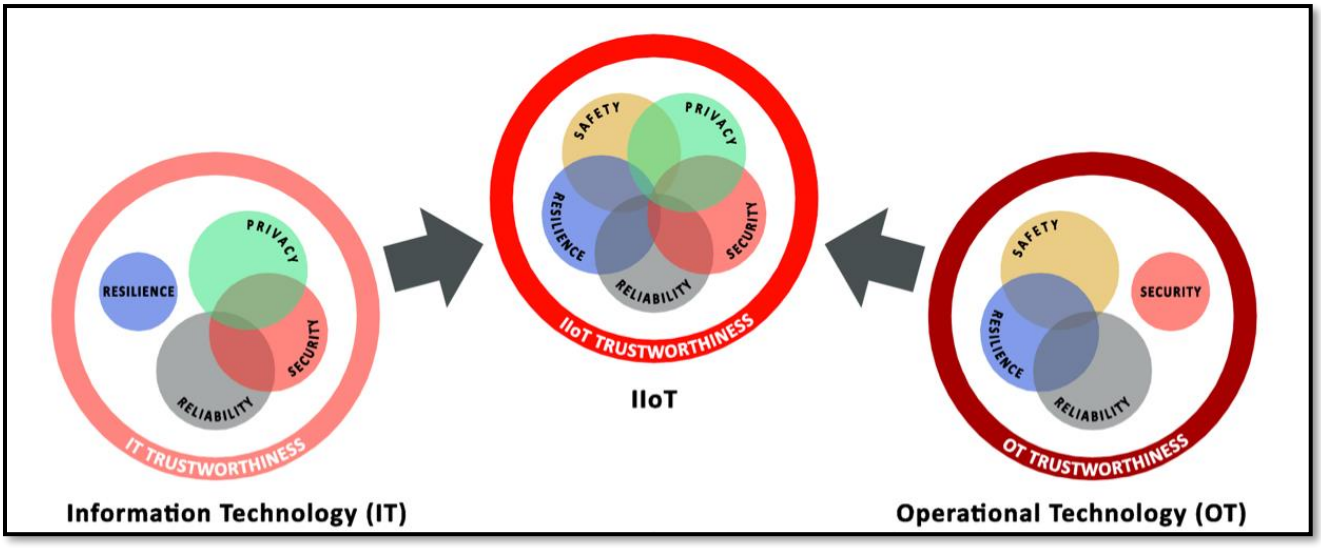
As we examine IIoT, it's important to understand some key differences between IT and OT and how they are converging to create the IIoT environment. For one thing, IT has very frequent updates and upgrades — we've all seen the blue screen of Windows wanting to update itself during a shutdown cycle. In contrast, OT is extremely stable and PLC programming has seen little change in 20 years. For the most part, industrial control technologies are installed and then left to run without software updates. Part of the reason IT has such frequent updating has to do with security — since typical IT systems are interconnected via the Internet and its ubiquitous TCP/IP protocols, they are exposed to hacking and exploitation of security bugs and flaws. By contrast, OT systems are typically isolated either as standalone systems or in a tightly controlled internal network running proprietary communications protocols and therefore much less vulnerable to external hacking and intrusions.

Once we connect industrial control systems to the open Internet, security becomes a major concern, especially since it is highly likely that much of the equipment on the production floor will have components

that were not designed with this type of security in mind, instead relying on the premise that they would always exist only in closed private networks. We've heard this described as the "elimination of the 'air gap' between IT and OT systems."

A good illustration of this critical difference is shown in Figure 7, below. While IT systems prioritize privacy, security, and reliability, they are potentially less focused on resilience, whereas historically, OT systems must place safety, resilience and reliability in the forefront, while giving system security a "back seat," primarily because until very recently these systems could rely primarily on physical security and were not connected outside of highly secured private networks.

Figure 7: Convergence of IT and OT Trustworthiness



Source: Industrial Internet Consortium: *IIoT, Volume G4: Security Framework*

Bedrock Automation, a wholly-owned, venture backed subsidiary of Maxim Integrated Products, Inc., has designed and built an industrial control system designed from the ground up with security in mind. Bedrock's system uses a different physical architecture (for its

***Security** is easy to overlook and difficult to implement after the fact. Existing installations may be insecure in unexpected ways due to fundamental design assumptions around physical isolation or controlled, proprietary "inside only" connectivity.*

In some cases, it may be both cheaper and far more effective to install entirely new systems rather than attempt to overlay security on an existing industrial control system.

backplane) and embeds security at the silicon level for comprehensive, integrated, total system security. [Callout box on Security issue?]

Companies like Bedrock Automation are developing new products to address the security issues while at the same time offering greater performance and functionality in the form of new industrial control system architectures that have security, scalability, and high performance without a cost penalty relative to existing technologies. Incumbent vendors will look to add layers of security to existing control systems with varying degrees of success. Customers will need to weigh carefully the tradeoffs between the cost of incremental vs. full-scale upgrades and the potentially much greater cost of security breaches in their control systems.

So why go to all of this trouble? The ability to gather real-time data and aggregate it into a central control system can offer significant advantages. The digitization of a process ultimately enables the locus of control to be remote from the process and to be shifted around easily. Used properly, sensor technology combined with actuators and robotics can enable predictive maintenance and self-healing systems, reducing costly downtime. In both process and manufacturing contexts, IIoT technology can reduce waste and failure rates, increase labor productivity and enable more flexibility in response to changing customer requirements. Apart from the direct manufacturing environment, IIoT technology has the potential to dramatically enhance field service and support, reducing unproductive site visits by enabling remote diagnosis and possibly even eliminating site visits through the use of drone technology, all of which dramatically affects costs.

As the use of these technologies extends outward, it has the potential to transform complex supply chains. Sensors and networked technologies accumulate data on in-process inventories, track production errors to their source for quicker correction, and give a much more complete picture of the end customer and their use of the product, creating a beneficial feedback loop back to product design (and, more importantly, *re*-design).

Indeed, as we mentioned above in our discussion of Digitization, the initial extension of factory automation beyond the boundaries of the factory floor was probably first seen in supply chain logistics. Originally

introduced by Japanese auto manufacturers in the 1970s and 1980s, "just-in-time" manufacturing endeavored to reduce carried inventory in the manufacturing plant and transferred the responsibility for maintaining adequate parts and raw materials supplies from the manufacturer to the vendor, removing significant cost from the manufacturers.

As more sophisticated communication technologies were implemented between vendors and end customers, vendors were able to monitor stock levels of parts very closely in order to ensure a smooth flow of necessary parts while the manufacturer could significantly reduce inventories of parts on hand and save the associated carrying cost. Ultimately, the operation of a real-time supply chain optimization process has the potential to reduce inventory holding costs by 20-50%, by optimizing the flow of materials and dramatically improving forecasting and overall operations through sophisticated analytics.

4. IIoT Enabled Business Models

More significantly, the automation that is enabled by what we generically refer to as IoT has the potential to do far more than simply add efficiency to existing systems. In fact, the new technology has already begun to enable entirely new business models. In addition to the classic manufacturing model characterized by design, product development, scale manufacturing, sales and service, we are already seeing the arrival of "as a Service" (often referred to as "XaaS") type models. Rolls Royce aerospace is selling engine power in a "power by the hour" model to airframe owners and airlines — rather than selling the engine outright and then separately handling responsibilities for warranty, maintenance, etc., Rolls Royce and GE now use sensors built into the jet power plants to accurately price the use of these engines by the hour. In addition, the sensors are able to monitor the operating conditions in order to make more accurate predictions about when maintenance will be needed. As opposed to following a fixed maintenance interval, which may either result in waste (if performed too frequently) or downtime (if harsh conditions create the need for earlier maintenance), under this approach the airline operator experiences less downtime and the engine manufacturer can offer a simplified and more predictable cost of operation to its customer base.

The next logical step, of course, is the use of the data — the sale of analytics on the data to provide additional competitive or operational insights to customers. Some customers may insist on retaining exclusive rights to data, while others will welcome the opportunity to learn more through a vendor's anonymized analysis of several competitors.

The opportunity to convert to a service model from a product sale model also brings new challenges. The way the product is designed may need to change in important ways. For example, the burden of maintenance and repair shifts entirely from the customer to the manufacturer. Designers may want to use more expensive components to enhance reliability or simplify products (fewer moving parts) in order to reduce ongoing maintenance and repair requirements. Simplification of design and operation may also reduce the potential for breakage or wear due to accidental misuse. User interface design will assume greater importance as operations are controlled through software

interfaces rather than mechanical controls, and the human-machine interface ("HMI") will become an important part of the overall design process, particularly as a younger labor force, accustomed to the ease of use of smartphones, enters the workplace.

In fact, digitization goes even further. The use of configurable software on products allows a manufacturer to reduce the number of separate physical designs, using the software to control the performance or other characteristics defined by differing model designations. For example, as noted by Porter and Heppelmann[6], John Deere used to manufacture multiple versions of engines, each providing a different level of horsepower. It now can alter the horsepower of a standard physical engine using software alone. This approach allows for less expensive customization of a single design to meet multiple customer configurations. Products can also be designed so that final configuration occurs on-site in the field. An example would be an installation technician programming the language of the menus on a system for localization.

Another implication of the inter-connected IIoT is the need for products to inter-operate, both with other systems and products made by the same manufacturer and with systems made by third parties. Products that might have been designed in relative isolation to work in a particular situation will now be required to work with many other products and systems. This raises the issue of standards, which will be essential if we are to realize the benefits of all of this. Both consumer IoT (as noted in our earlier report "The Internet Of Things — Smart Products Demand a Smart Strategy — Using M&A for a Competitive Edge," available (Woodside Capital Partners Industry Reports) and industrial IoT currently face a proliferation of protocols and technologies that will need to be standardized for the full benefits to be realized.

Porter and Heppelmann offer an interesting comparison to the software industry in which they categorize lessons manufacturers can learn from the all-digital software industry in terms of the organizational shifts required and note that the evolution to smart, connected products essentially requires "what is essentially an internal software company."

[6] *Ibid*, p. 8.

The implications for the entire manufacturing value chain, from design, to channel, and through ongoing after-market support, are significant. Development cycles will be much shorter, products will necessarily be part of larger "ecosystems," and the ongoing relationship with the customer driven by "as-a-service" type models will necessitate a much greater focus on customer success over the long term as opposed to a more transactional approach.

As companies begin to grapple with the strategic implications of IIoT technologies for their business, it is also critically important to note the many key differences between traditional product sale business models and XaaS business models, and their implications for strategic M&A. The difference between offering a product and offering a service generates numerous strategic questions. Fundamentally, when we examine a potential acquisition target for its "value," we will quickly see significant differences between companies offering a service and those selling products. For one thing, service-based business models generate steady cash flow (once they have achieved scale) but for businesses accustomed to the relatively large cash contribution of individual product sales (and the sales force compensation that goes along with it), the transition from product sales to offering a service model can be painful and disruptive. Depending on the specific situation, the impact of switching costs and its implications for customer loyalty can have a significant impact on enterprise value. Companies building their business on a service oriented model must carefully consider how to build in customer "stickiness," or they will find it difficult to attract an acquirer willing to pay a reasonable valuation.

Issues of ongoing product liability may take on additional importance as well. Companies in industries that have traditionally been served by product vendors with robust brand reputations riding on many years of product loyalty may find it very difficult to integrate the acquisition of a fast-moving smaller acquisition target offering a subscription-based XaaS product model.

5. Challenges

The Industrial Internet Consortium ("IIC"), founded by AT&T, Cisco, General Electric, Intel, and IBM, is a global, member supported organization that promotes the accelerated growth of the Industrial Internet of Things by coordinating ecosystem initiatives to securely connect, control and integrate assets and systems of assets with people, processes and data using common architectures, interoperability and open standards to deliver transformational business and societal outcomes across industries and public infrastructure.

Costs and Profits. A major challenge in this early phase of the IIoT marketplace is the question of who captures the profits – who makes money from these changes. As we predicted in our initial IoT report, (Woodside Capital Partners Industry Reports), the most profitable segment of the overall technology "stack" is likely to be in the higher level tiers performing sophisticated data analysis. Sensors and actuators, residing at the lower hardware levels, are likely to be commoditized rather quickly. But beyond this basic level, there are serious questions to be answered about how these newly enabled business models are to work, and a fair amount of uncertainty in the marketplace regarding the various business models, the shifting of existing costs and the burden of new costs, and who bears the various costs and responsibilities. Fortunes will rise and fall on the basis of these strategic decisions.

Interoperability. Another serious issue is the question of interoperability. Historically, industrial automation technologies have operated in relatively closed, proprietary environments, with highly controlled "industry standard" specifications governing cross-technology inter-connections. The world of the IIoT (and that of IoT generally), is a world of heterogeneous environments, with multiple technologies interacting in many new and different ways. While not difficult to understand in the abstract, the real world challenges of making all of this work are easily underestimated. For this reason, we believe systems integrators and other external "expert" consultants will play a very important role as these new technologies are deployed. The IIC (see sidebar) is an early industry attempt to develop interoperability and security standards across multiple vendors and disciplines.

Security. As mentioned earlier, security is a paramount concern, but also a significant and ongoing challenge. The continuing, widely publicized instances of harmful data breaches serve to illustrate the tremendous difficulty engineers confront when attempting to balance usability/functionality with appropriate security. Many more such incidents are never reported. The heterogeneous environments that will be constructed will dramatically increase the security challenges, as well as significantly raising the stakes around a breach or failure. Security

broadly involves both data (in motion and at rest) and integrity (of data, software, and systems). It will be an ongoing challenge and a major profit opportunity for those who develop robust solutions.

Regulations. The EU has passed the "General Data Protection Regulation," which extends EU regulation to personal data of EU residents even if it is being processed by non-EU entities. This is to be fully implemented next year. While the details and the implications of this regulation are beyond our scope here, it does illustrate the complexity of managing technologies and data which know no borders while remaining in compliance with complex, and sometimes conflicting, regulatory requirements. Methods of acquiring, storing and processing data will likely need to be different depending on specific regulations in different geographies and applications.

Data – BIG Data. The typical connected car throws off 25GB per hour of data. Deciding what to keep and what to abandon is challenging, so the primitive choice is to keep it all. But where, and for how long? Over time it is likely that data reduction at the endpoints will not only be desirable, but necessary. "Intelligent" systems for reducing overall data flow will be needed – some degree of endpoint intelligence that can suppress the flood of data until some actionable change occurs, for example.

Usability. As we've already mentioned, the human machine interface presents another challenge. The evolution from "dumb" terminal windows, then on to graphical user interfaces and finally to touchscreens, voice and gesture control and ultimately augmented and virtual reality interfaces will present new and interesting design challenges and opportunities for innovative incumbents and (no doubt) many new entrants. As an example, **Autodesk Fusion Connect** promises a "no coding," cloud based system to enable users to create virtual models of physical systems in order to deliver higher service levels, predictive maintenance, and real-time performance monitoring, potentially easing the shift from product to service-oriented business models.

6. The Smart Factory – Concluding Thoughts

Fundamentally, the "Smart Factory" involves digitizing and virtualizing every aspect of manufacturing that can be virtualized. Done properly, this can give managers a complete view of the production process, allowing adjustments and improvements in real-time. McKinsey Global Institute estimates that the IoT will have a $1.2 to $3.7 trillion economic impact on factories by 2025, $1.7 trillion in operations optimization alone.[7]

In summary, as we've already indicated, the smart factory will be much easier to manage from a remote location, and far more responsive to the rapidly changing demands of an evolving marketplace, as well as enjoying increased reliability and lower overall operational cost. The use of sophisticated information technology will ultimately allow manufacturers to connect the plant infrastructure to business process software and correlate data from multiple sources (both structured and unstructured) and gain real-time insights, eventually. The journey from here to there, however, still requires a significant amount of energy and effort, and we are still at the very early stages. While enterprises are already collecting a vast amount of data, their ability to understand and analyze it in real time lags significantly, and the impact of more sensors in more places will only exacerbate this problem.

Vendors of "big data" software will profit from offering solutions to this problem. **Sight Machine,** for example, is a startup with a creative strategy that seeks to blend the manufacturing expertise of traditional "Rust Belt" manufacturing with the Big Data analytics used by Silicon Valley software developers for a dedicated, manufacturing-oriented, Big Data solution.

We believe there will be multiple competing approaches to the management and analytics of the vast amounts of data that already are or soon will be produced, and that ultimately we will see a number of different strategies from both existing large incumbent players as well as aggressive young startups. Some will concentrate on specific industry verticals where they can offer a "best of breed" solution while others are likely to focus on relieving common pain points across multiple

[7] "Unlocking The Potential of The Internet of Things," *McKinsey Global Institute,* June 2015, p. 66

sectors and achieving economies of scale and scope, perhaps driven by existing customer commitments and legacy product lines. Large software players such as **SAP** and **Oracle** will be in competition with smaller players like **Maana**, **Uptake** and **Sight Machine**.

GE, IBM, and **Siemens** are also in the fray. Siemens just announced the nomination of Jim Hagemann Snabe, formerly of SAP, as its new Chairman effective January of next year, further emphasizing its focus on software. Siemens' current Chairman, Gerhard Cromme, commented that Snabe has "in depth industry expertise in software and digitalization," illustrating our point that digitization is the important underlying trend here. Heretofore, Siemens' acquisitions have focused on incremental additions to their capabilities in industrial automation and manufacturing systems. We've already discussed GE's emphasis on software (in the form of Predix) in detail, and it is possible the new Chairman will take Siemens more aggressively into the software and data analytics arena in order to address the competitive threat now being posed by GE. Siemens' recently announced plan to acquire design automation and industrial software provider Mentor Graphics for approximately $4.5 billion as part of its Vision 2020 strategy illustrates this new emphasis.

IBM has been transitioning its focus from hardware to software for years, though more recently it has begun to emphasize its Watson product as a platform for IoT application development and overall IoT analytics and support.

Additional opportunities and challenges arise from what is essentially a disaggregation of functions that formerly operated in a combined unit. Competition will emerge at multiple layers of the technology "stack" covered broadly by IIoT.

Two recent large acquisitions by Cisco illustrate this point. In Jasper, Cisco acquired an aggregator and manager of mobile data communications technology and monetization. We can view this as a lower layer of the "stack," just above the physical sensors, lying at the most basic and primitive communications level. By subsequently acquiring AppDynamics, Cisco is gaining the ability to monitor and manage applications that take the data coming over the communications networks from the IIoT and store and process it –

basically the “applications layer” of the system. Automating the management of these applications is important and helpful, but perhaps even more importantly, when the information gathered by AppDynamics is combined with other information generated by the network, it may be possible to predict failures and potentially automate responses to issues, moving toward more of a self-healing system based on artificial intelligence and machine learning.

For all of this to work, disparate technologies from unrelated vendors will need to communicate seamlessly (via APIs). The management of all of these disparate technologies is challenging and difficult, and won’t occur unless (i) the APIs are carefully developed and work reliably; and (ii) there is a way to make money from the effort of making all of this work together. These questions are far from being fully resolved at this point, leaving room for innovation and competitive advantage.

Another area of innovation that offers real opportunities for dramatic change in process and efficiency is the area of AR/VR – augmented/virtual reality. These new technologies will allow factory workers in the “smart" factory to interact with and control robots and manufacturing equipment in entirely new ways

In any case, we believe there will be intense competition on multiple levels as various players from historically separate technical disciplines come together to compete for attention in the IIoT space, bringing their unique perspectives and promoting alternative technologies and solutions, and seeking a profitable niche to occupy.

Ultimately, we believe that we are standing at an important crossroads. Industry 4.0 has the potential to drive the next wave of growth and profitability for many industrial players. However, as with any major inflection point, there are likely to be winners and losers. Some companies will leverage Industry 4.0 to reinvent themselves and gain significant competitive advantage, while others will lose their way and falter, making room for new leaders to emerge.

7. Selected M&A Transactions

One of the most common ways incumbent players react to rapidly developing new technologies and markets is through acquisition, and not surprisingly, we have seen a number of interesting acquisition transactions related to the IIoT over the past couple of years. Below, we take a closer look at some of these acquisitions and their implications for the acquirer and the rationale we think may be at work.

(Note: Acquirer/Target)

GE/Bit Stew Systems and Wise.io, Nov. 15, 2016.

GE announced the acquisition of two startups in the AI space, Bitstew Systems (Burnaby, BC) and Wise.io (Berkeley, CA). Both will expand the Predix platform for industrial internet applications. Wise.io has advanced machine learning technology that is "really well-built for the industrial world," according to Bill Ruh, CEO of GE Digital, the software subsidiary. Bit Stew had backing from GE Ventures, and applies machine learning to large data sets associated with utilities, aviation, oil and gas production, and manufacturing, according to the company's web site.

GE/ServiceMax, Nov. 14, 2016.

GE announced it is buying ServiceMax, a cloud-based field service management company, for $915 million. GE Ventures had been an investor in the company as part of the $82 million Series F round in 2015. This appears to be part of GE's overall Predix strategy, wherein they will be able to sell the service rather than the equipment itself, for example instead of selling MRI machines with maintenance contracts instead they might sell a subscription to the MRI machine with an uptime guarantee. ServiceMax intends to build "an operating system for the service economy," according to CEO Dave Yarnold.

GE/Baker Hughes, Oct. 31, 2016.

On October 31, 2016 GE announced the combination of its oilfield services business with Baker Hughes, Inc., creating a $32 billion business including oilfield services, equipment manufacturing and technology. Although fundamentally a continuation of GE's strategy to commit to

the oil & gas sector (having spent more than $14 billion to buy more than 30 businesses in the sector since 1994), it also represents GE's vision of adding automation and technology services to an industrial business, combining data with tools and drilling equipment and further extending the reach of its Predix software platform.

GE/Meridium Sep. 14, 2016.

On September 14, 2016, GE announced the acquisition of Meridium, Inc., a maker of asset performance management (APM) software and services for asset-intensive industries. This acquisition will help GE Digital accelerate its comprehensive APM offering and provide a solution to customers that unifies real-time analytics with reliability-centered maintenance best practices, delivering a complete APM solution. The acquisition follows an initial investment in Meridium in July 2014 for a 26 percent stake in the company. The total acquisition, inclusive of the original investment, was executed for an enterprise value of $495 million. GE's APM offering (powered by its Predix software) enables industrial companies to maximize the reliability and availability of their industrial assets, while minimizing operational cost and risk.

GE/Daintree Apr. 15, 2016.

On April 15, 2016, Current, powered by GE, acquired Daintree Networks, an Industrial Internet provider of building controls solutions for commercial facilities, thereby expanding Current's building automation platform and its energy-as-a-service offering to small- and medium-size facilities through the deployment of Daintree's open, standards-based wireless control systems.

Cisco/AppDynamics, Jan. 24, 2017.

Cisco snatched AppDynamics from its imminent IPO, paying a premium price of approximately $26 per share, well above the initial IPO price range of $10-$12. Cisco attributed the premium to the very strong revenue growth at AppDynamics. The combination of AppDynamics and Cisco provides enterprise customers with an intelligent and actionable analytics platform that enables companies to make smart, proactive, business and IT decisions — improving application and business

performance. Cisco plans to make AppDynamics a new unit in its Internet of Things and Applications business.

Cisco/Jasper, Feb. 3, 2016.

Jasper is a cloud-based SaaS IoT service platform "that enables enterprise players to launch, manage and monetize IoT services on a global scale." Essentially, Jasper simplifies the connection and management of a very wide variety of devices over the cellular networks of the top global service providers, facilitating the transition from product to service for a variety of industries. Jasper's initial success in partnering with over 120 mobile operator networks worldwide and signing eleven automotive OEMs to its "Connected Car Cloud" was likely a major factor in convincing Cisco to pursue the acquisition. Cisco plans to add enterprise wi-fi connectivity, security, and advanced analytics to the Jasper platform.

Cisco/Parstream, Oct. 26, 2015.

ParStream was part of the Cisco entrepreneurs in residence program, and as such, was likely well-known to Cisco strategists. ParStream's database technology was specially built to handle high-volume data streams at the edge in real-time, supporting Cisco's overall vision of fog computing. ParStream had raised approximately $14 million, and acquisition terms were not disclosed.

Siemens/Mentor Graphics, Nov. 13, 2016.

Siemens AG agreed to buy Mentor Graphics Corp. for $4.5 billion in its biggest acquisition since 2014 as the German engineering company extends its industrial software capability. Siemens will pay $37.25 a share in cash for Mentor, a 21% premium to the prior closing price. Mentor had been under pressure from Elliott Management Corp., owner of 8.1% of Mentor shares at the time of the announcement. Mentor adds significant software capabilities to Siemens' traditional hardware focus, including both software and hardware used to design electronics for the semiconductor, automotive and transportation industries.

Belden/Digi, Nov. 11, 2016.

In early November, 2016, Belden made an unsolicited offer to acquire Digi International (DGII), for $13.82 per share, an offer it eventually made public. Digi's board has rejected the offer as inadequate, and as of publication date, the transaction has not closed. Digi is a provider of wireless M2M solutions and Belden has historically been a supplier of a variety of connectivity solutions to industry and broadcast markets.

Softbank/ARM, Jul. 18, 2016.

7/18/2016. Softbank announced a $32 billion deal to acquire ARM Holdings, PLC, the U.K.-based designer of the microprocessors that power more than 95% of the world's smartphones. SoftBank Chief Executive Masayoshi Son said the acquisition marks a "paradigm shift" at the company to invest in the Internet of Things, as he bets on demand for internet connectivity across everyday devices as diverse as automobiles and refrigerators. Some commentators noted that the fall in the British pound sterling following the "Brexit" vote made Softbank's purchase a bit more affordable.

Cypress/Broadcom (WICED, wifi, BT, Zigbee), Jun. 16, 2016

6/16/16. Cypress Semiconductor Corp. will acquire Broadcom's Wireless Internet of Things (IoT) business and related assets in an all-cash transaction valued at $550 million. Under the terms of the deal, Cypress will acquire Broadcom's Wi-Fi, Bluetooth and Zigbee IoT product lines and intellectual property, along with its WICED brand and developer ecosystem. Broadcom's IoT business unit, which employs approximately 430 people worldwide, generated $189 million in revenue during the last twelve months. The acquisition strengthens Cypress's position in key embedded systems markets, such as automotive and industrial, and establishes it as a leader in the high-growth consumer IoT market, a segment that includes wearable electronics and home automation solutions.

ARM/Apical, May 18, 2016.

5/18/2016. ARM announced the acquisition of Apical Limited, a global leader in imaging and embedded computer vision intellectual property (IP) products, accelerating the ARM ecosystem's growth into new markets such as connected vehicles, robotics, smart cities, security systems, industrial/retail applications and Internet of Things devices.

Microsoft/Solair, May 3, 2016.

Solair, an Italy-based IoT platform, offers IoT customization and deployment solutions, built on Microsoft's Azure cloud platform. Their technology includes a gateway, the platform, and various applications. Solair has customers in Italy and Japan. Terms not disclosed.

Kore/Wyless, Mar. 9, 2016.

3/9/16. KORE Wireless Group, Inc. announced the acquisition, in an all-cash transaction, of Wyless Group Holdings ("Wyless"). Following the completion of this transaction, the combined company will be one of the six largest providers of M2M/IoT services globally, inclusive of carriers. Financial terms were not disclosed.

Amazon Web Services (AWS)/NICE, Feb. 12, 2016

2/12/16. AWS, the world's most broadly adopted cloud platform, announced its intention to acquire NICE. NICE is a leading provider of software and services for high performance and technical computing, based in Asti, Italy. Their products help customers to optimize and centralize their high performance computing (HPC) and visualization workloads while also providing tools that are a great fit for distributed workforces making use of mobile devices.

Sony/Altair, Jan. 26, 2016

1/26/16. Sony announced that it will acquire Israel-based Altair. Altair develops and sells products focused on LTE technology, and its modem chips stand out for their low power consumption, high performance and competitive cost, making them attractive for use in the interconnection of the Internet of Things ("IoT"). By combining Sony's sensing technologies - such as GNSS (Global Navigation Satellite System) and image sensors - with Altair's high-performance, low power consumption

and cost-competitive modem chip technology, and by further evolving both, Sony will strive to develop a new breed of cellular-connected, sensing component devices.

8. Selected Public Company Profiles

Applications, Services & Data Analytics

Company	Description	Financials ($mm)	Highlighted Transactions
AUTODESK *San Rafael, CA* Carl Bass, CEO	Autodesk operates as a design software and services company. The company's Manufacturing segment provides Autodesk Product Design Suites for digital prototyping.	Market Cap: $ 18,991 Cash & Equivalents: 1,213 Debt: 1,491 Enterprise Value: 18,582 LTM Revenue: 2,201 LTM EBITDA: (130) Undrawn Revolver: 400 EV/LTM Revenue: 9.1x EV/LTM EBITDA: NM Debt/LTM EBITDA: NM Acquisitions(#) 28	▪ CadSoft (2016, Application Software) ▪ **netfabb (2016, $44M, Application Software)** ▪ **SeeControl (2015, Internet Software and Services)** ▪ **TeamUp Technologies (2014, Internet Software and Services)**
amazon *Seattle, WA* Jeff Bezos, CEO	Amazon engages in the retail sale of consumer products and subscriptions. The company sells merchandise and content purchased for resale from vendors, as well as those offered by third-party sellers through retail Websites. Further, it provides compute, storage, database, and other AWS services.	Market Cap: $ 431,105 Cash & Equivalents: 19,334 Debt: 20,413 Enterprise Value: 425,537 LTM Revenue: 127,993 LTM EBITDA: 10,963 Undrawn Revolver: 3,000 EV/LTM Revenue: 3.1x EV/LTM EBITDA: 36.8x Debt/LTM EBITDA: 1.7x Acquisitions(#) 35	▪ Harvest.ai (2017, System Software) ▪ Cloud9 IDE (2016, Internet Software and Services) ▪ Elemental Technologies (2016, $296M, Application Software) ▪ Clusterk (2015, $50M, Internet Software and Services) ▪ **2lemetry (2015, Internet Software and Services)**
cisco *San Jose, CA* Charles Robins, CEO	Cisco designs, manufactures, and sells IP based networking products and services related to the communications and information technology industry.	Market Cap: $ 163,306 Cash & Equivalents: 10,898 Debt: 34,922 Enterprise Value: 126,388 LTM Revenue: 48,917 LTM EBITDA: 14,994 Undrawn Revolver: 3,000 EV/LTM Revenue: 2.6x EV/LTM EBITDA: 8.6x Debt/LTM EBITDA: 2.4x Acquisitions(#) 45	▪ AppDynamics (2017, $4.0B, Internet Software and Services) ▪ **CliQr Technologies (2016, $260M, Internet Software & Services)** ▪ **Jasper Technologies (2016, $1.4B, Internet Software & Services)** ▪ **Sourcefire (2013, $2.4B, Systems Software)**
 Boston, MA Jeffrey Immelt, CEO	General Electric operates as an infrastructure and financial services company. Its industrial segment offers critical power, drives/controls and electrical distribution products.	Market Cap: $ 258,126 Cash & Equivalents: 10,525 Debt: 136,211 Enterprise Value: 388,506 LTM Revenue: 110,698 LTM EBITDA: 16,544 Undrawn Revolver: 20,000 EV/LTM Revenue: 3.2x EV/LTM EBITDA: 22.7x Debt/LTM EBITDA: 7.9x Acquisitions(#) 97	▪ Nurego (2017, IT Consulting and Other Services) ▪ **Bit Stew Systems (2016, $153M, Internet Software and Services)** ▪ **Wise.io (2016, Internet Software and Services)** ▪ **Wurldtech Security Technologies (2014, Systems Software)**
Google *Mountain View, CA* Sundar Pichai, CEO	Google offers performance and brand advertising services. The Google segment includes principal Internet products, as well as technical infrastructure.	Market Cap: $ 585,023 Cash & Equivalents: 12,918 Debt: 3,935 Enterprise Value: 502,625 LTM Revenue: 85,537 LTM EBITDA: 28,294 Undrawn Revolver: 4,000 EV/LTM Revenue: 5.6x EV/LTM EBITDA: 16.8x Debt/LTM EBITDA: 0.1x Acquisitions(#) 130	▪ AppBridge (2017, Application Software) ▪ Fabric (2017, Internet Software and Services) ▪ Eyefluence (2016, Consumer Electronics) ▪ **Urban Engines (2016, Application Software)** ▪ **Apigee (2016, $630M, Internet Software and Services)**
IBM *Armonk, NY* Ginni Rometty, CEO	International Business Machines provides information technology (IT) products and services worldwide. The Company's Global Technology Services segment provides IT infrastructure services, such as IT outsourcing, integrated technology, cloud, and technology support services.	Market Cap: $ 161,384 Cash & Equivalents: 7,826 Debt: 42,176 Enterprise Value: 195,179 LTM Revenue: 78,487 LTM EBITDA: 17,539 Undrawn Revolver: 10,000 EV/LTM Revenue: 2.4x EV/LTM EBITDA: 10.5x Debt/LTM EBITDA: 2.3x Acquisitions(#) 61	▪ **Agile 3 Solutions/Ravy Technologies (2017, Application Software)** ▪ Sanovi Technologies (2016, Systems Software) ▪ **Resilient (2016, Internet Software and Services)** ▪ The Weather Co. (2015, $2.2B, Internet Software and Services)

Applications, Services & Data Analytics

Company	Description	Financials ($mm)	Highlighted Transactions
LogMeIn xively *Boston, MA* William R. Wagner, CEO	LogMeIn provides cloud-based services for individuals and businesses to securely connect to their workplace, colleagues, and customers.	Market Cap: $ 5,453 Cash & Equivalents: 141 Debt: 30 Enterprise Value: 5,286 LTM Revenue: 324 LTM EBITDA: 40 Undrawn Revolver: 113 EV/LTM Revenue: 15.7x EV/LTM EBITDA: 128.5x Debt/LTM EBITDA: 0.7x Acquisitions(#) 5	▪ Citrix Systems, GoTo Family Of Products (2016, $1.8B, Application Software) ▪ Marvasol (2015, $125M, Internet Software and Services) ▪ Zamurai (2014, $5M, Application Software) ▪ BBA (2014, $15M, Internet Software and Services)
Microsoft *Redmond, WA* Satya Nadella, CEO	Microsoft develops, licenses, and supports software products, services, and devices.	Market Cap: $ 505,999 Cash & Equivalents: 8,468 Debt: 87,806 Enterprise Value: 472,600 LTM Revenue: 85,394 LTM EBITDA: 26,961 Undrawn Revolver: - EV/LTM Revenue: 5.5x EV/LTM EBITDA: 17.0x Debt/LTM EBITDA: 3.2x Acquisitions(#) 59	▪ Deis (2017, Systems Software) ▪ Maluuba (2017, Application Software) ▪ LinkedIn (2016, $29B, Information Technology) ▪ **Solair (2016, Internet Software and Services)** ▪ **FieldOne Systems (2015, Application Software)**
ORACLE *Redwood City, CA* Safra A. Catz, CEO	Oracle develops, manufactures, markets, sells, hosts, and supports database and middleware software, application software, cloud infrastructure, hardware systems, and related services. It offers services in three primary layers of the cloud: Software as a Service, Platform as a Service.	Market Cap: $ 182,239 Cash & Equivalents: 19,748 Debt: 53,967 Enterprise Value: 177,262 LTM Revenue: 37,236 LTM EBITDA: 14,602 Undrawn Revolver: - EV/LTM Revenue: 4.7x EV/LTM EBITDA: 12.2x Debt/LTM EBITDA: 3.7x Acquisitions(#) 41	▪ **Dyn (2016, Internet Software and Services)** ▪ Apiary (2017, Application Software) ▪ Palerra (2016, Internet Software and Services) ▪ NetSuite (2016, $7.1B, Systems Software) ▪ **Opower (2016, $552M, Internet Software and Services)**
ptc *Needham, MA* James E. Heppelmann, CEO	PTC develops and delivers software products and solutions. The Company computer-aided design products, including PTC Creo, an interoperable suite of product design software for design engineers; and PTC Mathcad software for solving, analyzing, and sharing vital engineering calculations.	Market Cap: $ 6,071 Cash & Equivalents: 173 Debt: 732 Enterprise Value: 6,606 LTM Revenue: 1,141 LTM EBITDA: 105 Undrawn Revolver: 100 EV/LTM Revenue: 5.8x EV/LTM EBITDA: 72.2x Debt/LTM EBITDA: 8.0x Acquisitions(#) 9	▪ **Kepware (2015, $118M, Application Software)** ▪ Vuforia (2015, $65M, Internet Software and Services) ▪ **Coldlight Solutions (2015, $104M, Internet Software and Services)** ▪ **Axeda (2014, $176M, Internet Software and Services)** ▪ ThingWorx (2013, $130M, Systems Software)
redhat *Raleigh, NC* James Whitehurst, CEO	Red Hat provides open source software solutions to develop and offer operating system, virtualization, management, middleware, cloud, mobile, and storage technologies to various enterprises	Market Cap: $ 15,363 Cash & Equivalents: 1,091 Debt: 746 Enterprise Value: 14,648 LTM Revenue: 2,326 LTM EBITDA: 398 Undrawn Revolver: - EV/LTM Revenue: 6.1x EV/LTM EBITDA: 35.1x Debt/LTM EBITDA: 1.8x Acquisitions(#) 8	▪ 3Scale Networks (2016, Internet Software and Services) ▪ Ansible (2015, $126M, Internet Software and Services) ▪ eNovance SaS (2014, $95M, Internet Software and Services) ▪ Inktank Storage (2014, $175M, IT Consulting and Other Services)
salesforce *San Francisco, CA* Marc Benioff, CEO	Salesforce provides enterprise cloud computing solutions, with a focus on customer relationship management to various businesses and industries. It offers enterprise cloud computing applications and platform services, including Sales Cloud that enables companies to store data, monitor leads and progress, forecast opportunities through relationship intelligence.	Market Cap: $ 59,572 Cash & Equivalents: 1,607 Debt: 2,710 Enterprise Value: 60,072 LTM Revenue: 7,907 LTM EBITDA: 534 Undrawn Revolver: 1,000 EV/LTM Revenue: 7.2x EV/LTM EBITDA: 119.0x Debt/LTM EBITDA: 5.4x Acquisitions(#) 33	▪ Sequence (2017, Advertising) ▪ Twin Prime (2016, Internet Software and Services) ▪ Krux Digital (2016, $768M, Information Technology) ▪ BeyondCore (2016, Application Software) ▪ Quip (2016, $582M, Information Technology) ▪ Demandware (2016, $3.1B, Internet Software and Services)

Applications, Services & Data Analytics

Company	Description	Financials ($mm)	Highlighted Transactions
SAP *Walldorf, Germany* Bill McDermott, CEO	SAP provides application and analytics software and software-related services for enterprises. The company offers solutions for various businesses, including asset management, commerce, finance, human resources, manufacturing, marketing.	Market Cap: $ 116,432 Cash & Equivalents: 3,961 Debt: 8,431 Enterprise Value: 120,715 LTM Revenue: 23,195 LTM EBITDA: 6,176 Undrawn Revolver: - EV/LTM Revenue: 5.1x EV/LTM EBITDA: 18.7x Debt/LTM EBITDA: 1.3x Acquisitions(#) 20	▪ Abakus (2016, Application Software) ▪ **PLAT.ONE (2016, Application Software)** ▪ Altiscale (2016, Internet Software and Services) ▪ Hipmunk (2016, Internet Software and Services) ▪ Fedem Technology AS (2016, Application Software)
splunk> *San Francisco, CA* Douglas Merritt, CEO	Splunk provides software solutions that enable organizations to gain real-time operational intelligence. The company's products enable users to collect, index, search, explore, monitor, and analyze data regardless of format or source.	Market Cap: $ 8,314 Cash & Equivalents: 421 Debt: 86 Enterprise Value: 7,317 LTM Revenue: 864 LTM EBITDA: (323) Undrawn Revolver: 25 EV/LTM Revenue: 7.7x EV/LTM EBITDA: NM Debt/LTM EBITDA: NM Acquisitions(#) 4	▪ **Caspida (2015, $190M, IT Consulting and Other Services)** ▪ Metafor Software (2015, Application Software) ▪ Cloudmeter (2013, $21M, Internet Software and Services) ▪ BugSense (2013, $9M, Internet Software and Services)

Data Center

Company	Description	Financials ($mm)	Highlighted Transactions
ARISTA *Santa Clara, CA* Jayshree Ullal, CEO	Arista Networks was founded to pioneer and deliver software driven cloud networking solutions for large datacenter storage and computing environments. Arista's award-winning platforms, ranging in Ethernet speeds from 10 to 100 gigabits per second.	Market Cap: $ 9,427 Cash & Equivalents: 568 Debt: 40 Enterprise Value: 8,599 LTM Revenue: 1,047 LTM EBITDA: 234 Undrawn Revolver: - EV/LTM Revenue: 7.6x EV/LTM EBITDA: 32.7x Debt/LTM EBITDA: 0.2x Acquisitions(#) -	▪ NA
CISCO *San Jose, CA* Charles Robins, CEO	Cisco designs, manufactures, and sells IP based networking products and services related to the communications and information technology industry.	Market Cap: $ 163,306 Cash & Equivalents: 10,898 Debt: 34,922 Enterprise Value: 126,388 LTM Revenue: 48,917 LTM EBITDA: 14,994 Undrawn Revolver: 3,000 EV/LTM Revenue: 2.6x EV/LTM EBITDA: 8.6x Debt/LTM EBITDA: 2.4x Acquisitions(#) 43	▪ AppDynamics (2017, $4.0B, Internet Software and Services) ▪ **CliQr Technologies (2016, $260M, Internet Software & Services)** ▪ **Jasper Technologies (2016, $1.4B, Internet Software & Services)** ▪ Lancope (2015, $453M, Systems Software) ▪ **Sourcefire (2013, $2.4B, Systems Software)**
DELL EMC *Hopkinton, MA* Michael Dell, CEO	Dell EMC serves a key role in providing the essential infrastructure for organizations to build their digital future, transform IT and protect their most important asset, information. Compnay brings together Dell's and EMC's respective strong capabilities and complementary portfolios, sales teams and R&D.	Market Cap: $ - Cash & Equivalents: 9,474 Debt: 49,390 Enterprise Value: - LTM Revenue: 58,222 LTM EBITDA: 2,673 Undrawn Revolver: 1,808 EV/LTM Revenue: - EV/LTM EBITDA: - Debt/LTM EBITDA: 19.5x Acquisitions(#) 12	▪ **Wavefront (2017, Internet Software and Services)** ▪ **PLUMgrid (2016, Application Software)** ▪ EMC (2015, $75.7B, Technology Hardware, Storage and Peripherals) ▪ StatSoft (2014, Application Software) ▪ Enstratius (2013, Internet Software & Services)
Hewlett Packard Enterprise *Palo Alto, CA* Meg Whitman, CEO	HP Enterprise provides next generation technology infrastructure, software, solutions to businesses, public sector enterprises in government, health, and education.	Market Cap: $ 30,021 Cash & Equivalents: 9,858 Debt: 15,790 Enterprise Value: 36,026 LTM Revenue: 49,759 LTM EBITDA: 7,834 Undrawn Revolver: - EV/LTM Revenue: 0.7x EV/LTM EBITDA: 4.7x Debt/LTM EBITDA: 2.0x Acquisitions(#) 12	▪ Nimble Storage (2017, $1.3B, Technology Hardware, Storage and Peripherals) ▪ Cloud Cruiser (2017, Internet Software and Services) ▪ SimpliVity (2017, $650M, Data Processing and Outsourced Services) ▪ Aruba Networks (2015, $2.7B, Communications Equipment)
NUTANIX *San Jose, CA* Dheeraj Pandey, CEO	Nutanix provides enterprise cloud platform solutions that converge traditional silos of server, virtualization, and storage into one integrated solution.	Market Cap: $ 2,462 Cash & Equivalents: 226 Debt: - Enterprise Value: 2,107 LTM Revenue: 524 LTM EBITDA: (235) Undrawn Revolver: - EV/LTM Revenue: 3.5x EV/LTM EBITDA: NM Debt/LTM EBITDA: - Acquisitions(#) 2	▪ Idea Device (2016, Systems Software) ▪ PernixData (2016, $38M, Application Software)
NetApp *Sunnyvale, CA* George Kurian, CEO	NetApp provides software, systems, and services to manage and store computer data worldwide. It offers all-flash arrays that support data management across flash, disk, and cloud resources; hybrid arrays to deploy the speed of flash storage.	Market Cap: $ 10,781 Cash & Equivalents: 2,213 Debt: 2,014 Enterprise Value: 8,149 LTM Revenue: 5,400 LTM EBITDA: 715 Undrawn Revolver: 300 EV/LTM Revenue: 1.5x EV/LTM EBITDA: 10.6x Debt/LTM EBITDA: 2.6x Acquisitions(#) 4	▪ SolidFire (2016, $870M, Technology Hardware, Storage and Peripherals) ▪ Riverbed Technology, SteelStore Product Line (2014, $80M, Internet Software and Services) ▪ IonGrid (2013, $17M, Application Software) ▪ CachelQ (2012, $91M, Technology Hardware, Storage and Peripherals)

Data Center

Company	Description	Financials ($mm)	Highlighted Transactions
PURESTORAGE *Mountain View, CA* Scott Dietzen, CEO	Pure Storage provides enterprise data storage platform that enable businesses to enhance performance and reduce costs.	Market Cap: $ 2,171 Cash & Equivalents: 184 Debt: - Enterprise Value: 1,625 LTM Revenue: 650 LTM EBITDA: (171) Undrawn Revolver: - EV/LTM Revenue: 2.2x EV/LTM EBITDA: NM Debt/LTM EBITDA: - Acquisitions(#) 1	▪ International Business Machines, 100 Storage And Related Technology Patents (2014, Data Processing and Outsourced Services)

Communication & Networking

Company	Description	Financials ($mm)	Highlighted Transactions
AT&T *Dallas, TX* Randall Stephenson, CEO	AT&T provides telecommunications and digital entertainment services. The Consumer Mobility segment offers wireless services to consumers, and wireless wholesale and resale subscribers.	Market Cap: $ 247,505 Cash & Equivalents: 5,788 Debt: 127,394 Enterprise Value: 369,841 LTM Revenue: 164,064 LTM EBITDA: 54,503 Undrawn Revolver: 12,000 EV/LTM Revenue: 2.3x EV/LTM EBITDA: 7.4x Debt/LTM EBITDA: 2.6x Acquisitions(#) 50	▪ Straight Path Communications (2017, $1.2B, Alternative Carriers) ▪ INVIDI Technologies (2016, Application Software) ▪ Time Warner (2016, $109.3B, Movies and Entertainment) ▪ Leap Wireless (2013, $5B, Wireless Telecommunication Services)
CISCO *San Jose, CA* Charles Robins, CEO	Cisco designs, manufactures, and sells IP based networking products and services related to the communications and information technology industry.	Market Cap: $ 163,306 Cash & Equivalents: 10,898 Debt: 34,922 Enterprise Value: 126,388 LTM Revenue: 48,917 LTM EBITDA: 14,994 Undrawn Revolver: 3,000 EV/LTM Revenue: 2.6x EV/LTM EBITDA: 8.6x Debt/LTM EBITDA: 2.4x Acquisitions(#) 43	▪ AppDynamics (2017, $4.0B, Internet Software and Services) ▪ **CliQr Technologies (2016, $260M, Internet Software & Services)** ▪ **Jasper Technologies (2016, $1.4B, Internet Software & Services)** ▪ **Sourcefire (2013, $2.4B, Systems Software)**
DELL *Round Rock, TX* Michael Dell, CEO	Dell designs, develops, manufactures, markets, and sells information technology products. The company offers commercial, consumer, and third-party software and after-point-of sale peripheral solutions.	Market Cap: $ - Cash & Equivalents: 9,474 Debt: 49,390 Enterprise Value: - LTM Revenue: 58,222 LTM EBITDA: 2,673 Undrawn Revolver: 1,808 EV/LTM Revenue: - EV/LTM EBITDA: - Debt/LTM EBITDA: 19.5x Acquisitions(#) 12	▪ **Wavefront (2017, Internet Software and Service)** ▪ **PLUMgrid (2016, Application Software)** ▪ EMC (2015, $75.7B, Technology Hardware, Storage and Peripherals) ▪ StatSoft (2014, Application Software) ▪ Enstratius (2013, Internet Software & Services)
ERICSSON *Stockholm, Sweden* Borje Ekholm, CEO	Telefonaktiebolaget LM Ericsson provides network equipment and software, and services for network and business operations. Its Networks segment delivers products and solutions for mobile access, Internet protocol (IP) and transmission networks, core networks, and cloud.	Market Cap: $ 20,848 Cash & Equivalents: 4,117 Debt: 3,017 Enterprise Value: 18,340 LTM Revenue: 25,721 LTM EBITDA: 3,287 Undrawn Revolver: - EV/LTM Revenue: 0.7x EV/LTM EBITDA: 7.6x Debt/LTM EBITDA: 1.2x Acquisitions(#) 29	▪ Allolio&Konrad Partnerschaft (2016, Research and Consulting Services) ▪ **NodePrime (2016, Application Software)** ▪ Envivo (2015, $124.6M, Application Software) ▪ **Sentilla (2014, Application Software)** ▪ **MetraTech (2014, Application Software)**
Hewlett Packard Enterprise *Palo Alto, CA* Meg Whitman, CEO	HP Enterprise provides next generation technology infrastructure, software, solutions to businesses, public sector enterprises in government, health, and education.	Market Cap: $ 30,021 Cash & Equivalents: 9,858 Debt: 15,790 Enterprise Value: 36,026 LTM Revenue: 49,759 LTM EBITDA: 7,834 Undrawn Revolver: - EV/LTM Revenue: 0.7x EV/LTM EBITDA: 4.7x Debt/LTM EBITDA: 2.0x Acquisitions(#) 12	▪ Cloud Cruiser (2017, Internet Software and Services) ▪ SimpliVity (2017, $650M, Data Processing and Outsourced Services) ▪ Trilead (2016, Systems Software) ▪ Aruba Networks (2015, $2.7B, Communications Equipment)
HUAWEI *Shenzhen, China* Zhengfei Ren, CEO	Huawei provides information and communications technology (ICT) solutions and services for telecom carriers, enterprises, and consumers. The company operates in three segments: Carrier Network, Enterprise Business, and Consumer Business.	Market Cap: $ - Cash & Equivalents: 17,889 Debt: 6,513 Enterprise Value: - LTM Revenue: 57,427 LTM EBITDA: 7,395 Undrawn Revolver: - EV/LTM Revenue: - EV/LTM EBITDA: - Debt/LTM EBITDA: 0.8x Acquisitions(#) 4	▪ Hexatier (2016, Systems Software) ▪ Toga Networks (2016, IT Consulting and Other Services) ▪ Caliopa NV (2013, Electronic Components) ▪ The Centre for Integrated Photonics (2012, Semiconductors) ▪ Huawei Symantec Technologies (2011, $526M, Communications Equipment)

Communication & Networking

Company	Description	Financials ($mm)	Highlighted Transactions
Sunnyvale, CA Ramin Rahim, CEO	Juniper Networks designs, develops, and sells network products and services worldwide. The company offers various routing products, switching products, and security products.	Market Cap: $ 10,508 Cash & Equivalents: 1,833 Debt: 2,134 Enterprise Value: 10,056 LTM Revenue: 4,924 LTM EBITDA: 1,077 Undrawn Revolver: 500 EV/LTM Revenue: 2.0x EV/LTM EBITDA: 9.1x Debt/LTM EBITDA: 1.9x Acquisitions(#) 6	▪ AppFormix (2016, Internet Software and Services) ▪ Aurrion (2016, $165M, Semiconductor Equipment) ▪ WANDL (2014, $28.7, Systems Software) ▪ Webscreen (2013, $11M, Internet Software and Services)
Yokne'am Illit, Israel Eyal Waldman, CEO	Mellanox Technologies designs, manufactures, and sells interconnect products and solutions. Its products facilitate data transmission between servers, storage systems, communications infrastructure equipment, and other embedded systems.	Market Cap: $ 2,531 Cash & Equivalents: 57 Debt: 242 Enterprise Value: 2,445 LTM Revenue: 813 LTM EBITDA: 135 Undrawn Revolver: - EV/LTM Revenue: 2.9x EV/LTM EBITDA: 17.3x Debt/LTM EBITDA: 1.7x Acquisitions(#) 4	▪ EZchip Semiconductor (2015, $807M, Semiconductors) ▪ Integrity Project (2014, Systems Software) ▪ Mellanox Technologies Denmark (2013, $48M, Semiconductors) ▪ KOTURA (2013, $82M, Communications Equipment)
Espoo, Finland Rajeev Suri, CEO	Nokia provides network infrastructure and related services worldwide. It operates in five business groups: Mobile Networks, Fixed Networks, IP/Optical Networks, Applications & Analytics, and Nokia Technologies.	Market Cap: $ 29,644 Cash & Equivalents: 8,021 Debt: 4,339 Enterprise Value: 24,667 LTM Revenue: 22,019 LTM EBITDA: 2,282 Undrawn Revolver: 1,689 EV/LTM Revenue: 1.0x EV/LTM EBITDA: 12.5x Debt/LTM EBITDA: 2.2x Acquisitions(#) 16	▪ Comptel (2017, $382M, Application Software) ▪ DeepField (2016, Internet Software and Services) ▪ **Eta Devices (2016, Semiconductors)** ▪ **Withings (2016, $192M, Healthcare Equipment)** ▪ Alcatel-Lucent (2015, $23.1B, Communications Equipment)
Paris, France Stéphane Richard, CEO	Orange provides a range of fixed telephony and mobile telecommunications, data transmission, and other value-added services to consumers, businesses, and other telecommunications operators.	Market Cap: $ 39,733 Cash & Equivalents: 6,799 Debt: 37,178 Enterprise Value: 70,718 LTM Revenue: 43,691 LTM EBITDA: 12,961 Undrawn Revolver: - EV/LTM Revenue: 1.6x EV/LTM EBITDA: 5.4x Debt/LTM EBITDA: 2.8x Acquisitions(#) 23	▪ BigHill Companies (2017, Application Software) ▪ Login Consultants Nederland B.V. (2016, IT Consulting and Other Services) ▪ SunCommunications SRL (2016, Cable and Satellite) ▪ Groupama Banque (2016, Regional Banks) ▪ Jazztel (2014, $5.0B, Integrated Telecommunication Services)
San Jose, CA Michael Bell, CEO	Silver Spring Networks operates as a networking platform and solutions provider for smart energy networks. Its networking platform provides customers to communicate with devices connected to the power grid.	Market Cap: $ 599 Cash & Equivalents: 50 Debt: - Enterprise Value: 481 LTM Revenue: 444 LTM EBITDA: 76 Undrawn Revolver: 61 EV/LTM Revenue: 1.5x EV/LTM EBITDA: NM Debt/LTM EBITDA: - Acquisitions(#) 2	▪ Detectent (2015, $12M, Internet Software and Services) ▪ Streetlight.Vision SARL (2014, $9M, Application Software)
Madrid, Spain Jose Maria Lopez, CEO	Telefónica provides mobile and fixed communication services. The company's mobile and related services and products comprise mobile voice, value added, mobile data and Internet, wholesale, corporate, roaming, fixed wireless, and trunking and paging services.	Market Cap: $ 54,406 Cash & Equivalents: 3,997 Debt: 64,578 Enterprise Value: 124,772 LTM Revenue: 47,553 LTM EBITDA: 13,001 Undrawn Revolver: - EV/LTM Revenue: 2.2x EV/LTM EBITDA: 7.1x Debt/LTM EBITDA: 3.7x Acquisitions(#) 25	▪ Telxius Telecom (2016, Integrated Telecommunications Services) ▪ Towerco Latam (2016, Integrated Telecommunications Services) ▪ Teabla Comunicaciones (2015, Computer and Electronics Retail) ▪ Digital Bubble S.L. (2014, Internet Software and Services)

Communication & Networking

Company	Description	Financials ($mm)	Highlighted Transactions
Telit *London, UK* Oozi Cats, CEO	Telit Communications plc operates in the field of the Internet of Things (IoT) and machine to machine communications. It develops, manufactures, and markets communication modules, which enable machines, devices, and vehicles to communicate via cellular wireless networks.	Market Cap: $ 497 Cash & Equivalents: 27 Debt: 44 Enterprise Value: 516 LTM Revenue: 357 LTM EBITDA: 28 Undrawn Revolver: - EV/LTM Revenue: 1.3x EV/LTM EBITDA: 15.6x Debt/LTM EBITDA: 1.4x Acquisitions(#) 6	▪ Gainspan (2017, $8M, Semiconductors) ▪ Stollmann Entwicklungs (2016, Wireless Communcation Services ▪ **Telit IoT Platforms (2013, $8.5M, Systems Software)** ▪ **Crossbridge Solutions (2013, $9M, Wireless Telecommunication Services)**
verizon *New York, NY* Lowell C. McAdam, CEO	Verizon provides communications, information, and entertainment products and services to consumers, businesses, and governmental agencies.	Market Cap: $ 198,985 Cash & Equivalents: 2,880 Debt: 108,314 Enterprise Value: 305,927 LTM Revenue: 127,894 LTM EBITDA: 44,160 Undrawn Revolver: 8,900 EV/LTM Revenue: 2.4x EV/LTM EBITDA: 7.1x Debt/LTM EBITDA: 2.5x Acquisitions(#) 32	▪ Skyward IO (2017, Application Software) ▪ **Sensity Systems (2016, Application Software)** ▪ **Fleetmatics (2016, Systems Software, $2.4B)** ▪ Yahoo! (2016, Internet Sosftware and Services, $4.8B) ▪ **Telogis (2016, Internet Software and Services)**

Things / Devices

Company	Description	Financials ($mm)	Highlighted Transactions
ABB *Zurich, Switzerland* Ulrich Spiesshofer, CEO	ABB provides power and automation technologies for utility and industrial customers. The company offers automation components products and solutions for process optimization.	Market Cap: $ 48,666 Cash & Equivalents: 3,644 Debt: 6,803 Enterprise Value: 50,401 LTM Revenue: 34,077 LTM EBITDA: 4,308 Undrawn Revolver: 2,000 EV/LTM Revenue: 1.5x EV/LTM EBITDA: 11.1x Debt/LTM EBITDA: 1.5x Acquisitions(#) 22	▪ Bernecker + Rainer (2017, Electronic Equipment and Instruments) ▪ **Svensk Industriautomation (2016, Technology Hardware, Storage and peripherals)** ▪ Striebel & John (2015, Electrical Components & Equipment) ▪ Power-One (2013, $945M, Electronic Components)
BOSCH *Stuttgart, Germany* Volkmar Denner, CEO	Bosch provides technology and services. It operates through Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology segments.	Market Cap: $ - Cash & Equivalents: 4,194 Debt: 7,077 Enterprise Value: - LTM Revenue: 52,371 LTM EBITDA: 4,625 Undrawn Revolver: - EV/LTM Revenue: - EV/LTM EBITDA: - Debt/LTM EBITDA: 0.8x Acquisitions(#) 32	▪ TrustPoint (2017, Systems Software) ▪ ITK Engineering (2016, IT Consulting) ▪ **Skyline Automation (2016, Facilites Services)** ▪ Klikwood (2015, Industrial Machinery) ▪ Seeo (2015, Electrical Components and Equipment) ▪ Tecsor Machines et Systèmes (2013, Industrial Machiney)
EMERSON *St. Louis, MO* David Farr, CEO	Emerson offers products, and delivers services to industrial, commercial, and consumer markets. It offers systems/software, analytical instrumentation and industry services/solutions.	Market Cap: $ 37,672 Cash & Equivalents: 4,151 Debt: 4,069 Enterprise Value: 37,631 LTM Revenue: 14,522 LTM EBITDA: 3,111 Undrawn Revolver: 1,183 EV/LTM Revenue: 2.6x EV/LTM EBITDA: 12.1x Debt/LTM EBITDA: 1.3x Acquisitions(#) 23	▪ **FMC Technologies (2016, Industrial Machinery)** ▪ **Permasense (2016, $52M, oil and gas equipment services)** ▪ **Locus Traxx and PakSense (2016, Electronic Equipment & Instruments)** ▪ **IntelliSAW (2015, $5M, Electronic Equipment & Instruments)**
Honeywell *Morris Plains, NJ* Darius Adamczyk, CEO	Honeywell provides productivity solutions, industrial safety products, and building solutions/services for homes, commercial buildings, and industrial facilities.	Market Cap: $ 93,895 Cash & Equivalents: 7,843 Debt: 15,775 Enterprise Value: 100,000 LTM Revenue: 39,299 LTM EBITDA: 7,798 Undrawn Revolver: 7,000 EV/LTM Revenue: 2.5x EV/LTM EBITDA: 12.9x Debt/LTM EBITDA: 2.0x Acquisitions(#) 19	▪ **Intelligrated (2016, $1.5B Industrial Machinery)** ▪ RSI Video Technologies (2016, $123M, Electronic Equipment & Instruments) ▪ **Xtralis (2015, $480M, Electronic Equipment & Instruments)** ▪ Elster Group (2015, $6.5B, Electronic Equipment & Instruments)
Schneider Electric *Rueil-Malmaison, France* Jean-Pascal Tricoire, CEO	Schneider provides automation and control solutions. The company offers building management and security systems; critical power and cooling systems; cybersecurity solutions.	Market Cap: $ 40,104 Cash & Equivalents: 2,990 Debt: 8,151 Enterprise Value: 45,403 LTM Revenue: 26,924 LTM EBITDA: 4,001 Undrawn Revolver: - EV/LTM Revenue: 1.7x EV/LTM EBITDA: 11.3x Debt/LTM EBITDA: 2.1x Acquisitions(#) 24	▪ MWPowerlab(2017, Application Software) ▪ Luminous Power Technologies (2017, $139M, Electrical Components and Equipment) ▪ **Applied Instrument Technologies** (2016, Electronic Equipment and Instruments) ▪ LimeWare (2015, Application Software) ▪ **Instep Software (2014, Application Software)**
SIEMENS *Munich, Germany* Josef Kaeser, CEO	Siemens offers automation technologies and services for fire safety, security, building automation, heating, ventilation, air conditioning, and energy management.	Market Cap: $ 109,404 Cash & Equivalents: 10,193 Debt: 32,735 Enterprise Value: 123,448 LTM Revenue: 84,161 LTM EBITDA: 10,394 Undrawn Revolver: 7,596 EV/LTM Revenue: 1.4x EV/LTM EBITDA: 11.2x Debt/LTM EBITDA: 3.0x Acquisitions(#) 46	▪ 9Ren Espana (2017, Renewable Electricity) ▪ Mentor Graphics (2016, $4.5B, Application Software) ▪ CD-adapco (2016, $970M, Application Software) ▪ Camstar Systems (2014, Application Software) ▪ VRcontext (2012, Application Software)

Things / Devices

Company	Description	Financials ($mm)	Highlighted Transactions
ZEBRA *Lincolnshire, IL* Anders Gustafsson, CEO	Zebra Technologies designs, manufactures, sells, and supports direct thermal and thermal transfer label printers, radio frequency identification(RFID) printer/encoders, dye sublimation card printers, real-time locating solutions, related accessories, and support software.	Market Cap: $ 4,687 Cash & Equivalents: 156 Debt: 2,671 Enterprise Value: 7,202 LTM Revenue: 3,583 LTM EBITDA: 528 Undrawn Revolver: 246 EV/LTM Revenue: 2.0x EV/LTM EBITDA: 12.2x Debt/LTM EBITDA: 4.5x Acquisitions(#) 6	▪ **ITR Mobility (2015, Application Software)** ▪ Gimbal (2014, Internet Software and Services) ▪ **Motorola Solutions: *Enterprise Business* (2014, $3,450M, Technology Hardware, Storage and Peripherals)** ▪ Hart Systems (2013, $96M, Internet Software and Services)

Things / Semiconductors

Company	Description	Financials ($mm)	Highlighted Transactions
BROADCOM *San Jose, CA* Hock Tan, CEO	Broadcom provides semiconductor solutions for wired and wireless communications. Its products offer voice, video, data, and multimedia connectivity in the home, office, and mobile environments.	Market Cap: $ 85,839 Cash & Equivalents: 3,536 Debt: 13,562 Enterprise Value: 98,842 LTM Revenue: 13,240 LTM EBITDA: 5,011 Undrawn Revolver: 500 EV/LTM Revenue: 6.3x EV/LTM EBITDA: 16.7x Debt/LTM EBITDA: 2.3x Acquisitions(#) 11	▪ Brocade (2016, $7.1B, Communications Equipment) ▪ Emulex (2015, $768M, Communications Equipment) ▪ PLX Technology (2015, $314M, Semiconductors) ▪ LSI (2013, $6.6B, Semiconductors) ▪ 376M, Electronic Components)
CYPRESS *San Jose, CA* Hassane El-Khoury, CEO	Cypress Semiconductor designs, develops, manufactures, markets, and sells mixed-signal programmable solutions. The company's Programmable Solutions division designs and develops programmable solutions.	Market Cap: $ 4,435 Cash & Equivalents: 120 Debt: 1,225 Enterprise Value: 5,541 LTM Revenue: 1,843 LTM EBITDA: 303 Undrawn Revolver: 248 EV/LTM Revenue: 2.9x EV/LTM EBITDA: 45.1x Debt/LTM EBITDA: 8.7x Acquisitions(#) 4	▪ **Broadcom, Wireless Internet of Things Business and Related Assets (2016, $555M, Semiconductors)** ▪ Spansion (2014, $2.2B, Semiconductors) ▪ Fujitsu Semiconductor Limited, Microcontroller and Analog Business Assets/Products Profile (2013, $110M, Semiconductors) ▪ Ramtron (2012, $116M, Semiconductors)
Infineon *Neubiberg, Germany* Reinhard Ploss, CEO	Infineon Technologies provides semiconductors and system solutions in Germany and internationally. It operates in four segments: Automotive, Industrial Power Control, Power Management & Multimarket, and Chip Card & Security.	Market Cap: $ 22,132 Cash & Equivalents: 678 Debt: 2,186 Enterprise Value: 21,955 LTM Revenue: 6,925 LTM EBITDA: 1,691 Undrawn Revolver: - EV/LTM Revenue: 3.1x EV/LTM EBITDA: 12.9x Debt/LTM EBITDA: 1.3x Acquisitions(#) 5	▪ Innoluce (2016, Electronic Components) ▪ Wolfspeed (2016, Semiconductors, $850M) ▪ LS Power Semitech (2015, Electrical Components and Equipment, $16M) ▪ TTTech Computertechnik (2015, Electronic Components, $55M) ▪ Schweizer Electronic (2014, Electronic Components)
intel *Santa Clara, CA* Brian Krzanich, CEO	Intel designs, manufactures, and sells integrated digital technology platforms. It operates through Client Computing Group, Data Center Group, Internet of Things Group, Software and Services, and All Other segments.	Market Cap: $ 167,383 Cash & Equivalents: 5,560 Debt: 25,283 Enterprise Value: 175,567 LTM Revenue: 57,927 LTM EBITDA: 22,790 Undrawn Revolver: - EV/LTM Revenue: 3.0x EV/LTM EBITDA: 7.7x Debt/LTM EBITDA: 1.1x Acquisitions(#) 50	▪ Mobileye (2017, $15.4B, Application Software) ▪ HERE Global (2017, Internet Software and Serrvices) ▪ **MAVinci (2016, Electric Equipment and Instruments)** ▪ **YOGITECH (2016, Semiconductor)** ▪ Movidius (2016, $355M, Semiconductors) ▪ Nervana Systems (2016, Technology Hardware, Storage and Peripherals)
MICROCHIP *Chandler, AZ* Steve Sanghi, CEO	Microchip offers semiconductor products for various embedded control applications. The Company sells its products through a network of direct sales personnel and distributors.	Market Cap: $ 15,804 Cash & Equivalents: 664 Debt: 3,124 Enterprise Value: 18,258 LTM Revenue: 2,769 LTM EBITDA: 824 Undrawn Revolver: 1,104 EV/LTM Revenue: 6.0x EV/LTM EBITDA: 19.7x Debt/LTM EBITDA: 3.4x Acquisitions(#) 12	▪ Atmel (2016, $3.4B, Semiconductors) ▪ Micrel (2015, $816M, Semiconductors) ▪ Supertex (2014, $397M, Semiconductors) ▪ EqcoLogic (2013, Semiconductors) ▪ Standard Microsystems (2012, $910M, Semiconductors) ▪ IDENT Technology (2012, $40M, Semiconductors)
NORDIC SEMICONDUCTOR *Trondheim, Norway* Sven-Tore Larsen, CEO	Nordic Semiconductor develops and sells integrated circuits and related solutions for short-range wireless applications. It offers ultra-low power components based on its proprietary 2.4 GHz radio frequency (RF) and Bluetooth smart technology.	Market Cap: $ 602 Cash & Equivalents: 21 Debt: 20 Enterprise Value: 601 LTM Revenue: 192 LTM EBITDA: 26 Undrawn Revolver: 30 EV/LTM Revenue: 3.0x EV/LTM EBITDA: 38.7x Debt/LTM EBITDA: 1.3x Acquisitions(#) -	▪ NA

Things / Semiconductors

Company	Description	Financials ($mm)	Highlighted Transactions
QUALCOMM *San Diego, CA* Steve Mollenkopf, CEO	Qualcomm develops, designs, manufactures, and markets digital communications products and services.	Market Cap: $ 78,121 Cash & Equivalents: 6,885 Debt: 11,684 Enterprise Value: 78,984 LTM Revenue: 23,554 LTM EBITDA: 8,240 Undrawn Revolver: 4,000 EV/LTM Revenue: 3.3x EV/LTM EBITDA: 9.2x Debt/LTM EBITDA: 1.4x Acquisitions(#) 22	▪ **NXP Semiconductors (2016, $47.6B, Semiconductors)** ▪ Maxim Integrated Products: *Capacitive Touch Business* (2015, $39M, Semiconductors) ▪ CSR (2015, $2.4B, Fabless Semiconductors) ▪ **StonestreetOne (2014, Systems Software)**
SILICON LABS *Austin, TX* Tyson Tuttle, CEO	Silicon Laboratories designs, develops, and markets mixed-signal analog intensive integrated circuits. the company offers infrastructure products comprising timing devices, such as clocks and oscillators; and multi-channel isolators.	Market Cap: $ 2,958 Cash & Equivalents: 141 Debt: 73 Enterprise Value: 2,735 LTM Revenue: 675 LTM EBITDA: 92 Undrawn Revolver: 228 EV/LTM Revenue: 3.9x EV/LTM EBITDA: 26.1x Debt/LTM EBITDA: 0.7x Acquisitions(#) 7	▪ **Zentri (2017, Internet Software and Services)** ▪ Micriμm (2016, Systems Software) ▪ Telegesis (2015, $19.7M, Semiconductors) ▪ Silicon Laboratories Finland Oy (2015, $60.8M, Communications Equipment) ▪ Touchstone Semiconductor (2014, $1.5M, Semiconductors)
life.augmented *Geneva, Switzerland* Carlo Bozotti, CEO	STMicroelectronics designs, develops, manufactures, and markets semiconductor products, and subsystems and modules. The company offers a range of products, including discrete and standard commodity components, application-specific integrated circuits.	Market Cap: $ 12,456 Cash & Equivalents: 1,629 Debt: 1,451 Enterprise Value: 11,998 LTM Revenue: 6,761 LTM EBITDA: 892 Undrawn Revolver: - EV/LTM Revenue: 1.7x EV/LTM EBITDA: 11.7x Debt/LTM EBITDA: 1.4x Acquisitions(#) 3	▪ ams AG, NFC and RFID Reader Assets (2016, $114.8M, Semiconductors) ▪ bTendo (2012, Electric Equipment and Instruments) ▪ ST-Ericsson, Stand-Alone Application Processor Activities (2012, Semiconductor)
TEXAS INSTRUMENTS *Dallas, TX* Rich Templeton, CEO	Texas Instruments designs, manufactures, and sells semiconductors to electronics designers and manufacturers. It operates through two segments, Analog and Embedded Processing.	Market Cap: $ 78,692 Cash & Equivalents: 1,154 Debt: 3,609 Enterprise Value: 78,811 LTM Revenue: 13,145 LTM EBITDA: 5,523 Undrawn Revolver: 2,000 EV/LTM Revenue: 5.9x EV/LTM EBITDA: 13.8x Debt/LTM EBITDA: 0.6x Acquisitions(#) 1	▪ UTAC Chengdu, 358,000 Square-Foot Facility In Chengdu Hi-Tech Zone (2013, $16.5m, Real Estate Operating Companies)

Security

Company	Description	Financials ($mm)	Highlighted Transactions
Check Point SOFTWARE TECHNOLOGIES LTD. *San Carlos, CA* Gil Shwed, CEO	Checkpoint Software develops, markets, and supports a range of software, combined hardware, and software products and services for IT security. It offers a portfolio of network security, endpoint security, data security, and management solutions.	Market Cap: $ 18,032 Cash & Equivalents: 187 Debt: - Enterprise Value: 16,659 LTM Revenue: 1,713 LTM EBITDA: 863 Undrawn Revolver: - EV/LTM Revenue: 9.6x EV/LTM EBITDA: 19.3x Debt/LTM EBITDA: - Acquisitions(#) 2	▪ Lacoon Security (2015, Internet Software & Services) ▪ Hyperwise Security (2015, Systems Software) ▪ Dynasec (2011, Application Software) ▪ Liquid Machine (2010, $14M, Application Software)
CISCO *Milpitas, CA* Chuck Robbins, CEO	Cisco designs, manufactures, and sells IP based networking products and services related to the communications and information technology industry.	Market Cap: $ 163,306 Cash & Equivalents: 10,898 Debt: 34,922 Enterprise Value: 126,388 LTM Revenue: 48,917 LTM EBITDA: 14,994 Undrawn Revolver: 3,000 EV/LTM Revenue: 2.6x EV/LTM EBITDA: 8.6x Debt/LTM EBITDA: 2.4x Acquisitions(#) 43	▪ AppDynamics (2017, $4.0B, Internet Software and Services) ▪ **CliQr Technologies (2016, $260M, Internet Software & Services)** ▪ **Jasper Technologies (2016, $1.4B, Internet Software & Services)** ▪ **Sourcefire (2013, $2.4B, Systems Software)**
FireEye *Milpitas, CA* Kevin Mandia, CEO	FireEye provides cybersecurity solutions that allow organizations to prepare for, prevent, respond to, and remediate cyber-attacks. The company provides vector-specific appliance and cloud-based solutions detect and block known and unknown cyber-attacks.	Market Cap: $ 2,183 Cash & Equivalents: 224 Debt: 742 Enterprise Value: 1,990 LTM Revenue: 714 LTM EBITDA: (367) Undrawn Revolver: - EV/LTM Revenue: 2.8x EV/LTM EBITDA: NM Debt/LTM EBITDA: NM Acquisitions(#) 4	▪ Invotas International (2016, $28M, System Software) ▪ iSight Security (2016, $268M,) ▪ nPulse (2014, $67M, Communications Equipment) ▪ Mandiant (2014, $1.02B, Systems Software)
FORTINET *Sunnyvale, CA* Ken Xie, CEO	Fortinet provides cybersecurity solutions. The company offers FortiGate physical and software licenses that provide various security and networking functions, including firewall, intrusion prevention, anti-malware, virtual private network, application control, Web filtering, anti-spam, and wide area network acceleration	Market Cap: $ 6,674 Cash & Equivalents: 709 Debt: - Enterprise Value: 5,589 LTM Revenue: 1,209 LTM EBITDA: 60 Undrawn Revolver: - EV/LTM Revenue: 4.4x EV/LTM EBITDA: 58.4x Debt/LTM EBITDA: - Acquisitions(#) 4	▪ AccelOps (2016, $32M, Application Software) ▪ Meru Networks (2015, $42M, Communications Equipment) ▪ Coyote Point Systems (2013, $12M, Communications Equipment) ▪ XDN (2013, $0.5M, Internet Software and Services) ▪ IntruGuard Devices (2012, $0.95M, Communications Equipment)
gemalto security to be free *Amsterdam, Netherlands* Philippe Vallée, CEO	Gemalto is an international digital security company providing software applications, secure personal devices such as smart cards and tokens, and managed services. It is the world's largest manufacturer of SIM cards.	Market Cap: $ 5,245 Cash & Equivalents: 710 Debt: 782 Enterprise Value: 5,323 LTM Revenue: 3,340 LTM EBITDA: 552 Undrawn Revolver: - EV/LTM Revenue: 1.6x EV/LTM EBITDA: 9.2x Debt/LTM EBITDA: 1.3x Acquisitions(#) 10	▪ 3M Cogent and 3M's Document Reader and Secure Materials Businesses (2016, $850M, Electronic Equipment and Instruments) ▪ Internet Payment Exchange (2015, Application Software) ▪ Marquis ID Systems (2014, Application Software) ▪ SafeNet (2014, $957M, Systems Software)
paloalto NETWORKS *Santa Clara, CA* Mark McLaughlin, CEO	Palo Alto Networks provides security platform solutions. Its platform includes Next-Generation Firewall, Advanced Endpoint Protection, and Threat Intelligence Cloud.	Market Cap: $ 10,112 Cash & Equivalents: 761 Debt: 512 Enterprise Value: 9,270 LTM Revenue: 1,479 LTM EBITDA: (160) Undrawn Revolver: - EV/LTM Revenue: 5.9x EV/LTM EBITDA: NM Debt/LTM EBITDA: NM Acquisitions(#) 5	▪ LightCyber (2017, $105M, Systems Software) ▪ SentinelOne (2016, $200M, Systems Software) ▪ ShieldArc (2015, $18M, Internet Software and Services) ▪ Cyvera (2014, $213M, Systems Software ▪ Morta Security (2014, $10M, Internet Software and Services)

Security

Company	Description	Financials ($mm)	Highlighted Transactions
radware *Tel Aviv, Israel* Roy Zisapel, CEO	Radware is a global leader of application delivery and cyber security solutions for virtual, cloud and software defined data centers. Its award-winning solutions portfolio delivers service level assurance for business-critical applications, while maximizing IT efficiency.	Market Cap: $ 679 Cash & Equivalents: 80 Debt: - Enterprise Value: 453 LTM Revenue: 200 LTM EBITDA: 7 Undrawn Revolver: - EV/LTM Revenue: 2.3x EV/LTM EBITDA: 239.1x Debt/LTM EBITDA: - Acquisitions(#) 2	▪ Seculert (2017, Application Software) ▪ Strangeloop Networks (2013, $14M, Internet Software and Services)
Symantec. *Mountain View, CA* Greg Clark, CEO	Symantec helps organizations, governments and people secure their most important data wherever it lives. Symantec operates one of the world's largest civilian cyber intelligence networks, allowing it to see and protect against the most advanced threats.	Market Cap: $ 18,720 Cash & Equivalents: 5,575 Debt: 7,138 Enterprise Value: 20,283 LTM Revenue: 3,645 LTM EBITDA: 940 Undrawn Revolver: 1,000 EV/LTM Revenue: 5.4x EV/LTM EBITDA: 23.2x Debt/LTM EBITDA: 8.2x Acquisitions(#) 9	▪ **LifeLock (2016, $2.3B, Internet Software & Services)** ▪ **Blue Coat (2016, $4.6B, Internet Software & Services)** ▪ Bop FM (2015, Internet Software and Services) ▪ Bityota (2013, $13M, Internet Software and Services)

System Integrators

Company	Description	Financials ($mm)	Highlighted Transactions
accenture High performance. Delivered. *Dublin, Ireland* Pierre Nanterme, CEO	Accenture provides consulting, technology, and outsourcing services. Its Communications, Media & Technology segment provides professional services that help clients accelerate and deliver digital transformation, and enhance business results through industry-specific solutions.	Market Cap: $ 71,756 Cash & Equivalents: 3,239 Debt: 27 Enterprise Value: 69,193 LTM Revenue: 33,385 LTM EBITDA: 5,656 Undrawn Revolver: 1,490 EV/LTM Revenue: 2.0x EV/LTM EBITDA: 12.1x Debt/LTM EBITDA: 0.0x Acquisitions(#) 84	▪ BeesPath (2017, Internet Software and Services) ▪ **InvestTech Systems Consulting (2017, Asset Management and Custody Banks)** ▪ **Realworld OO Systems (2016, Application Software)** ▪ **2nd Road (2016, Research and Consulting Services)** ▪ **Octo Technology Société Anonyme (2016, IT Consulting and Other Services)**
Capgemini CONSULTING.TECHNOLOGY.OUTSOURCING *Paris, France* Paul Hermelin, CEO	Cap Gemini provides consulting, technology, professional, and outsourcing services. It operates through Consulting Services, Local Professional Services, Application Services, and Other Managed Services segments.	Market Cap: $ 14,884 Cash & Equivalents: 2,010 Debt: 3,690 Enterprise Value: 16,578 LTM Revenue: 13,428 LTM EBITDA: 1,673 Undrawn Revolver: - EV/LTM Revenue: 1.2x EV/LTM EBITDA: 9.8x Debt/LTM EBITDA: 2.2x Acquisitions(#) 11	▪ Ciber, Substantially All Assets in North America and India (2017, IT Consulting and Other Services) ▪ Fahrenheit 212 (2016, Research and Consulting Services) ▪ IT & Business Services (2016, IT Consulting and Other Services) ▪ CPM Braxis (2015, IT Consulting and Other Services)
Cognizant *Teaneck, NJ* Francisco D'Souza, CEO	Cognizant Technology Solutions provides information technology (IT), consulting, and business process services worldwide. The company operates through four segments: Financial Services, Healthcare, Manufacturing/Retail/Logistics, and Other.	Market Cap: $ 35,727 Cash & Equivalents: 2,034 Debt: 878 Enterprise Value: 31,436 LTM Revenue: 13,258 LTM EBITDA: 2,648 Undrawn Revolver: 750 EV/LTM Revenue: 2.3x EV/LTM EBITDA: 11.8x Debt/LTM EBITDA: 0.3x Acquisitions(#) 21	▪ Brilliantservice (2017, Application Software) ▪ Mirabeau (2016, Advertising) ▪ Frontica Business Solutions (2016, Data Processing and Outsourced Services) ▪ ReD Associates (2016, Research and Consulting Services) ▪ KBACE Technologies (2016, IT Consulting and Other Services)
HCL *Noida, India* C. VijayaKumar, CEO	HCL Technologies provides software, business process outsourcing (BPO), and information technology (IT) infrastructure services.	Market Cap: $ 17,852 Cash & Equivalents: 326 Debt: 99 Enterprise Value: 16,221 LTM Revenue: 6,595 LTM EBITDA: 1,449 Undrawn Revolver: - EV/LTM Revenue: 2.3x EV/LTM EBITDA: 10.3x Debt/LTM EBITDA: 0.1x Acquisitions(#) 9	▪ Butler America Aerospace (2016, $85M, Aerospace and Defense) ▪ Geometric (2016, $192M, IT Consulting and Other Services) ▪ Point to Point (2016, $11M, Internet Software and Services) ▪ PowerTeam (2015, Application Software) ▪ AB Volvo, External IT Business (2015, $46M, IT Consulting and Other Services)
IBM *Armonk, NY* Virginia Rometty, CEO	International Business Machines provides information technology (IT) products and services worldwide. The company's Global Technology Services segment provides IT infrastructure services, such as IT outsourcing, integrated technology, cloud, and technology support services.	Market Cap: $ 161,384 Cash & Equivalents: 7,826 Debt: 42,176 Enterprise Value: 195,179 LTM Revenue: 78,487 LTM EBITDA: 17,539 Undrawn Revolver: 10,000 EV/LTM Revenue: 2.4x EV/LTM EBITDA: 10.5x Debt/LTM EBITDA: 2.3x Acquisitions(#) 61	▪ **Agile 3 Solutions/Ravy Technologies (2017, Application Software)** ▪ Fluid (2016, Internet Software and Services) ▪ Sanovi Technologies (2016, Systems Software) ▪ The Weather Co. (2015, $2.3B, Internet Software and Services)
Infosys *Bengaluru, India* Vishal Sikka, CEO	Infosys provides consulting, technology, and outsourcing services. The company offers business information technology services, engineering services, and consulting and systems integration services.	Market Cap: $ 32,655 Cash & Equivalents: 3,489 Debt: - Enterprise Value: 27,611 LTM Revenue: 10,085 LTM EBITDA: 2,787 Undrawn Revolver: - EV/LTM Revenue: 2.7x EV/LTM EBITDA: 9.9x Debt/LTM EBITDA: - Acquisitions(#) 6	▪ TidalScale (2016, Application Software) ▪ Noah Consulting (2015, $38M, IT Consulting and Other Services) ▪ Kallidus (2015, $111M, Internet Software and Services) ▪ Panaya (2015, $225M, Internet Software and Services)

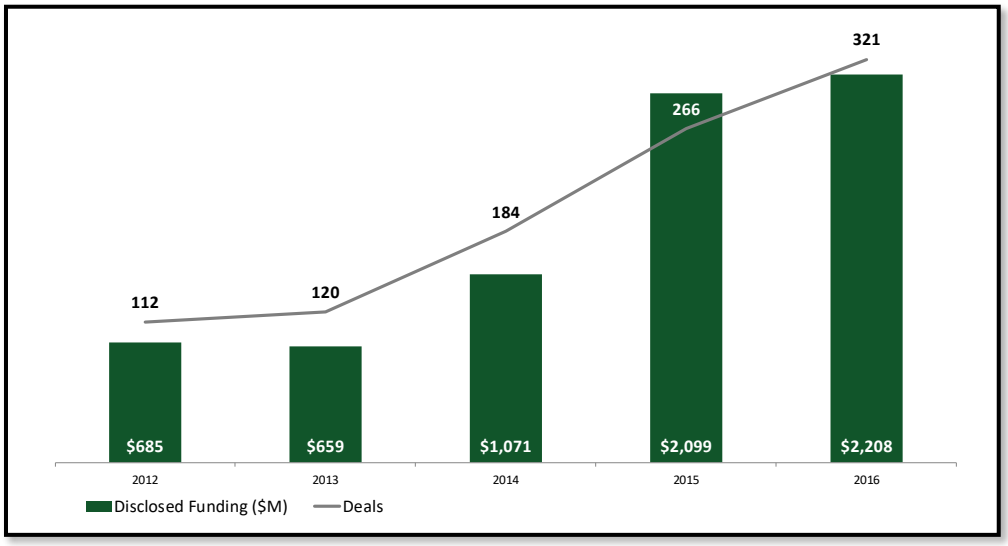
System Integrators

Company	Description	Financials ($mm)	Highlighted Transactions
Mumbai, India Rajesh Gopinathan, CEO	Tata Consultancy Services provides information technology (IT) and IT enabled services worldwide. The company offers assurance services, such as test consulting and advisory, test services implementation, and managed services; business intelligence and performance management, and business process services.	Market Cap: $ 70,445 Cash & Equivalents: 580 Debt: 39 Enterprise Value: 64,520 LTM Revenue: 17,715 LTM EBITDA: 4,879 Undrawn Revolver: - EV/LTM Revenue: 3.6x EV/LTM EBITDA: 13.0x Debt/LTM EBITDA: 0.0x Acquisitions(#) 6	▪ CMC (2014, $512M, IT Consulting and Other Services) ▪ IT Frontier (2014, $58M, IT Consulting and Other Services) ▪ Nippon TCS Solution Center (2014, Data Processing and Outsourced Services) ▪ Alti SA (2013, $85M, IT Consulting and Other Services) ▪ Computational Research Laboratories (2012, $34M, IT Consulting and Other Services)
Bengaluru, India Abidali Z. Neemuchwala, CEO	Wipro operates as an information technology (IT), consulting, and business process services company. The company's IT Services segment provides a range of IT and IT-enabled services.	Market Cap: $ 18,491 Cash & Equivalents: 928 Debt: 2,421 Enterprise Value: 15,816 LTM Revenue: 8,340 LTM EBITDA: 1,671 Undrawn Revolver: - EV/LTM Revenue: 1.9x EV/LTM EBITDA: 9.4x Debt/LTM EBITDA: 1.4x Acquisitions(#) 16	▪ InfoSERVER (2017, $9M, IT Consulting and Other Services) ▪ Appirio (2016, $500M, Internet Software and Services) ▪ Designit (2015, $103M, Diversified Support Services) ▪ Opera Solutions (2014, Application Software)

9. IIoT Investment Trends

According to CB Insights, Industrial IoT has experienced its fourth straight year of growth in 2016, with investment exceeding $2.2bn across 321 deals. Notably, in 2016, IoT platform vendor C3 IoT raised a Series D round (amount undisclosed) and has just closed (March 2017) a Series E round (led by Breyer Capital) at a $1.4bn valuation (Figure 8).

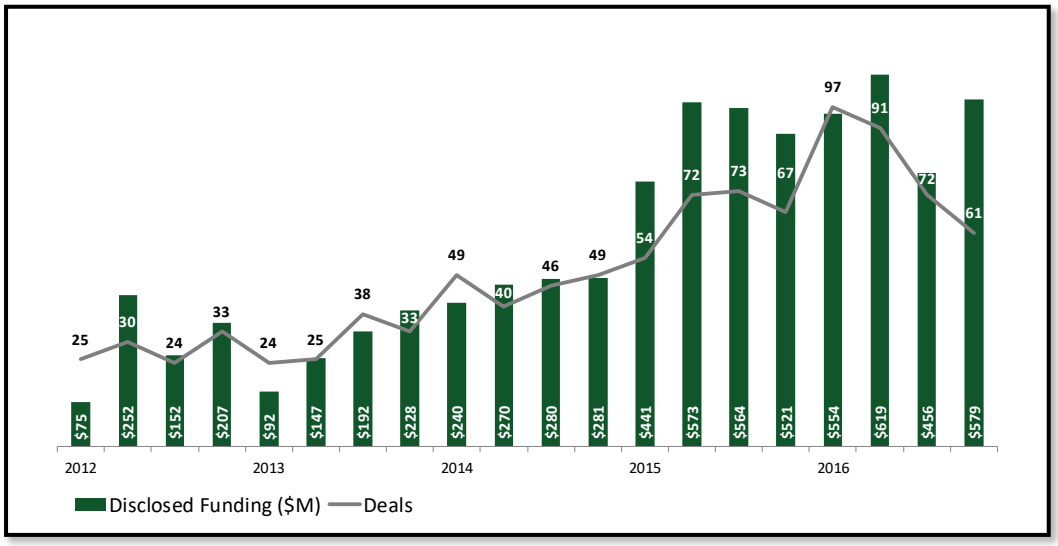
Figure 8: IIoT Annual Global Financing History



Source: CB insights (March 2017)

Examining quarterly trends, we note that while the volume of deals has declined steadily since Q1 of 2016, the dollar value has not followed consistently, suggesting that larger amounts of capital continue to flow to this investment category (Figure 9).

Figure 9: IIoT Quarterly Global Financing History



Source: CB insights (March 2017)

The proportion of IIoT deals in the overall ecosystem has fluctuated. In 2012, IIoT accounted for 35% of deals, but in 2013 that number fell to 26%. Since then, however, its share of deals has grown in every year. Industrial IoT represented 39% of deals in 2016 through Q3, with 154 out of 394 deals.

10. Selected Private and Small Cap Companies

aeris

Contact Details

Aeris
2350 Mission College Blvd, Suite 600
Santa Clara, CA 95054

www.aeris.com

Phone: (888) 462-3747

Employees: 250+

Founded: 1992

Company Overview

Aeris is a technology partner with a proven history of helping companies unlock value through IoT. For over a decade, Aeris has powered critical projects for some of the most demanding customers of IoT services today, including Hyundai, Honda, Trimble, Badger Meter, and Sprint. Aeris strives to fundamentally improve their businesses – by dramatically reducing costs, accelerating time-to-market, and enabling new revenue streams. Built from the ground up for IoT and road tested at scale, Aeris IoT Services are based on the broadest technology stack in the industry, spanning connectivity up to vertical solutions. Aeris Communications knows that implementing an IoT solution can be complex, and pride themselves on making it simpler.

Product/Service

- **Aeris IoT Connectivity:** IoT network offering 2G, 3G, and 4G / LTE connectivity (both CDMA and GSM)
- **AerPort**. Connectivity management platform that enables companies to monitor and manage IoT programs
- **Aeris IoT Data Management:** Cloud-based services to collect, store and manage IoT data
- **Aeris IoT Analytics.** Cloud-based services to visualize IoT data and mine it for critical business insights
- **Vertical Solutions.** Full-stack IoT solutions addressing connected vehicles other mobile assets

Recent News

January 2017: Aeris and MapmyIndia forge Partnership to offer geo-spatial intelligence-based IoT solutions in India.

December 2016: Chicago Mayor Rahm Emanuel and Aeris open new Aeris IoT hub in Chicago.

October 2016: Aeris attains visionary positioning in Gartner M2M Magic Quadrant.

Management

Name	Title
Marc Jones	CEO & Chairman
Raj Kanaya	CMO, GM Automotive & CEO of Aeris Japan
Drew Johnson	VP, Engineering
Marc Cratsenburg	VP, Global Sales

Total Funding

NA

Investors

NA

Customers

Badger Meter

Honda

Hyundai

Sprint

Trimble

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Arrayent
2317 Broadway Street, Suite 20
Redwood City, CA 94063

www.arrayent.com

Phone: (650) 260-4520

Employees: 39

Founded: 2002

Company Overview

Arrayent provides an Internet of Things (IoT) platform that enables consumer brands to implement and deliver connected products and systems to market. The Company's IoT platform enables connected products and services from consumer brands; provides various layers of security, including data encryption, access control, and authorization for data, user, and application transactions; and offers consumers a way to interact with their connected products. Its platform provides a solution from device agents to cloud services to mobile app SDKs to IoT-enable products and devices through smartphone and Web applications.

Product/Service

- **Arrayent Connect Cloud Services:** IoT operating system that hosts cloud-based virtual devices that can be managed remotely from anywhere in the world through mobile apps
- **Arrayent Insight Services:** Provides secure access to customer and product data in a variety of formats that are compatible with all major data analytics environments
- **Arrayent EcoAdaptor Services:** Multi-brand integration via cloud to cloud connections

Recent News

January 2017: Arrayent announces new EcoAdaptors for Amazon Echo/Alexa, Google Home, IFTTT and more.

September 2016: Arrayent named Consumer IoT Enabling Company of the year.

September 2016: Peter Radsliff joins Executive Team of Consumer IoT platform leader Arrayent as VP of Marketing.

Management

Name	Title
Cyril Brignone	CEO
Shane Dyer	Founder
Jarrod Sinclair	Chief Architect
William Oget	VP Engineering
Bob Dahlberg	VP Business Development

Total Funding

NA

Investors

Band of Angels

DCM Ventures

Intel Capital

Opus Capital

Customers

Chamberlain
Intel
LiftMaster
Maytag
Monster
Pentair
Procter and Gamble
Sylvania
Whirlpool

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Augury
110 5th Ave, 5th Floor
New York, NY 10011

www.augury.com

Employees: 57

Founded: 2012

Company Overview

Augury brings internet age technologies into the maintenance world and combines them with the gold-standard practices of Predictive Maintenance. It offers a Diagnostics-as-a-Service solution that enables maintenance staff to perform recording and diagnostics on HVAC and other building machinery. Built on the idea that each machine has a unique acoustic fingerprint, Augury technology listens to a machine, analyzes data and catches any malfunctions before they arise. The technology combines two key shifts in the industry: artificial intelligence and the Internet of Things. The intersection of these trends allows Augury to provide machines with the awareness to optimize their own health, thereby accelerating human productivity and safety.

Product/Service

- **Platform Overview:** Collected data is sent to servers, where it is compared with previous data collected from that machine, as well as data collected from similar machines. Augury's platform can detect the slightest changes and warn customers of developing malfunctions. This analysis is done in real-time and the results are displayed on the technician's smartphone within seconds
- **Predictive Maintenance (PdM):** PdM helps to eliminate catastrophic equipment failures, extends the operational life of machine components and reduces the costs of parts and labor

Recent News

September 2016: Augury unveiled OEM partnership program for Industrial IoT.

August 2015: Augury raised Series A financing of $7M lead by Eclipse Venture Capital.

Management

Name	Title
Saar Yoskovitz	CEO & Co-Founder
Gal Shaul	CTO & Co-Founder

Total Funding

NA

Investors

Eclipse Venture Capital

First Round Capital

Lerer Hippeau Ventures

Pritzker Group Venture Capital

Customers

AECOM
Aramark
Armstrong
Brooklyn Navy Yard
Carrier
Grundfos
Johnson Controls
Mueller Industries
PSG
Trane

Sources: Capital-IQ, Company website, Crunchbase

awesense

Contact Details

Awesense
2300 1075 West Georgia Street
Vancouver, BC, V6E3C9, Canada

www.awesense.com

Phone: (888) 868-4607

Employees: 40

Founded: 2009

Company Overview

Awesense offers an integrated system for smart in-grid data collection and advanced analytics. Awesense provides rigorous systematic processes, analytics software and mobile in-grid data collection to locate hard-to-find losses and optimize the performance of electrical distribution grids. The Company's approach can help customers pinpoint and reduce non-technical losses by half in just a few years.

Awesense customers reached an important milestone in battling climate change: over 1 TWh of energy savings, equivalent to 700,000t of CO_2.

Product/Service

- **TGI (True Grid Intelligence):** A combination of cloud-based analytics software, IoT devices, and a proven methodology, TGI helps utilities find problems on the grid faster. TGI provides organization-wide value – from investigation tools in the field, to dashboards for management
- **TGI Raptor Sensors:** High Accuracy IoT Sensors with integrated wireless communication. These smart devices can be quickly deployed on live low and medium voltage lines without service disruption

Recent News

February 2017: Awesense awarded IoT Software & Tool Award at European Smart Energy Awards.

June 2016: Awesense welcomed John Chase as CFO.

April 2016: Gartner names Awesense to list of *Cool Vendors in Energy and Utilities in 2016*.

August 2015: Awesense works with IBM to provide utility grid analytics in the cloud.

October 2014: Awesense announced release of True Grid Intelligence 2.0.

Management

Name	Title
Mischa Steiner	CEO
John Chase	CFO
Mike Rowling	CTO

Total Funding

NA

Investors

Self-funded

Customers

BC Hydro

Central Virginia Electric Cooperative

FortisBC

Other customers under NDAs

Sources: Capital-IQ, Company website, Crunchbase

Ayla

Contact Details

Ayla Networks
4250 Burton Drive
Santa Clara, CA 95054

www.aylanetworks.com

Phone: (408) 830-9844

Employees: 151

Founded: 2010

Company Overview

Ayla Networks from its inception was founded for one sole purpose, to solve the Internet of Things so product manufacturers don't have to. Ayla's Agile IoT Platform was architected from the ground up to deliver a truly end-to-end software foundation that enables any product manufacturer to develop not only intelligent products but, also elegant and reliable IoT services for their end users.

Ayla removes the need for manufacturers to invest in networking stack development, end-to-end security, cloud infrastructure, and other IoT "must haves" when bringing connected products to market, allowing them to focus on their areas of expertise.

Product/Service

- **Ayla IoT Platform:** Comprised of three primary components; Ayla Device Agents, Ayla Cloud Services, and Ayla Application Libraries, Ayla's Agile IoT Platform provides a complete solution to connect nearly any device to the cloud and applications while offering all of the tools and premium services needed for a product manufacturer to deploy, manage, and analyze their Internet of Things devices. In addition, the Ayla Agile IoT platform, Ayla has a number of complementary products to provide additional capabilities around mobile application development and advanced analytics for connected devices

Recent News

January 2017: Ayla Networks added Amazon Alexa integrations to its IoT Platform.

August 2016: Ayla Networks established comprehensive and strategic IoT relationship with Chinese appliance manufacturing giant Midea Group.

May 2015: Ayla Networks named a 2015 cool vendor in the IoT report by Gartner.

Management

Name	Title
David Friedman	CEO & Co-Founder
Thomas Clark	CFO
Adrian Caceres	CTO & Co-Founder

Total Funding

$59.0 M

Investors

3nod

Ants Capital

Cisco Investments

Crosslink Capital

Mitsui

Voyager Capital

Customers

Brinks Home Security

Fujitsu General

Hisense

Salus Controls

United Technologies

Sources: Capital-IQ, Company website, Crunchbase

BaseN

Contact Details

BaseN Corporation
Salmisaarenaukio 1
Helsinki, Finland 00180

www.basen.net

Phone: +358 9-4282-4200

Employees: 50

Founded: 2001

Company Overview

BaseN is a Global Full Stack IoT Operator, enabling scalable, fault-tolerent and inherently distributed IoT applications for existing and new businesses. Utilizing its own infrastructure and patented, independent technology developed for 15 years, BaseN provides unmatched technical and financial scalability to most demanding IoT requirements.

BaseN provides an inherently scalable computing Platform that is built on redundant computing grid for hosting billions of spimes, the core objects of the Internet of Things. BaseN currently handles close to one million spime transactions per second, and enables the transformation from physical products to intelligent services in any industry. Since BaseN's establishment in 2001, its powerful Platform has served telecom operators and large multinational enterprises with extreme-scale and fault-tolerant network and service management systems, and now enables them to roll out entirely new Internet of Things services.

Product/Service

- **BaseN Platform:** SaaS offering removes the need for investments in hardware, software licenses and administration by making everything globally accessible in a public or fully private cloud
- BaseN Platform as a **distributed** system that can collect massive amounts of data that can be delivered to millions of users. Unlike traditional architectures, BaseN Platform is not a piece of static software but an **organic system**
- **BaseN Spime Containers:** Globally migratable containers for Spimes, the Digital Twins of smart objects in virtually any industry running on global BaseN network

Recent News

March 2017: BaseN starts the year with 874000 transactions/ second.

February 2017: Spimes up – BaseN leading digital transformation at MWC 2017.

December 2016: BaseN has recently joined the Finnish Information Security Cluster (FISC) in order to advocate better security awareness across industries.

April 2016: Spime IoT leader BaseN acquired ITvilla from Estonia, the Digital Citizenship country.

Management

Name	Title
Pasi Hurri	CEO & President
Erik Bunn	CTO
Kaj Niemi	Chief Engineer, SVP Engineering
Corina Maiwald	CMO
Anders Viden	VP, Product Management
Jukka Paananen	SVP, Sales

Total Funding

NA

Investors

Self-funded

Customers

CGI
Deutsche Telekom
DNA
Fortum
Fujitsu
IBM
KESKO
Responda 113
Sulzer
Trimble
Vattenfall

Sources: Capital-IQ, Company website, Crunchbase

Bastille

Contact Details

Bastille Networks
101 2nd St., Suite 510
San Francisco, CA 94105

www.bastille.net

Phone: (800) 530-3341

Employees: 50

Founded: 2014

Company Overview

Bastille is the leader in enterprise threat detection through software-defined radio. The Company provides full visibility into the known and unknown mobile, wireless and Internet of Things (IoT) devices inside an enterprise's corporate airspace – together known as the Internet of Radios. Through its patented software-defined radio and machine learning technology, Bastille senses, identifies and localizes threats, providing security teams the ability to accurately quantify risk and mitigate airborne threats that could pose a danger to network infrastructure.

Product/Service

Bastille provides full visibility into the Internet of Radios inside an enterprise's corporate airspace. Through patented software-defined radio and machine learning technology, Bastille senses, identifies and localizes threats, providing security teams the ability to accurately quantify risk and mitigate airborne threats that could pose a danger to customer data and network infrastructure.

- **Sense:** Patent pending technology to quickly and accurately scan the spectrum for emitters and threats
- **Identify:** Detects and identifies devices in Enterprise airspace
- **Localize:** Provides actionable position information of all emitters in your corporate airspace

Recent News

December 2016: Dark Reading's The Coolest Hacks of 2016.

October 2016: Bastille Unveils Unprecedented Solution to Protect Enterprises from Internet of Radios-Based Security Threats.

October 2016: Bastille Unveils list of Top 10 Internet of Radios Vulnerabilities.

Management

Name	Title
Chris Risley	Chief Executive
Bob Baxley	Chief Engineer
Betty Kayton	CFO
Ivan O'Sullivan	CRO

Total Funding

$12.0 M

Investors

Bessemer Venture Partners

Customers

Cylance

Dana Foundation

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Bayshore Networks
6903 Rockledge Drive, Suite 910
Bethesda, MD 20817

www.bayshorenetworks.com

Phone: (301) 493-5424

Employees: <50

Founded: 2012

Company Overview

Bayshore Networks is the cybersecurity leader for the Industrial Internet of Things (IIOT). Bayshore Networks offers visibility, control, and protection for industrial Operational Technology, and transforms OT data for IT applications. Incorporating threat intelligence, and filtering open, standard, and proprietary protocols at a deep level. Bayshore parses OT protocol content and context, validating every command and parameter against logic-rich policies.

Product/Service

Bayshore IT/OT Gateway software offers visibility, control, and protection for Operational Technology, and transforms industrial data for use in IT applications. Incorporating threat intelligence, and filtering open, standard, and proprietary protocols at a deep level, the system parses OT traffic for both content and context, validating every command and parameter against logic-rich policies. Addressing zero day, internal, and rapidly evolving threats, Bayshore can allow, alert, and/or block individual transactions at line speed – allowing white-listed communication while protecting against unauthorized communication and commands.

Recent News

March 2017: Bayshore Networks closed Series A funding with final investment from Benhamou Global Ventures.

February 2017: Bayshore Networks received strategic equity investment from Samsung NEXT.

November 2016: Bayshore Networks received strategic investment from Yokogawa Electric.

May 2016: Bayshore Networks raised $6.6M in Series A Funding from Trident Capital Cybersecurity and Current Angel Investors.

Management

Name	Title
Michael Dager	CEO
Francis Cianfrocca	Founder & Chief Scientist
Bob Lam	VP, Corporate Development

Total Funding

$15.0 M

Investors

Benhamou Global Ventures

Houston Angel Network

Samsung NEXT Ventures

Trident Capital Cybersecurity

Yokogawa Electric

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

BEDROCK
OPEN SECURE AUTOMATION

Contact Details

Bedrock Automation Platforms
160 Rio Robles
San Jose, CA 95134

www.bedrockautomation.com

Phone: (781) 821-0280

Employees: 30-50

Founded: 2013

Company Overview

Bedrock Automation has developed the next generation industrial control system with a revolutionary electro-magnetic backplane architecture and deeply embedded cyber security for the highest levels of system performance, security and reliability at the lowest system cost.

Bedrock started with a clean sheet of paper just a few years ago and re-imagined how a modern industrial control system should be designed: **Simple, Scalable,** and **Secure**.

Simple: One controller for every conceivable application and size of control task.

Scalable: An unprecedented automation architecture with unlimited scalability from tens to tens of thousands of I/O using less than a dozen system part numbers. Regardless of application or size, the Bedrock's Secure Controller scales to the control task.

Secure: All traditional industrial control systems are vulnerable to multiple forms of cyber-attack, IP, and counterfeiting theft. Black Fabric™ Cybershield is Bedrock's embedded deep trust cyber defense using patented processor, memory, communications, interconnections, backplane, and packaging technologies to integrate cyber security into every module at birth.

Product/Service

- **Bedrock (Industrial Automation Systems):** Provides a simple, secure and scalable platform that prevents cyber attacks, optimizes ICS performance and enables secure IIoT

Recent News

February 2017: Bedrock announces newly upgraded control system firmware that extends its intrinsic cyber security protection to networks, IIoT and third-party applications.

January 2017: Jacobs Engineering Group and Bedrock Automation to pursue open secure automation systems opportunities.

December 2016: Bedrock secure power supply wins 2016 Breakthrough Product Award from Processing Magazine.

Management

Name	Title
Albert Rooyakkers	CEO & Founder
Rob Bergman	Vice President, Sales & Business Development & Founder
David Morris	CFO

Total Funding

NA

Investors

Maxim Integrated

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

C3 IoT
1300 Seaport Boulevard, Suite 500
Redwood City, CA 94063

www.c3iot.com

Phone: (650) 503-2200

Employees: NA

Founded: 2009

Company Overview

C3 IoT provides a next-generation enterprise platform (PaaS) for the rapid design, development, and deployment of large-scale big data, AI, and IoT applications. By leveraging telemetry, elastic cloud computing, analytics, and machine learning, C3 IoT brings the power of predictive insights to any business value chain. C3 IoT also provides a family of turn-key SaaS IoT applications including predictive maintenance, fraud detection, sensor network health, supply chain optimization, investment planning, and customer engagement.

Product/Service

- **C3 IoT Platform:** A cloud based, flexible, machine learning software platform for deploying industrial-scale IoT applications
- **C3 IoT Applications:** Cross-industry enterprise SaaS applications that use advanced machine learning predictive models at scale, to provide ever-smarter actionable insights and operational intelligence

Recent News

March 2017: C3 IoT closed Series E financing at a $1.4 billion valuation.

February 2017: C3 IoT delivers Version 7 of its Enterprise Software Platform.

December 2016: Con Edison Selects C3 IoT for Big Data and Predictive Analytics Platform and Applications.

Management

Name	Title
Thomas Siebel	CEO & Chairman
Ed Abbo	CTO & President
Houman Behzadi	Chief Product Officer
Paul Philips	CFO

Total Funding

< $110.0 M

Investors

Breyer Capital
Interwest Partners
Pat House
Sutter Hill Ventures
Thomas Siebel
TPG Growth
Wildcat Venture Partners

Customers

Cisco

Enel

Engie

Sources: Capital-IQ, Company website, Crunchbase

CENTRI

Contact Details

CENTRI Technology
701 5th Ave, Suite 550
Seattle, WA 98104

www.centritechnology.com

Phone: (206) 395-2793

Employees: 25

Founded: 2010

Company Overview

CENTRI provides a complete, advanced security solution for the Internet of Things. Our flexible, software-only platform enables organizations to quickly get to market with IoT security, purpose-built to protect their data from chip to Cloud. CENTRI reduces the business risk of data theft and loss of device integrity with efficient data encryption security, optimization technology and data insight for the unique requirements of the connected world.

Product/Service

CENTRI **Internet of Things Advanced Security – IoTAS**, is a standards-based cybersecurity solution designed to enable manufacturers and enterprises to easily implement device integrity, data encryption and optimization into their products and services. IoTAS is embedded on endpoints, applications, network servers and the Cloud to secure and compress all data in motion and at rest to protect the privacy of you and your customers. IoTAS uses patented cache mapping technology and efficient algorithms resulting in 20% less CPU utilization, less heat and less use of power with IoT devices.

Advantages of IoTAS:

- Complete Solution – IoTAS establishes trusted device integrity, secures and optimizes IoT data in transit and at rest, and provides visibility to all activity with GUIs for user administration and forensics/analytics
- Flexibility – IoTAS has a 50kB footprint with ultimate flexibility to fit on the smallest endpoints and gateways
- Data Integrity – IoTAS never sends a single byte in the clear and works with a trusted endpoint-server model for data integrity
- Simplified Key Management – IoTAS protects data at rest with patented "vault-less" technology to remove the risk and expense of managing your encryption keys
- Device Authentication – IoTAS employs a trusted endpoint model with certificate-less technology for authentication
- Developer-Centric Experience – Unlike DIY tools, IoTAS libraries and tools come pre-configured for faster integration to your endpoints, applications and Cloud
- Mission-Critical Uptime – IoTAS uses only 1% CPU power to provide up to 30% more uptime of battery-powered IoT equipment
- Handles the Data Spike – IoTAS compresses the data up to 80% to save bandwidth and Cloud storage costs

Use Cases:

- **Secure Things:** IoTAS provides complete encryption and compression of data with endpoint authentication and no key vault.
- **Secure Central Command:** Maintain control of remote edge devices from central operations as IoTAS encrypts data in motion with endpoint authentication and low latency connections.
- **Secure IoT Big Data:** IoTAS secures data on and between devices and in the Cloud without disrupting the user experience including encrypted search of Big Data.

Recent News

January 2017: CENTRI is named as IoT Enterprise Security Platform of the Year in the Industrial and Enterprise IoT category at the IoT Breakthrough Awards.

June 2016: CENTRI selected as a 2016 Red Herring Top 100 North America Winner.

August 2014: CENTRI raises $6.3 M in venture financing.

Management

Name	Title
Vaughan Emery	CEO & Founder
Michael Mackey	CTO & VP of Engineering
Grant Asplund	VP, Sales & Business Development
Luis Paris	Chief Scientist

Total Funding

$18.5 M

Investors

Alliance of Angels

LaunchCapital

Matthew Pritzker Company

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Claroty
130 East 59th Street 14th floor
New York, NY 10022

www.claroty.com

Phone: (212) 937-9095

Employees: 46

Founded: 2014

Company Overview

Claroty operates an OT security software platform that enables engineers, operators, and cyber security professionals to protect and optimize OT networks. The Claroty platform provides visibility into ICS, SCADA and other control system devices, protocols and networks using passive monitoring techniques to safely examine and analyze OT networks. The system provides real-time monitoring and anomaly detection; employing high-fidelity models and algorithms to alert customers to both cybersecurity and process integrity issues.

Product/Service

- **See:** Claroty is able to safely see the widest array of OT systems and dive deeper into the communications protocols than any other vendor in the market.
- **Know:** Advanced models and algorithms provide security and engineering teams with deeper insights, superior anomaly detection, and more detailed and actionable alerts.
- **Secure:** Claroty enables customers to proactively identify and fix configuration issues that can leave your network vulnerable to attack and to highlight other operational issues.

Recent News

March 2017: Claroty moved headquarters from Tel Aviv, Israel to New York, NY.

February 2017: Ex-FireEye CEO Dave DeWalt joined Claroty as Chairman of the Board.

February 2017: Claroty and Rockwell Automation will work together to combine their security products and services into future, packaged security offerings.

January 2017: Claroty selected as finalist for RSA Conference Innovation Sandbox 2017.

Management

Name	Title
Amir Zilberstein	CEO & Co-Founder
Benny Porat	CTO & Co-Founder
Galina Antova	CBDO & Co-Founder

Total Funding

$32.0 M

Investors

Bessemer Venture Partners

ICV Capital Partners

Innovation Endeavors

Mitsui & Co

Red Dot Capital Partners

Team8

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

CLEARPATH ROBOTICS™

Contact Details

Clearpath Robotics
1425 Strasburg Road, Suite 2A
Kitchener, Ontario N2R1H2, Canada

www.clearpathrobotics.com

Phone: (800) 301-3863

Employees: 176

Founded: 2009

Company Overview

Clearpath Robotics designs and manufactures unmanned vehicles for industrial applications. The Company offers robotic utility vehicles, unmanned ground vehicles, heavy load material transporters, omnidirectional platforms, and learning platforms for mining, military, and agricultural research; hummingbird and pelican UAVs for dynamic aerial control or multi-robot research; unmanned surface vessels; and accessories, such as sensors, manipulators and actuators, controllers, computers and networking products, infrastructure products, and other accessories.

Product/Service

- **Competencies:** Clearpath Robotics supports customers' efforts in design, perception, navigation, and simulation as clients look to develop complex autonomous systems
- **Research Services:** Clearpath provides world-class, robotic product development at your beck and call
- **Industrial Services:** Clearpath launched an industrial division called OTTO Motors that provides self-driving vehicles for material handling in industrial environments

Recent News

January 2017: Clearpath Robotics won 2017 IEEE Robotics and Automation Award for Product Innovation from the IEEE Robotics and Automation Society (RAS).

October 2016: Featured in Forbes Magazine: "Clearpath Robotics develops self-driving robots to handle some of the more dangerous jobs in the industrial workplace."

October 2016: Clearpath Robotics raised $30M in a Series B financing to expand indoor self-driving vehicle market.

Management

Name	Title
Matt Rendall	CEO
Bryan Webb	CFO/COO
Ryan Gariepy	CTO

Total Funding

$41.4 M

Investors

Caterpillar Ventures

Eclipse

GE Ventures

Customers

Carnegie Mellon

Microsoft

NASA

QinetiQ

Sources: Capital-IQ, Company website, Crunchbase

CloudPlugs
Connecting Things

Contact Details

CloudPlugs
1818 Library Street, Suite 500
Reston, Virginia 20190

www.cloudplugs.com

Phone: (571) 346-7655

Employees: <20

Founded: 2014

Company Overview

CloudPlugs engineers and markets the most advanced end-to-end connectivity and lifecycle automation platform for the Internet of Things using Fog Computing. It enables manufacturers, utilities, transportation companies, telecom operators and cities to implement end-to-end digital supply chains that connect and automate the lifecycle of devices and applications to gain substantial operational efficiencies, to deliver better and new customer experiences and to create new revenue streams.

CloudPlugs was founded in January 2014 by team of professionals with strong backgrounds in Internet of Things (IoT), mobile device management, security, cloud storage services, enterprise sales and global management.

Product/Service

- **CloudPlugs IoT platform and applications:** State-of-the-art, event-driven, scalable, secure, fog computing based service platform to connect and automate the full lifecycle of IoT devices, applications and data. It includes powerful rules, data processing and geo-location engines and a battery of connectors to easily integrate with analytics, business and operations support systems and applications
- **SmartPlug™:** Secure, robust, lightweight, powerful edge software agent for data collection, control and edge processing and analytics
- **IIoT Edge Gateways:** Secure, modular, SmartPlug™ based, software gateways to connect and manage commercial and industrial devices and applications
- **CloudPlugs Control Designer™:** Visual tool for ultra-fast development of web/mobile, multi-screen, control applications

Recent News

March 2017: CloudPlugs announced integration with Azure Analytics and Azure Machine Learning services.

February 2017: CloudPlugs announced the open Beta program for the SmartPlug™ edge agent for Windows.

July 2015: CloudPlugs announced the general availability of its Industrial Internet of Things (IIoT) product line designed to integrate legacy devices, SCADA and Building Management Systems.

February 2015: Cannon-Automata selected the CloudPlugs SmartPlug™ IoT agent technology to power its new generation F3 System.

September 2014: Unidata SpA selected CloudPlugs SmartPlug™ to power its TarquinIoT CPE.

Management

Name	Title
Jimmy Garcia-Meza	CEO & Co-Founder
Antonio Muratore	CTO & Co-Founder
Pasquale Giampa	VP, Product Strategy & Co-Founder

Total Funding

NA

Investors

Self-funded

Customers

Canon Automata
Endesa
Enel
eFM
KETI
Unidata SpA,
USG Corp

Sources: Capital-IQ, Company website, Crunchbase

Cumulocity (acquired by Software AG, March 2017)

Contact Details

Cumulocity
Speditionstrasse 13
Dusseldorf, Germany 40221

www.cumulocity.com

Phone: +49 211 74951433

Employees: 50+

Founded: 2010

Company Overview

Cumulocity is the leading Internet of Things (IoT) device management and application enablement platform. Cumulocity is used by brands, including Deutsche Telekom, Software AG and Gardner Denver, to power IoT solutions in manufacturing, fleet management, consumer electronics and many more.

Cumulocity's platform incorporates real-time analytics and visualization, and can be easily tailored via publicly documented APIs and our open UI framework. Cumulocity is available in the cloud, on premise or as a hybrid.

Carrier grade security, scalability and reliability provide the assurance needed to manage millions of devices. The Company's active partner eco-system, 3,000 strong developer community and GTM support ensure their customer's success.

Product/Service

- **Cumulocity IoT Platform features:**
  - Device Connectivity
  - Device Management
  - Real-Time Analytics
  - Visualization and Plug-Ins
  - Applications and Hosting
  - Integration
- **Cumulocity IoT Platform capabilities:**
  - Flexible Deployment
  - End-to-End Security
  - True Multi-tenancy
  - Scalability & High Availability
  - Cloud Fieldbus
  - Cloud Remote Access

Recent News

March 2017: *Cumulocity acquired by Software AG. Valuation metrics undisclosed*

February 2017: Reliance Group's Unlimit and Cumulocity enter strategic partnership to deliver IoT solutions and services in India.

February 2017: Cumulocity announced Release 8.0 which simplifies deployment and operation of mass customized IoT platforms.

January 2017: Quark IOE and Cumulocity enter strategic partnership to deliver IoT solutions and services in China.

January 2017: Teleena and Cumulocity enter strategic partnership to accelerate IoT adoption through zero-touch IoT solutions.

Management

Name	Title
Bernd Gross	CEO & Co-Founder
Jos Grond	VP of Business Development
Stefan Vaillant	CTO & Co-Founder

Total Funding

NA

Investors

High-Tech Gruenderfonds

VersoVentures

Customers

Deutsche Telekom

Gardner Denver

Sensor Technik Wiedemann (STW)

Software AG

Sources: Capital-IQ, Company website, Crunchbase

CYANCONNODE

Contact Details

CyanConnode Holdings
Merlin Place, Milton Road
CV4 0DP, Cambridge
UK

http://www.cyanconnode.com

Phone:(+44) 1223 225060

Employees: 60

Founded: 2002

Company Overview

CyanConnode engages in the design and development of narrowband RF mesh networks that enable Omni Internet of Things (IoT) communications. The Group provides customers with long-range, low-power, end-to-end networking solutions and high-performance applications that help them enhance service delivery, improve business efficiency and save energy. Its Narrowband RF mesh technology supports multi-application networks, enabling communication with any device, including gas, water, and electricity meters as well as street lighting and traffic lights.

Product/Service

Provides the following applications using their RF Narrowband Mesh, Ultimesh, Panmesh and Omnimesh solutions:

- Highly secure IP-based Platform to create city wide networks for reliable and seamless IoT connectivity
- Low cost smart gas, electricity, and water metering targeting developing countries
- Street light automation

Recent News

March 2017: CyanConnode has raised £3.2m by issuing new shares at 0.17p each. Money used in order to achieve large scale commercialisation and take on more people.

February 2017: Signs MoU with Tech Mahindra.

February 2017: $5.4M purchase order for smart metering in Bangladesh.

February 2017: 100,000 software license order from HM Power.

Management

Name	Title
John Cronin	Executive Chairman
Simon Peter Smith	CFO & Executive Director
Henry James Berry	Non-Executive Director

Total Funding

$38.5 M

Prior & Current Investors include:

Hargreaves Lansdown

Herald Investment Management

Legal & General Investment Management

New Century

Customers

HM Power

Landis+Gyr

Larsen & Toubro

Tata Power

UK Smart Meter Project

Sources: Capital-IQ, Company website, Crunchbase

CyberX

Contact Details

Cyber X
550 Cochituate Road, Suite 25
Framingham, MA 01701

www.cyberx-labs.com

Phone: (657) 229-2370

Employees: 40

Founded: 2013

Company Overview

Founded in 2013 by IDF cyber experts, CyberX provides the most widely-deployed platform for continuously securing IIoT and ICS networks. The CyberX platform combines continuous, non-invasive risk monitoring and patent-pending behavioral analytics with proprietary ICS-specific threat intelligence, enabling organizations to immediately detect and mitigate risk to their critical industrial infrastructures, including targeted threats and industrial malware.

Nation-states, cybercriminals, hacktivists, and malicious insiders pose financial, reputational and regulatory risk to industries such as electric utilities, manufacturing, pharmaceuticals, chemicals, oil & gas, energy and nuclear. The business impact can include costly production outages, catastrophic safety failures, and environmental release of hazardous materials, as well as theft of corporate IP such as sensitive information about proprietary manufacturing processes and product designs.

Recognized by Gartner as a "Cool Vendor," CyberX is also the only industrial cybersecurity vendor selected for the SINET16 Innovator Award sponsored by the US DHS and DoD, and the only ICS security vendor recognized by the International Society of Automation (ISA).

Product/Service

- **XSense Platform:** Continuous monitoring of industrial networks with real-time alerting to detect cyber and operational incidents. Supports any ICS vendor and industrial protocol; integrates with any SIEM
- **ICS Security Assessment:** Automated, non-invasive assessment with risk scoring for critical vulnerabilities such as unauthorized remote access, unpatched devices, and industrial malware such as Black Energy

Recent News

March 2017: Deutsche Telekom and T-Systems select CyberX as strategic partner to secure their customers' critical industrial infrastructures.

February 2017: CyberX discovers large-scale Cyber-Reconnaissance Operation targeting Ukrainian organizations.

November 2016: CyberX won SINET 16 Innovator Award for Cybersecurity.

October 2016: CyberX Threat Intelligence uncovers Critical Vulnerability in Industrial Control Systems (ICS) Firewall.

August 2016: CyberX raised $9 million to focus on securing the Industrial Internet.

Management

Name	Title
Omer Schneider	CEO & Co-Founder
Nir Giller	CTO & Co-Founder
Jim Blaschke	VP, Sales and Business Development

Total Funding

$11.0 M

Investors

ff Venture Capital

Flint Capital

GlenRock Israel

Glilot Capital Partners

Technology Partners

CheckPoint

Microsoft Azure

SkyBox

Sources: Capital-IQ, Company website, Crunchbase

electric imp

Contact Details

Electric Imp
5150 El Camino Real Suite C31
Los Altos, CA 94022

www.electricimp.com

Phone: 650-383-7143

Employees: 60

Founded: 2011

Company Overview

Electric Imp offers an industrial-strength Internet of Things (IoT) platform that securely connects devices with advanced cloud computing resources. The firm's unique solution — featuring fully integrated hardware, OS, security, APIs and cloud services — dramatically decreases cost and time to market while increasing security, scalability and flexibility. The Electric Imp platform enables innovative commercial and industrial applications and empowers manufacturers to manage and quickly scale their connected products and services to millions of users.

Product/Service

- **Electric Imp Platform:** End-to-end secure IoT connectivity and advanced middleware solution can connect almost any sensor, device or cloud service/application. Components include:
    - imp certified & designed hardware
    - impOS
    - impCloud
    - BlinkUp
    - impSecure
    - impFactory
    - impCentral (coming Spring 2016)
    - IoT QuickStart Family

Recent News

January 2017: Electric Imp debuted IoT QuickStart Family accelerate IoT adoption by cutting up to 12 weeks from PoC development and up to 6 months from test & trials.

November 2016: Pitney Bowes wins 2016 Business Transformation Solution Award for SmartLink based on Electric Imp platform.

October 2016: Electric Imp: EPRI, Eaton Commence Field Test, with 20 utilities representing more than 50M households, of Energy Management Circuit Breaker to create a more intelligent, responsive Grid and Smarter Homes.

September 2016: Arrow Electronics to Market Full Electric Imp IoT Platform in Europe.

Management

Name	Title
Hugo Fiennes	CEO & Co-Founder
Oliver Hutaff	CFO
Peter Hartley	Software Architect & Co-Founder

Total Funding

$44.0 M

Investors

Foxconn Technology Group

Lowercase Capital

PTI Ventures

Rampart Capital

Customers

Anheuser Busch	Cybex
Eaton	GE
Liberty Pumps	Pitney Bowes

Sources: Capital-IQ, Company website, Crunchbase

enlighted

Contact Details

Enlighted
930 Benecia Avenue
Sunnyvale, CA 94085

www.enlightedinc.com

Phone: (650) 964-1094

Employees: 172

Founded: 2009

Company Overview

Enlighted is an IoT platform and sensory system for commercial real estate.

By bringing commercial real estate into the Internet of Things (IoT), Enlighted redefines smart buildings. Enlighted makes buildings brilliant.

Enlighted offers tailored solutions for virtually every industry and commercial space type including office, retail, warehouse, education, healthcare, and industrial.

Enlighted can finance large deployments through their GEO financing program that enables companies to pay for the deployment of the company's IoT platform through the energy savings that Enlighted generates for them.

Product/Service

- **IoT Platform:** This platform includes fifth generation smart sensors, advanced networking and both on - premise and cloud based applications
- **Applications**
    - Energy Optimization for lighting and HVAC
    - Real estate optimization. Applications that help you analyze the usage of your real estate assets with detailed and comprehensive data
    - RTLS:BLE based Real Time Location Services for applications like asset tracking in hospitals and wayfinding inside buildings

Recent News

September 2016: Enlighted features in Gartner's "Market Guide for Smart Lighting".

July 2016: Enlighted ranks in CIOReview's "100 most promising big data solution providers".

July 2016: Enlighted named a "Cool Vendor" by Gartner.

Management

Name	Title
Joe Costello	CEO & Chairman
Tanuj Mohan	CTO & Co-Founder
Mike Martini	CFO

Total Funding

$80.4 M

Investors

Draper Fisher Jurvetson (DFJ)

Intel Capital

RockPort Capital

Tao Capital Partners

Customers

AT&T

Agilent Technologies

Interface

JDSU

Sources: Capital-IQ, Company website, Crunchbase

EnOcean
Self-powered IoT

Contact Details

EnOcean
Kolpingring 18a
D-82041 Oberhaching

www.enocean.com

Phone: +49.89.67 34 689 - 0

Employees: 44

Founded: 2001

Company Overview

EnOcean produces and markets self-powered wireless sensor solutions for batteryless applications in the Internet of Things, which are used for building and industrial automation, smart homes and LED light control. The EnOcean products are based on miniaturized energy converters, ultra-low power electronics and robust radio technology in open standards such as EnOcean, ZigBee and Bluetooth Low Energy. Leading product manufacturers have been relying on EnOcean wireless modules for their system solutions for the past 15 years and have installed the products in several hundreds of thousands of buildings around the world.

Product/Service

- **Energy Converter:** Energy converters (kinetic, solar, thermal) collect and save the tiniest amounts of energy from the environment
- **Energy Harvesting Wireless Switches**: Energy harvesting switches use kinetic energy for switching applications in buildings and the Internet of Things
- **Energy Harvesting Wireless Sensors:** Solar-powered energy harvesting sensors monitor and sense the environment to transmit this data to a wireless node
- **Controllers:** Wireless transceiver modules and products receive sensor data as well as transmit values to other devices
- **Tools:** Software starter kits help OEMs to implement energy harvesting wireless modules and products
- **Solutions:** Self-powered sensors and Gateways to build IoT End to End solutions

Recent News

January 2017: Andreas Schneider became the new CEO of EnOcean.

November 2016: IBM joined EnOcean Alliance as promoter.

October 2016: EnOcean launched batteryless switch Module PTM 215B based on Bluetooth Low Energy.

September 2016: EnOcean launched Dolphin brand for its energy harvesting wireless modules.

Management

Name	Title
Andreas Schneider	CEO & Co-Founder
Frank Schmidt	CTO & Co-Founder
Graham Martin	VP, Strategic Alliance

Total Funding

€35.5 M

Investors

ATMOS

Emerald Technology Ventures

Kathrein Group

SET Venture Partners

Siemens Technology Accelerator

Siemens Venture Capital

Sobera Capital

Wellington Partners

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

FOGHORN

Contact Details

FogHorn Systems
800 West El Camino Real, Suite 100
Mountain View, CA. 94040

www.foghorn-systems.com

Employee: 35

Founded: 2014

Company Overview

FogHorn has created a ground-breaking edge computing software platform (i.e. fog computing) for real time streaming analytics and machine learning targeted at industrial IoT (IIoT) use cases in the manufacturing, energy, transportation, Smart Building and Smart Cities sectors.

Initial industrial OEM partners adopting FogHorn's edge analytics/ML technology include GE, Bosch and Yokogawa with several more in the offing. Leading global IIoT developers and systems integrators have also embraced FogHorn's unique technology including Accenture, PWC, Tech Mahindra, TCS, Genpact, Cognizant and Wipro among others. FogHorn's partner ecosystem also encompasses leading IoT gateway manufacturers such as Dell, HPE, Intel, Samsung and Huawei as well as IoT cloud infrastructure providers like AWS, Microsoft, SAP, Cloud Foundry and others.

Product/Service

- **FogHorn Technology Platform:** FogHorn provides an efficient and highly scalable edge analytics platform that enables real-time, on-site stream processing of sensor data from industrial machines
- **Lightning™ Micro Edition:** Embeddable software with a very small memory footprint (less than 256 MB) required for data processing and real-time analytics at the edge
- **Lightning™ Standard Edition:** Includes all of the features of Lightning Micro edition with additional support for advanced analytics, and edge applications
- **FogHorn Edge:** Responsible for ingesting the data from sensors and industrial devices onto a high-speed data bus and then executing user-defined analytics expressions on the streaming data
- **EdgeML**: Apply Machine Learning on the edge on the live streaming data by executing industry standard algorithms or importing existing ML models

Recent News

February 2017: Yokogawa and FogHorn sign industrial IoT partnership agreement.

January 2017: Appcessories lists FogHorn as one of 10 IoT Companies to Watch in 2017 (above AWS, Microsoft, Google, Tesla and IBM).

December 2016: CRN named FogHorn one of 10 coolest technology startups of 2016. HPE Matter designates FogHorn the #1 hottest IoT startup for 2017.

July 2016: FogHorn Systems secured $12 million in Series A funding.

Management

Name	Title
David C. King	CEO
Sastry Malladi	CTO
Yuta Endo	VP, APAC

Total Funding

$17.5 M

Investors

Darling Ventures

Dell Technologies Capital

EMC Ventures

GE Ventures

March Capital Partners

Robert Bosch Venture Capital

Yokogawa Electric Corporation

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

FREEWAVE

Contact Details

FreeWave Technologies
5395 Pearl Parkway
Boulder, CO 80301

www.freewave.com

Phone: (303) 381-9200

Employees: 116

Founded: 1993

Company Overview

Freewave Technologies, a leader with over 20 years of RF innovation and over 1,000,000 installed radios, has leveraged this extensive experience to become a leader in IoT and fog computing. Freewave's strategy is to combine industry leading wireless capabilities with user programmability in a unified platform. Programming models will include the industry's widest range of options from traditional SCADA PLC Ladder Logic to Node-Red, Node-JS, Python, and Java. Agnostic to industry standards, Freewave's platforms will support everything from traditional MODBus to IoT world MQTT. Extensive, easy to use APIs allow new IoT and SCADA systems to be deployed in minutes versus days, weeks or months. The capital and operational expense associated with deploying separate products including PLCs, IoT gateways, and wireless transport are combined into a single easy to use platform which can be programmed at the edge simply and efficiently. Combine this with best in class outdoor ruggedized radios that have seen action in some of the harshest and most dangerous places in the world and you have Freewave, a company that moves customers seamlessly from the SCADA world to the IoT world for mission critical applications. ZumLink IPR, their latest offering, is a high throughput IIOP Programmable Radio (IPR) Platform that makes Fog Computing, M2M and Intelligent IIOT a reality.

Product/Service

- **ZumLink IPR:** Delivers high throughput in a rugged, spread spectrum frequency hopping platform. In addition to a high-powered application server that can host 3rd party applications this radio incorporates network throughput optimization algorithms such as Compression, Forward Error Correction, Packet Aggregation and patent pending Adaptive Spectrum Learning
- **WavePro:** A cost effective, rugged, high-speed, dual band Wi-Fi communication platform designed for outdoor industrial locations. 802.11 a/b/g/n/ac and self-healing mesh support allows the platform to deliver Point to Point or Point to Multipoint deployments in industrial and outdoor settings
- **WaveContact:** Short and long range, Class 1 Div. 1 and Class 1 Div. 2 I/O technology designed to transmit sensor data from dangerous industrial locations
- **FreeWave Classic:** The Company continues to deliver FGR, MM2 and GX series radios to thousands of customers worldwide

Recent News

January 2017: FreeWave Technologies Partnered Systech to introduce "If This Then That" applications services on their new ZumLink radio platform.

November 2016: FreeWave announced the release of ZumLink, the next generation of SSFH high speed RF technology with programmability.

June 2016: FreeWave Technologies rolled out WavePro installation with Saudi Electricity Company.

January 2016: FreeWave Technologies Launches Sensor-2-Server (S2S) Strategy with Release of WavePro WP201 Short Haul Communications Solution. WP201 provides customers with a comprehensive IoT communication system to enable data transport for a variety of business applications including Voice, Video, Data and Sensor (VVDS™) communications.

Management

Name	Titles
Kim Niederman	CEO
Karl Kunz	CFO & COO
Patrick Lazar	VP, Engineering
Scott Allen	CMO
Kirk Byles	VP, Worldwide Sales

Total Funding

$113.0 M

Investors

TA Associates

Customers

4,300+ customers
Mexico City Smart Grid Overlay
Top 3 Irrigation Companies
Top 30 O&G producers in NA

Sources: Capital-IQ, Company website, Crunchbase

GREENWAVE SYSTEMS

Contact Details

Greenwave Systems
200 Spectrum Center Drive, 15th Floor
Irvine, CA 92618

www.greenwavesystems.com

Phone: (949) 502-7436

Employees: 274

Founded: 2008

Company Overview

Greenwave Systems offers comprehensive solutions for managed services across residential, commercial and industrial IoT. The company's AXON Platform is a proven, market-leading IoT and managed services platform that provides seamless connectivity and interoperability. Its modular and scalable architecture enables unlimited business models, creates new revenue streams and increases ARPU, all while optimizing costs. The AXON platform and its core capabilities in IoT, Mobile, Networking, Video, enhanced by UX and Analytics solutions, allows service providers to quickly and profitably deploy managed services for any application by combining any number of above-mentioned solutions into a discrete offering.

Product/Service

AXON is a horizontal, modular, scalable, live messaging platform that enables multiple-go-to market strategies.

- **AXON IoT** – A cloud management system for implementing management, control, automation and interoperability of devices in a common network
- **AXON Networking** – A cloud management and embedded solution for the discovery, configuration, monitoring and management of in-home networks
- **AXON Mobile** – Connects devices that are on a cellular network
- **AXON Media** – An embedded software solution designed to support rapid and robust deployment of feature rich, multimedia technologies in IPTV, OTT and Adaptive Streaming over LTE, Mobile and Wi-Fi networks along with last mile and end-to-end QoS
- **AXON Predict** – While many analytics companies are cloud-based, AXON Predict differentiates itself by additionally sitting on the end device

Recent News

March 2017: Greenwave Systems announced AXON Predict, a real-time, visual, edge analytics engine for Industrial IoT.

January 2017: Greenwave Systems introduced AXON platform for conversational IoT, the first voice activated smart gateway solution for service providers.

September 2016: Greenwave Systems acquired Predixion Software.

January 2016: Greenwave Systems completed Series C financing round.

Management

Name	Title
Martin Manniche	CEO & Founder
Peter Christensen	CFO, GM EMEA & Co-Founder
Leon Hounshell	CTO
Christos Lagomichos	COO

Total Funding

$92.0 M

Investors

BDCA Venture

Craton Equity Partners

EDB Investments

Singapore EDB

ST Telemedia

The Westly Group

Customers

Verizon, Frontier, Century Link, E. ON, Wind River, SP Ausnet, Dong, Nuon, TCP, California State Lottery, Freewire Technologies, V-Tech, NXP, Marvell

Sources: Capital-IQ, Company website, Crunchbase

Indegy

Contact Details

Indegy
154 Grand street
New York, NY 10013

www.indegy.com

Phone: (866) 801-5394

Employees: 32

Founded: 2014

Company Overview

Indegy provides situational awareness and real-time security for industrial control networks to ensure operational continuity and reliability. The company's mission is to prevent operational disruptions caused by cyber threats, malicious insiders and human error, by providing visibility and control to industrial networks. The Indegy team combines a unique mix of cyber-security expertise with hands-on industrial control knowledge. The leadership team and the core of our R&D team consist of veterans of the IDF elite cyber security units.

Product/Service

Indegy Industrial Cyber Security Platform: The Indegy platform delivers comprehensive visibility and real-time security for ICS/SCADA networks. It enables operational engineers and security personnel to secure and control ICS networks by mapping all the controllers on the network (e.g. PLCs, RTUs, DCS controllers) and continuously assess risk to these devices. Industrial controllers are ultimately the most critical devices in ICS/SCADA networks, in charge of the process automation, safety and control, yet they lack protections. Continuously monitoring access and changes to these devices enables Indegy to detect malicious or unauthorized access, which can put these networks at risk and lead to operational disruptions.

Recent News

February 2017: Indegy Named Best Next Gen ICS/SCADA Security Solution for Second Consecutive Year by Cyber Defense Magazine.

July 2016: Indegy Lands $12M in Series A Financing to Protect Critical Infrastructures from Cyber Threats.

February 2016: Indegy Launched Cyber Security Platform.

Management

Name	Title
Barak Perelman	CEO & Co-Founder
Mille Gandelsman	CTO & Co-Founder
Ido Trivizki	VP, R&D & Co-Founder
Dana Tamir	VP, Marketing

Total Funding

$18.0 M

Investors

Aspect Venture Partners

Gen. (Ret.) David H. Petraeus

Magma Venture Partners

SBI Holdings

Shlomo Kramer

Vertex Venture Capital

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

inductive automation

Contact Details

Inductive Automation
340 Palladio Parkway, Suite 540
Folsom, CA 95630

www.inductiveautomation.com

Phone: (916) 456-1045

Employees: 76

Founded: 2003

Company Overview

Inductive Automation offers the Ignition Platform, an industrial application platform with fully integrated tools for building solutions in human-machine interface (HMI), supervisory control and data acquisition (SCADA), and the Industrial Internet of Things (IIoT). The web-based, cross-platform software provides real-time data acquisition, data visualization, and supervisory control.

Product/Service

- **The Universal Industrial Application Platform:** Ignition is the only IIoT platform with full-featured SCADA functionalities built right in. Ignition offers cross-platform compatibility and flexible modular configurability, making it possible to connect IIoT data across the entire enterprise, launch clients to any device equipped with a web browser, rapidly develop automated systems, and scale up without limits
- **Cross-platform compatibility:** Ignition works with any major operating system
- **Modular configurability:** Can customize to any process or industry with SCADA, MES & IIoT modules

Recent News

February 2017: Introduced Ignition Edge, a new solution for the edge of the network. Ignition Edge empowered enterprises to build complete IIoT infrastructures — from the network's edge to the Cloud to local sites — all on one platform, for “end-to-end IIoT.”

August 2016: Ignition User SugarCreek Won Food Engineering Plant of the Year using Ignition for SCADA.

April 2016: Gartner named Inductive Automation a Cool Vendor for 2016.

Management

Name	Title
Steven Hechtman	CEO
Don Pearson	Chief Strategy Officer
Carl Gould	Co-Director of Software Engineering

Total Funding

NA

Investors

NA

Customers

Amazon

Coca Cola

Morgan Stanley

Whirlpool

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Ingenu
10301 Meanley Drive
San Diego, CA 92131

www.ingenu.com

Phone: (858) 201-6000

Employees: 140

Founded: 200

Company Overview

Ingenu was founded by a group of engineers from the telecommunications industry that saw the need for machine-dedicated wireless connectivity. Initially focusing on private multi-application networks in the smart city, smart grid, oil & gas and industrial markets, the Company rebranded itself under the Ingenu name in 2015 and refined its strategic direction to serve the wider market focused on bringing public, multiuser Internet of Things (IoT) connectivity to customers across the globe. Ingenu is currently building the first wireless Machine Network™, the world's largest IoT network dedicated to LPWA connectivity for machines only. The company's RPMA® (Random Phase Multiple Access) technology is a proven standard for connecting IoT devices around the world.

Product/Service

- **RPMA®:** Utilizing globally available 2.4GHz spectrum, Ingenu's RPMA technology is purpose-built for IoT/M2M connectivity, offering unparalleled range, coverage and capacity with extremely low power requirements and longer-lasting battery life. With 34 unique patents granted and over 20 production networks deployed worldwide, RPMA is rapidly becoming a global standard for IoT communication.
- **Machine Network™:** Ingenu's Machine Network is the first nationwide wireless public network dedicated entirely to IoT/M2M connectivity. The U.S. Machine Network build-out is currently in progress, covering over 30 markets. Outside the US, the company is driving a global licensing initiative to deploy RPMA network connectivity throughout the globe.

Recent News

March 2017: Ingenu's Machine Network™ expands coverage from the Southeast to Southwest regions of the U.S.

February 2017: Ingenu Expands Global Network, Providing IoT Connectivity to over 29 Countries, and Growing.

February 2017: Partnership with Microsoft Corp. to use Microsoft's Azure IoT Hub to facilitate deployment of networks based on its technology.

January 2017: Ingenu and Arrow Electronics to Deliver Comprehensive RPMA Solutions to the Global IoT Market.

Management

- John Horn — Chief Executive Officer
- Ted Myers — Chief Technology Officer/Co-Founder
- Robert Boesel — Chief Network Officer/Co-Founder
- Landon Garner — Chief Marketing Officer
- Tom Gregor — Pres. & GM, Machine Network
- Dan Halvorson — EVP and Chief Financial Officer
- Robert Hines — Corporate Counsel & Secretary

Total Funding

$120.7 M

Board of Directors

- Richard Lynch (Chairman; former CTO, Verizon)
- Ivan Seidenberg (former CEO, Verizon)
- Babak Razi (Third Wave Ventures)
- Barak Russel (Third Wave Ventures
- David Dull (former General Counsel, Broadcom)
- John Horn
- Rob Boesel
- Dr. Andrew Viterbi (Advisor; Co-Founder, Qualcomm)

Investors

- EMAAR Properties
- Enbridge (U.S.)
- GE Ventures
- Gemtek Investments
- Third Wave Ventures

Customers, Partners & Licensees

Customers: Nolin RECC, N.V. Elmar, City of Riverside, San Diego Gas & Electric, Shell, U.S. Sugar, WellAware

Ecosystem Partners: Aclara, AgriSource Data, Arrow, Compal, EDMI, Flex, LED Roadway Lighting, Microsoft, Trilliant, u-blox

Global Licensees: Datora Mobile, MEC Telmatik, Meterlinq, Vula Telematix

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

IQP Corporation
941 E. Charleston, Suite #108
Palo Alto, CA, 94303

www.iqp-iot.com

Phone: (650) 600-7085

Employees: 14

Founded: 2011

Company Overview

IQP Corporation's mission is to enable users to easily adopt IoT in their organization, significantly reduce application development time, contribute greater ROI to IoT/IIoT processes, and turn IoT into a profitable new revenue stream.

The IQP development platform makes it simple for brands, manufacturers, telecom operators, system integrators, public service providers and other organizations to develop a sustainable business model for the IoT and Business Application Markets. Users can quickly develop applications without any knowledge in programming code.

Product/Service

IQP is a development environment for creating code-free cross-platform IoT/IIoT and Enterprise applications. IQP provides a complete solution for working with connectivity with sensors and control devices to code-free application development. It is designed to enable rapid, code-free application creation by anyone – from end-users to sophisticated programmers.

IQP offers various business models: Revenue share, License, IQP Cloud, On premise, Private Cloud.

The IQP App Builder makes easy to IoT or Enterprise apps using a web-based user-friendly interface. Users choose from ready-to-use, customizable design templates and build an app using simple drag & drop operation.

- **The IQP data collection module** gathers and analyzes data from a variety of sources (sensors, devices, cameras, streaming video data…) that includes real-time reporting activity from people working in a sensor-enabled environment
- **IQP runs as a** PaaS Server for multi gateway protocol, asset management app, tenant management and more
- **Proprietary Device Protocols including:** ATrack OBD-II – Telematics, Fujitsu M2M Cloud, iDiGi® Device Cloud connectivity, Eurotech Device Cloud connectivity, and Helios Sensor

Recent News

November 2016: IQP Corporation selected for the GE Predix Startup Program.

May 2016: IQP global headquarters opened in Palo Alto, California. IQP-Motorola airport security application presented at Critical Communications World 2016 in Amsterdam.

June 2016: IQP Corporation joined the Microsoft CityNext Smart Cities Consortium.

November 2015: IQP Corporation and IBM agreed to collaborate in Japan and Global Markets - IQP solution paired with IBM Bluemix and Watson IoT.

June 2015: IQP Corporation partnered with Fujitsu.

Management

Name	Title
Guy Kaplinsky	CEO & Co-Founder
Maki Kaplinsky	COO
Paul Bloom	CSO (former CTO – IBM)

Total Funding

NA

Investors

Fujitsu

Softbank

Customers

Fujitsu

Motorola

Ricoh

Toyota

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

iS5 Communications
#1-1815 Merseyside Drive
Mississauga, Ontario, Canada

www.is5com.com

Phone: (844) 520-0588

Employees: 25

Founded: 2012

Company Overview

iS5Com is an innovative industry leader in designing secure communications products, services and solutions for critical infrastructure protection and control applications. The Company's intelligent industrial Ethernet products are designed to meet the stringent demand requirements of utility sub-stations, roadside transportation, rail, and industrial applications. iS5Com's services and products are key enablers of advanced technology implementation such as the Smart Grid, Intelligent Transportation Systems, Intelligent Oil Field, and the Industrial Internet of Things. All products have the ability to transmit data efficiently without the loss of any packets under harsh environments and EMI conditions, and architected for the convergence of IT/OT networks.

Markets served: Utility, intelligent transportation, industrial, defense and surveillance.

Product/Service

- Offers a full suite of industrial Ethernet products and services
    - Hardened Ethernet switches that support HSP/PRP, TSN and SDN
    - Operates in harsh environments of EMI, shock and vibration, impact, dust, humidity, -40C to +85F temperatures without fans
    - Secure hardware platforms – compliant with NERC-CIP
    - Secure boot offers better security than hardware-based TPM
    - 10Gb security/protocol acceleration
    - Able to encrypt across layer2 network (EAP-IKEv2)
    - Hardware crypto engines and data encryption
    - Configured via cloud services, SDN and apps
    - Architected for future convergence of IT and OT networks

Recent News

January 2017: Exhibited at DistribuTECH Conference in San Diego.

January 2016: iS5 Communications Inc. Raises Financing for Security-focused Research and Development Activities.

2016: White paper: What are Smart Cities and a Smart Transportation System without a Cyber Secured Smart Grid Fortified Network?

Management

Name	Title
Clive Dias	CEO & President
John MacCharles	VP Business Development & Founder
Yuri Luskind	CTO

Total Funding

NA

Investors

Canadian National Research Council

Export Development Canada

Federal Economic Development Agency of Canada

Trellis Capital

Customers

ABB

Berkshire Hathaway Energy

Burns McDonnel

China Construction Bank

Govt of Canada

Honeywell

Hydro One

Larsen & Toubro

Nuclear Power Corp of India

Siemens

Saudi Aramco

Sources: Capital-IQ, Company website, Crunchbase

libelium

Contact Details

Libelium Comunicaciones Distribuidas
Calle Escatrón, 16,
50014 Zaragoza, Spain

www.libelium.com

Phone: +34 976 54 74 92

Employees: 70

Founded: 2006

Company Overview

Libelium designs and manufactures wireless sensor network devices so that system integrators, engineering, and consultancy companies can deliver reliable Internet of Things (IoT), M2M and Smart Cities solutions with minimum time to market. Waspmote—Libelium's open wireless sensor platform—is modular and ready to integrate with key Cloud systems such as Esri, IBM, Indra, Microsoft, Telefónica orThingWorx and low-energy IoT protocols (LoRaWAN, MQTT or Sigfox).

Over 10,000 developers from 120 countries in companies ranging from startups to universities to large international corporations have adopted Libelium's hardware and software technology for projects in North America, Australia, Asia and Europe. Commercial deployments based on Waspmote include applications as varied as parking, traffic congestion, environmental monitoring, and precision agriculture.

Product/Service

- **Waspmote OEM:** IoT sensor platform ultra-low powered with more than 120 sensors integrated. It allows communication through 16 radio technologies (long, medium and short range)
- **Waspmote Plug & Sense:** Encapsulated version of Waspmote with robust waterproof IP65 enclosure powered by a solar panel with 10 different models
- **Meshlium:** IoT gateway to connect any sensor to any Cloud platform. Meshlium is fully integrated with 36 Cloud software platforms and is worldwide certified. The device also detects Smartphones
- **MySignals:** eHealth IoT development platform with 15 different sensors that measure the most important body parameters
- **Cooking Hacks:** Online store for makers, developers and education community to buy IoT Starter Kits with Waspmote, Arduino and Raspberry Pi
- **The IoT Marketplace:** It is a one-stop click-and-buy online store that offers fully integrated solutions from hardware sensors to cloud applications to speed up IoT adoption

Recent News

February 2017: Libelium presents IoT solutions for environment care in green cities, flood prevention, security and golf courses.

February 2017: Libelium added Industrial Protocols to its IoT Sensor Platform (RS-232, RS-485, Modbus, CAN Bus, 4-20mA).

November 2016: Libelium celebrated its 10th Anniversary with Worldwide Partners.

November 2016: New Sound Level Sensor to control Noise Pollution.

November 2016: Libelium releases new IoT Smart Cities Platform enhancing accuracy in noise level and air quality pollution sensors.

November 2016: Libelium IoT Platform Powers Smart Cities in US adding LoRaWAN and Sigfox.

October 2016: Libelium releases new IoT Sensor Platform worldwide certified.

October 2016: Libelium releases MySignals, the new IoT Platform to Develop eHealth and Medical Products.

July 2016: White Paper: *Smart Agriculture Revolution.*

Management

Name	Title
Alicia Asin	CEO & Co-Founder
David Gascon	CTO & Co-Founder

Total Funding

NA

Investors

NA

Customers

Arrow
IBM Bluemix
Microsoft Azure
NexMachina
SensorInsight
Sofia2
Thing+
Thingworx

Sources: Capital-IQ, Company website, Crunchbase

LinkLabs

Contact Details

LinkLabs
130 Holiday Court, Suite 110
Annapolis, MD 21401

www.link-labs.com

Phone: (202) 524-1390

Employees: 25

Founded: 2013

Company Overview

Link Labs is the world's leading platform for managing the power and data efficiency of enterprise IoT devices.

Link Labs' innovative low-power, wide-area network technology options enable companies to optimize the trade-offs between battery life, data transfer rate, and cost for their IOT devices.

The company's patented Symphony Link™ technology provides secure, two-way, low data rate, long range connectivity for Internet-connected devices. Link Labs powers a range of IoT applications across industries, including smart cities, agriculture, building controls, automotive, healthcare, government, defense, retail, and utilities.

Product/Service

- **Symphony Link™:** An innovative, patented wireless solution for enterprise and industrial customers who need to optimize battery life and data rates while securely connect their IoT devices to the cloud
- **LTE-M:** The world's first carrier-certified, low-power hardware for Verizon's LTE-network. Link Labs pairs the low-power performance of LTE Cat-M1 devices with the nationwide coverage, scalability, and security of Verizon's LTE cellular network
- **Real-time asset location:** "AirFinder", leverages Bluetooth low energy in conjunction with Symphony Link to provide an easily installed, low-cost, secure Real-time Location System (RTLS)

Recent News

January 2017: Telecom Veteran, Kris Rinne, joined Link Labs, Advisory Board.

January 2017: Link Labs first to certify IoT LTE Category M1 end device on Verizon's 4G LTE Network.

October 2016: M2M Spectrum Networks and Link Labs announced technology partnership.

Management

Name	Title
Bob Proctor	CEO
Brian Ray	Founder & CTO
Reed Fawell	CRO

Total Funding

$9.3 M

Investors

J. Hunt Holdings

Maryland Dept of Commerce

New Dominion Angeles

TCP Capital

Customers

Several Fortune 500 Companies

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Litmus Automation
2107 N 1st Street, Suite 440
San Jose, CA 95131

141 Bathurst St., Suite 201
Toronto, Ontario, Canada M5V 2R2

www.litmusautomation.com

Phones: (416) 904-4572

Employees: 25

Founded: 2013

Company Overview

Litmus Automation is an end-to-end IoT cloud platform for connecting any type of device to enterprise applications securely. The Company provides an extensive PaaS for companies that are in a rush to embrace the disruptive Internet of Things technology and leverage it for real business challenges. The Company simplifies the complexity of developing IoT systems and solutions with a secure and scalable middleware cloud platform called Loop 2.0.

Product/Service

- **The Loop Platform:** reduces the time it takes to build IoT Solutions to weeks or even days and enables users to quickly shift their projects into production. Litmus Automation offers ready to go device connectivity and management for 1000 of types of industrial legacy systems, embedded devices, gateways, IoT devices and sensor based devices, as well as data integration to over 45 enterprise systems
- **LoopEdge:** provides several key functionalities that are necessary for any IIoT deployment. With a proper management UI, LoopEdge is a gateway software that enables the ability for data collection from almost all legacy industrial protocols and systems (PLCs, DCS, etc.) on the factory floor. LoopEdge also provides various applications that can be run locally over the collected data, for example Complex Event processing, local datastore and filtering, edge analytics, before then sending the data securely to Loop Cloud or 3rd party Cloud platforms

Recent News

March 2017: Litmus Automation launched into the Japanese market.

February 2017: Litmus Automation receives 2016 connected transportation award from IoT evolution.

January 2017: Litmus Automation launches worldwide partnership program for its IoT platforms.

October 2016: Litmus Automation raised $1.5M in seed funding.

Management

Name	Title
Sacha Sawaya	CFO & Co-Founder
John Younes	COO & Co-Founder
Vatsal Shah	CEO & Co-Founder

Total Funding

$1.6 M

Investors

Angel Investors

Momenta Partners

Customers

Kyra Solutions

Nissan

Renaut

Key Partners:

Dell

HMS

HPE

Intel

Sources: Capital-IQ, Company website, Crunchbase

MAANA

Contact Details

Maana
524 Hamilton Avenue, Suite 201
Palo Alto, CA 94301

www.maana.io

Phone: (888) 956-2262

Employees: 88

Founded: 2012

Company Overview

Maana has pioneered "digital knowledge technology" for the enterprise. The Maana Knowledge Platform accelerates profitability by turning human expertise and data into digital knowledge for employees to make better decisions faster. Maana's patented Knowledge Graph™ — combined with Maana's algorithms, expedite extracting knowledge from data silos and information sources, to reveal their relationships in the context of optimizing assets and processes. With Maana Fortune 500 customers such as Chevron, GE, Maersk, Shell and Saudi Aramco are optimizing their assets and decision flows 3-10x faster than any other technology.

Product/Service

- Maana's Knowledge Platform is a knowledge-centric technology that encodes human expertise and data from across silos into digital knowledge and provides continuous, actionable recommendations into the operations of assets and workflows
- Maana's platform includes a comprehensive set of technologies, including Maana's patented knowledge graph, a variety of proprietary AI algorithms, semantic search, machine learning, natural language processing, text analytics and predictive analytics

Recent News

March 2017: Maana recognized as Innovation Pioneer for Energy industry by CERAWeek.

May 2016: Maana raised $26M in Series B funding round led by Saudi Aramco Energy Ventures.

May 2015: Maana raised $15M in a Series A funding round led by Chevron, Intel, and Frost Data Capital.

April 2016: Maana named Gartner Cool Vendor in IoT Analytics.

September 2015: Maana named by NetworkWorld as one of 13 big data & analytics companies to watch.

Management

Name	Title
Babur Ozden	CEO & Co-Founder
Donald Thompson	COO & Co-Founder
Allen Jones	CTO

Total Funding

$43.2 M

Investors

Chevron Ventures

GE Ventures

Intel Capital

Shell Technology Ventures

Saudi Aramco Energy Ventures

Customers

Chevron

GE

Maersk

Saudi Aramco

Shell

Sources: Capital-IQ, Company website, Crunchbase

MICROEJ

Contact Details

MicroEJ Inc.
125 Cambridge Park Drive, Suite 301,
Cambridge, MA 02140

www.microej.com

Phone: (857) 209 5114

Company Overview

MicroEJ's software platform disrupts the way to design any electronics device through unrivalled software technology and through impressive ROI for its users and customers (design costs cut by half, COGS optimized). It massively leverages both hardware & cloud innovations to produce more powerful devices fitting various markets requirements from high volumes to highly complex products: robustness, costs effectiveness, security, high-end performance.

Since the introduction of its first standard product in 2014 MicroEJ is experiencing a strong and steady growth in with blue chip customers in wearables, smart home & appliances, generic IoT, industrial, etc.

MicroEJ business model leverages its IP in each device *Powered by MicroEJ*, in a multi-years revenues stream. MicroEJ complements its main revenues stream with its strong R&D center that customizes incrementally MicroEJ standard product for dedicated big corporations' projects.

MicroEJ has built a powerful ecosystem of partners (Semiconductor, IoT, OEM, experts) who all together have successfully archived more than 75 projects, resulting in more than 30.000.000 engaged production of smart devices *Powered by MicroEJ*, and an increasing Y2Y number of projects based on MicroEJ technology, expanding worldwide.

Product/Service

Backed by >8 million software developers and engineers, MicroEJ product line is:

- **Features**: User Interface & experience, Data communication & protocols, Ecosystem & community, Software content management, multi-stakeholders process, agile process support & test tools
- **Core**: Built-in security, Simulation, Virtualization, Application store.
- **Starter kits:** cross-industries ready to go out-of-the-box devices starters kits, community application store
- **MicroEJ Vee:** the only known standard safe and secure virtual execution environment capable of running on any chip: MCU, MPU,SoC & modules.

Recent News

January 2017: Several high volumes smart IoT thermostats launches after less than 6 months of design (Sowee, Atlantic, …). A massive step forward for fast monetization of the embedded and IoT industries.

October 2016: MicroEJ and Micrium announced the integration of MicroEJ Vee and Micrium real-time OS, a move designed to accommodate to software developers.

June 2016: MicroEJ introduced the first white label application store for any electronic devices based ecosystem. MicroEJ application store enables to create shelfs of reusable (software) building blocks, which once "lego-assembled together", make the software of a *Powered by MicroEJ* electronics device.

Management

Name	Title
Fred Rivard, PhD	CEO
Regis Latawiec	COO

Total Funding

$7 Million

Investors

Innovacom VC

Customers

Itron – *Smart Energy*
Hager – *Industrial IoT*
Audi – *Connected Automotive*
EDF – *Smart Energy*
Atlantic – *Smart Home & Appliances*
SEB – *White Goods*
Polar – *Wearables*
Thales – *Security & Defense*
FDE– *Medical*
Deltadore – *Smart Home & Appliances*
Bosch – *Industrial IoT*
ECA – *Industrial*
Hill-Rom – *Healthcare*
Sigma – *Wearables*

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Midokura
Rue du Grand – Chene 2, Case postale 6791
1002 Lausanne, Switzerland

www.midokura.com

Phone: (888) 512-0460

Employees: 58

Founded: 2010

Company Overview

Midokura provides network virtualization overlay software solutions worldwide. It offers Enterprise MidoNet, a software solution that offers end-to-end operational tools, including advanced analytics and dynamic visualization for data-driven network monitoring, end to end operational control, programmable virtual networking, distributed architecture, integrated cloud orchestration, and network management. The Company also provides MidoNet, an open software solution that allows enterprises and service providers to build, run, and manage virtual networks; and allows the users to build isolated networks in software, and overlays the existing network hardware infrastructure.

Product/Service

- **MidoNet:** MidoNet creates a complete set of logical networking objects and services:
    - Logical Switching
    - Logical Routing
    - Logical Firewall
    - Logical Layer 4 Load Balancer
    - VPN as a Service
    - (NAT) and Floating IP addresses
    - Hardware VTEP
    - MidoNet API

Recent News

December 2016: Midokura hired Software Executive (Japan).

June 2016: Midokura partnered with Mirantis to integrate with Mirantis Openstack 8.0 and fuel.

June2016: Network virtualization market leader Midokura announced $20M in Series B financing.

Management

Name	Title
Antonio Espinosa	CEO & President
Pino de Candia	CTO
Tim McNally	CFO

Total Funding

$38.6 M

Investors

Innovation Network

Innovative Ventures

SunBridge Global Ventures

WingArc1st

Customers

Dell

Overstock

S2

Zetta.io

Sources: Capital-IQ, Company website, Crunchbase

mnubo

Contact Details

mnubo
1751 Richardson St. Suite 4110
Montreal, Quebec, Canada H3K 1G6

www.mnubo.com

Phone: (514) 313-1400

Employees: 46

Founded: 2012

Company Overview

mnubo is an Internet of Things (IoT) company, providing Data Analytics solutions for connected Product Manufacturers and Service Providers. mnubo extracts business value from Industrial and Consumer IoT data by delivering out-of-the-box insights, automated reports and advanced IoT data science.

Product/Service

SmartObjects Analytics Solution - mnubo's SmartObjects analytics solution is purpose-built for the IoT, it balances scalability and performance. With highly interactive interfaces and out-of-box advanced analytics, it makes it easy for all types of users to access and explore data, and create custom dashboards and insights without additional IT support and coding.

Professional Services - Work with mnubo's team of specialist to define a winning IoT strategy and onboard world class data scientists to develop and deploy advanced machine learning and data-driven insights to enable computer-aided predictions at the heart of your business process.

- **IoT Business Strategy & Data Discovery Workshop**
  - Exploration & prioritization of high value use cases, KPIs, and ROIs
  - Competitive differentiations
  - IoT business model
  - IoT monetization models
  - Data exploration
  - IoT data journey requirements
- **Data Integration**
  - Exploration and definition of data structure and models
  - IoT data insights list
  - Definition of data views and dashboards for every stakeholder
  - Support for the integration of the SmartObjects API & SDKs
- **Data Science-as-a-Service**
  - Machine learning and predictive algorithms training and deployment
  - Advanced research & modeling

Recent News

January 2017: mnubo awarded "20 Most Promising IoT Solution Providers" by CIO Review.

December 2016: mnubo named amongst "Top 10 IoT Analytics Players" by Market Research Future.

October 2016: Ayla networks and mnubo partnered to deliver a turnkey IoT solution.

January 2016: mnubo identified as "Top Startup Transforming the IIoT" by CB-Insights.

June 2015: mnubo named a "Cool Vendor" in Gartners 'cool vendors in communications Service Providers Operational & Business Infrastructure'.

May 2015: mnubo raised $6M in Series A funding led by White Star Capital and McRock Capital.

February 2015: mnubo named "Hot Tech Innovator" by ABI Research.

Management

Name	Title
Fred Bastien	CEO & Co-Founder
JC Cimino	CTO & Co-Founder
Aditya Pendyala	VP, Growth & Co-Founder
JC Beaudin	VP, Data Science & Co-Founder

Total Funding

$6.0 M

Investors

McRock Capital
White Star Capital

Customers

Buzz Products
Casa Connect
Connected Design
ConnectedDevice
Hortau
iControl
GSI
ROC-Connect
Stelpro

Sources: Capital-IQ, Company website, Crunchbase

mobideo

Contact Details

Mobideo Technologies
5100 Westheimer Rd
Houston, TX

www.mobideo.com

Phone: (888) 509-3390

Employees: 50

Founded: 2007

Company Overview

Mobideo is a cross-industry platform that fully digitizes & optimizes industrial services throughout the entire asset life cycle by converging Mobile, IoT, Cloud, Big Data and Analytics Technologies.

Product/Service

Mobideo's patented full stack platform connects workforce, data and machines for 360 degrees' operational excellence and provides a set of holistic applications that provide total service transformation.

- **Field Force – Task Execution:** A personalized mobile application, providing all the information that field workers require to get the job done right
- **Managers – Coordinate & Optimize:** Real-time management insights into field operations, 360° visibility and live interaction with field force for timely, cost-effective decision making
- **Processes – Operational Excellence:** Capturing, digitizing and streamlining existing organizational know-how, procedures and processes for fully optimized operations

Recent News

February 2017: Mobideo announced Eran Burns as Chief Operating Officer.

November 2016: GE Digital recognized Mobideo as partner of GE's Predix Industrial IoT platform.

February 2016: Mobideo announced Paul Muir President of Northern America Operations.

Management

Name	Title
Yaron Eppel	CEO
Amir Green	CTO & Co-Founder
Paul Muir	President, North America

Total Funding

NA

Investors

NA

Customers

Bazan Group

FedEx

Orange

Paz

VISA

Sources: Capital-IQ, Company website, Crunchbase

MOCANA

Contact Details

Mocana
20 California Street, 4th Floor
San Francisco, CA 94111

www.mocana.com

Phone: (415) 617-0055

Employees: 67

Founded: 2002

Company Overview

Mocana provides mission-critical IoT security solutions for embedded systems and the Internet of Things. It's proven cybersecurity software goes beyond traditional security approaches by making industrial control and IoT devices trustworthy and enabling secure device-to-cloud communications. Mocana's full-stack platform operates across complex, multi-vendor environments where performance and security are critical to ensuring safety and uptime. Hundreds of industrial IoT companies depend on Mocana's military-grade technology to protect millions of IoT devices, controllers and embedded systems.

Product/Service

- **Mocana IoT Security Platform**: Full-stack software solution that can be customized and embedded into industrial control system (ICS) devices, IoT endpoints, gateways and cloud servers. Mocana's software addresses various IoT vulnerabilities, from authentication to secure boot to firmware validation to ensure device and data integrity and secure device-to-cloud communications
- **Multi-vendor Compatibility:** Mocana's comprehensive solution is integrated with more than 70 chipsets, 30 operating systems and real-time operating systems (RTOS) and supports a variety of standard networking environments (SSL, SSH, multicast, IPSec, wireless, X.509 and SCEP, EST)
- **Abstraction Layer and API:** Mocana's software abstracts the underlying hardware, enabling applications to call cryptographic functions through a simple set of APIs. Mocana also provides a compatibility interface to easily migrate from open source crypto libraries
- **Support and Professional Services:** Mocana uses its deep cybersecurity expertise to assist customers with all aspects of security application lifecycle management, including: design, development, integration, validation, quality assurance, compliance and support

Recent News

April 2017: DDC-I and Mocana announced Integrated IoT Security Platform for Military and Commercial Avionics.

March 2017: Mocana unveils Next Generation Security Platform for Industrial IoT Devices and Industrial Clouds.

February 2017: Mocana announced Planned Support of Infineon OPTIGA Trusted Platform Module 2.0.

Management

Name	Title
Bill Diotte	CEO
Dean Weber	CTO
Srinivas Kumar	VP of Engineering
Keao Caindec	VP of Marketing

Total Funding

$77.4 M

Investors

GE Ventures
In-Q-Tel
Intel Capital
Shasta Ventures
Southern Cross Venture Partners
Sway Ventures
Trident Capital

Customers

GE
General Dynamics
HP
Panasonic
Samsung
Schneider Electric
Siemens
Yokogawa

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

n-Join
4 Hamada St., Yokneam Illit 20692, Israel

www.n-join.com

Employees: 14

Founded: 2014

Company Overview

n-Join is an international technology firm specializing in the harnessing of data and artificial intelligence for better manufacturing. n-Join creates a system that plugs into factories, listens to the data flowing between machines, and uses that information to find ways to make the whole operation more efficient, profitable, and environmentally sustainable.

Product/Service

- **Integrate:** n-Join's system fuses seamlessly with a factory's existing operations. The analytical engine lives on a desktop computer-sized device and installs within only hours, requiring zero disruption to factory operations
- **Listen:** n-Join's technology captures the billions of machine-to-machine communications shared within a factory every day – valuable data that is often discarded without examination or analysis
- **Learn:** Using algorithms inspired by machine learning, natural language processing, and beyond, the system builds a dynamic, data-driven model of the entire production process, from first raw materials to final finished product
- **Share:** Completely autonomously, n-Join's system shares the resulting knowledge and alerts with managers, company CEOs, and anyone else who can benefit. n-Join's optional cloud integration allows even greater visibility

Recent News

March2017: n-Join presented at Daimler Sponsored Startup Autobahn Expo Day.

August 2016: n-Join won the Daimler sponsored accelerator.

June 2016: n-Join won EY Startup Challenge 2016.

June 2015: n-Join raised a $1M seed round.

Management

Name	Title
Haim Piratinskiy	CEO
Elkana Porag	CTO
Or Biran Ph.D	Chief Scientist

Total Funding

$6.0 M

Investors

Terra Venture Partners

Additional undisclosed investors

Installations

Enel

Nilit

Coca-Cola

Strauss

Sources: Capital-IQ, Company website, Crunchbase

PLATAINE
people-smart automation

Contact Details

Plataine Technologies
94 Em Hamoshavot Road Azorim Park
Petach Tikva 4970602 Israel

www.plataine.com

Phone: (+972) 3-769-1100

Employees: 70

Founded: 2008

Company Overview

Plataine is an award-winning, leading provider of Internet of Things (IoT) based, Intelligent Automation software solutions for discrete manufacturing industries.

Plataine enables complete traceability of the digital thread of material, assets and manufacturing processes, allowing plant managers and staff to automatically capture and analyze data from the production floor and receive data-driven recommendations and alerts in real-time.

Product/Service

- **Production Optimization:** Plataine's Context Aware Computing solutions leverage the Industrial Internet of Things (IIoT) to create a rich digital context, weave the digital thread, automate and optimize decision making in advanced manufacturing environments
- **Industrial IoT Solution:** IoT and shop floor sensors collect vast amounts of data in real time, creating a rich digital context that starts with design engineers and is continuously built through the entire lifecycle of the product. Plataine's IIoT solution enables you to meet the strict quality, cost-reduction and delivery requirements while remaining profitable and competitive
- **Material & Asset Tracking:** Brings real-time visibility of critical high-value mobile assets such as: raw material, kits, tools and molds. The solution utilizes a variety of technologies such as RFID and shop-floor sensors that collects the location and context-aware information of critical assets

Recent News

March 2017: AMRC with Boeing Partners with Plataine to Promote Industrial IoT (IIoT) in Composites Manufacturing

November 2016: Plataine announced winner of the '2016 Innovation in Composite Manufacture Award' by Composites UK.

June 2016: Veada Industries selected Plataine Solutions to automate and streamline seating manufacturing.

March 2016: CTC Stade (an AIRBUS Company) to Partner with Plataine to Create the 'Factory of the Future'.

Management

Name	Title
Avner Ben-Bassat	CEO & President
Amir Ben-Assa	CMO
Eduard Goldner	Chief Scientist

Total Funding

NA

Investors

NA

Customers

AIRBUS

AVCORP

GE Aviation

IAI

MT Aerospace

Triumph Group

Sources: Capital-IQ, Company website, Crunchbase

Pointr

Contact Details

Pointr
The Stables, 28 Britannia St, Kings Cross
London WC1X9JF

www.pointrlabs.com

Phone: +442087207087

Employees: 31

Founded: 2014

Company Overview

Pointr is an indoor positioning and navigation technology that works on multiple platforms, is easy to deploy and requires minimal maintenance. Technology applications include Retail, Exhibitions, Libraries, Airports, Offices and many more. The core strength is accurate indoor positioning of people and assets down to 1 metre accuracy, when linked with our web dashboard providing points of interest and analytics it provides a powerful navigation platform. The SDK modules also include contextual messaging and data analytics that provide a powerful platform to connect the online and offline world.

Product/Service

- **Hardware Beacons:** bluetooth beacons enabling accurate positioning
- **Mobile SDKs:** Android and iOS supported SDK that is easily incorporated into customer's own app
- **Web Dashboard:** For device management and data analysis in order for customers to understand things like how busy an area based on the day, time or age group

Recent News

December 2016: Pointr successfully deployed 500 in-store beacons and launched its mapping tool for Harrods' 1 million square feet of retail space.

June 2016: Pointr signs an agreement to deploy 2000 beacons throught Gatwick airport and carparks.

May 2015: Pointr is nominated for the hottest IoT startup in Europe by The Europas.

Management

Name	Title
Ege Akpinar	CEO & Co-Founder
Can Akpinar	CTO & Co-Founder
Axel Katalan	CMO & Co-Founder
Chris Charles	COO

Total Funding

£250 K

Investors

Angel Investors

Founders

Customers

Dubai Airport

Gatwick Airport

Harrods

TUYAP Exhibition Centre

Virgin Trains

Sources: Capital-IQ, Company website, Crunchbase

PubNub

Contact Details

PubNub
725 Folsom Street
San Francisco, CA 94107

www.pubnub.com

Phone: (415) 223-7552

Employees: 94

Founded: 2010

Company Overview

PubNub provides a Global Data Stream Network (DSN) for building real time IoT, Mobile and Web apps. The companies Data Stream Network provides real-time messaging, user/device status monitoring and a programmable network for processing “data-in-motion”.

PubNub’s realtime messaging provides low-latency, bi-directional communication for any device with an IP address. With over 2,000 customers using our Data Stream Network for everything from Smart Home/Building, Retail, and Public Safety, to Healthcare, Transportation & Logistics, Business Collaboration, Social Apps and more. PubNub currently has over 330 million devices on their network and transacts ~2 trillion "messages" each month between devices.

The Company also offers PubNub BLOCKS which are a collection of prebuilt functions that be executed on your ‘data-in-motion’ as it passes through the network. Moving processing closer to the device and removing the need to deploy and scale infrastructure.

Product/Service

- **Built as a network:** PubNub Data Stream Network connects 15 globally redundant points of presence into a single network capable of handling hundreds of millions of simultaneous device connections and relaying trillions of messages. The Data Stream Network architecture was built as a network – not as a single PoP “cloud” solution – allowing PubNub to deliver unmatched speed, reliability, and scalability
- **Works Everywhere:** PubNub provides 75+ SDK’s with easy to use APIs for developers building secure real-time IoT, Mobile and Web Applications
- **Realtime Messaging:** Protocol independent, Publish/Subscribe architecture to connect any device on earth in under 1/4 second. Also includes automatic catch-up features for unreliable connections and push notifications for mobile apps
- **Status Monitoring:** Detects devices/users join, leave and status change events. Can trigger actions and notifications instantly through the use of PubNub BLOCKS
- **Programmable Network:** PubNub BLOCKS catalog provides prebuilt functions that can be executed on data as it passes through the network. Also supports custom built functions. BLOCKS can be executed on data streams or can be called via REST endpoints
- **Enterprise-Ready Security:** Production-grade security & end-to-end encryption via TLS and AES. Fine Grade Access Control to data streams with ability to instantly grant and revoke read/write access to data streams. EU and US only Storage Options. HIPAA Compliant

Recent News

September 2016: PubNub raised $6M in venture round lead by Ericsson and Cisco Investments.

August 2016: PubNub enabled Streaming Visualizations in Microsoft Power BI.

April 2016: PubNub announced delivery of private, on premise deployment for In-Q-Tel customers.

April 2016: Network World included PubNub in "10 Internet of Things companies to watch".

Management

Name	Title
Todd Greene	CEO & Co-Founder
Stephen Blum	CTO & Co-Founder
Wendy Schott	CMO
Marc Friend	CFO

Total Funding

$46.1 M

Investors

Bosch

Cisco Investments

Ericsson

Relay Ventures

Sapphire Ventures

Scale Venture Partners

Customers

Adobe

Athenahealth

Logitech

McDonalds

Yahoo

Yelp

Sources: Capital-IQ, Company website, Crunchbase

radiflow
Secure Your Assets

Contact Details

Radiflow
31 HaBarzel Street
Tel Aviv, Israel

www.radiflow.com

Phone: +972-77-5012702

Employees: 30

Founded: 2010

Company Overview

Radiflow provides cyber security solutions for critical distributed automation applications.

Radiflow's security tool-set validates the behavior of both M2M applications and H2M (Human-to-Machine) sessions within the distributed operational network. The solution is available both as in-line secure gateways for remote sites and as central monitoring tool. Combined, these solutions create a complete architecture for protecting SCADA network against cyber-attack.

Product/Service

- **iSID:** Radiflow's iSID Intrusion Detection System (IDS) for SCADA networks is a server-based software that analyzes the OT network traffic in order to protect against cyber threats
- **2120/2180 Smart Probe:** A distributed agent for the iSID performing pre-processing of the captured traffic in remote sites and sending in an optimized wat the relevant portion of the data to a central iSID
- **3180/1031 Secure Ruggedized Gateway:** The Radiflow 3180 is a ruggedized compact communication platform with multiple interfaces of Ethernet, Serial and Cellular and a unique security feature-set including: DPI firewall, Authentication Proxy and IPSec VPN

Recent News

December 2016: Radiflow introduces new security assessment service for Industrial Control Systems (ICS).

March 2017: Deutsche Telekom selected Radiflow solutions for its OT Security offering.

Management

Name	Title
Ilan Barda	CEO & Founder
Yehonatan Kfir	CTO
TJ Roe	VP, Sales North-America

Total Funding

NA

Investors

NA

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

rethink robotics

Contact Details

Rethink Robotics
27-43 Wormwood St
Boston, MA 02210

www.rethinkrobotics.com

Phone: (617) 500-2487

Employees: 124

Founded: 2008

Company Overview

Rethink Robotics is transforming the way manufacturing gets done, with smart, collaborative robots able to automate the 90 percent of tasks that until now, have been beyond the reach of traditional automation. Its Baxter® and Sawyer™ robots, powered by the Intera™ software platform, adapt to real-world variability, can change applications quickly and perform tasks like people do. The result: manufacturers of all shapes, sizes and industries get the fast-to-deploy, easy-to-use and versatile automation solution they need to increase flexibility, lower cost and accelerate innovation.

Product/Service

- **Intera:** a new software-first approach to automation, the Intera platform allows users to deploy automation faster and more effectively than ever before. Intera offers a graphical interface to create and modify robot tasks, and enables the world's first smart, collaborative robot to orchestrate key elements of a work cell
- **Sawyer:** gives manufacturers high performance automation, while maintaining flexibility, safety and affordability. Weighing only 19 kg (42 lbs), Sawyer features a 1260 mm reach that maneuvers into tight spaces and operates in work cells designed for humans. Sawyer offers a unique combination of features that distinguish it from other collaborative robots, including 7 degree-of-freedom force sensing, force control and embedded vision
- **Baxter:** a proven industrial automation solution for a wide range of tasks – from line loading and machine tending, to packaging and material handling. This product allows manufacturers to automate monotonous and dangerous tasks

Recent News

February 2017: Rethink Robotics announces distribution agreement with Aldakin Automation in Spain.

February 2017: Rethink Robotics releases Intera 5.

December 2016: Rethink Robotics announces $18 million in new funding to drive global expansion and new product development.

Management

Name	Title
Scott Eckert	CEO
Rodney Brooks	CTO & Co-Founder
Jim Lawton	Chief Product and Marketing Officer

Total Funding

$131.5 M

Investors

Adveq
Bezos Expeditions
CRV
DFJ
GE Ventures
Goldman Sachs
Highland Capital Partners
Sigma Partners
Two Sigma Ventures
Wellington Management

Customers

DHL
Flambeau
GE
MS Schramberg
Praxis Packaging
Schneider Electric
Steelcase
Steelcase
Standby Screw
Yanfeng Automotive Interiors

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

RFMicron
3700 N. Capital of Texas Hwy, Suite 570
Austin, TX 78746

www.RFMicron.com

Phone: (512) 535-4647

Employees: 16

Founded: 2006

Company Overview

RFMicron's Smart Passive Sensing™ solution has redefined, connectivity, sensing and processing data. RFMicron delivers a novel system approach to sensing, using tightly coupled hardware and software, which collects the "raw" sensor data and processes it at the central processing node. The solution eliminates the need for battery, enables passive sensing, adds intelligence to the sensor, minimizes the amount of data processing at the sensor node, and transfers the complicated data processing to be completed at a central processing location using software.

RFMicron Smart Passive Sensing™ solution, brings connectivity to previously unconnected objects and situations. Addressing diverse markets that include automotive manufacturing, health care, and industrial. RFMicron's Smart Passive Sensing solutions are based on RFMicron's low-cost semiconductor sensors, which operate in wireless, microcontroller-free, battery-free deployments. The company brings the sensor data to SMART Edge devices for data reduction, analytics and cognitive processing, all designed to drive business insights.

Product/Service

- **Hermes Platform:** A complete system architecture platform, running in the cloud or on the smart edge gateway hub, converting the raw sensor data into actionable data. The platform hosts cognitive data processing algorithms, business rules, aggregates, manages and processes the collected data
- **Passive Sensors:** Enables more measurable parameters to be monitored at a lower cost, with easily deployed, maintenance-free, battery-free, sensing solutions. These sensors are deployed in locations where existing technology cannot
- **Sensor ICs:** Integrates multiple sensors, encryption engine, power harvester, stimuli detector, and a transceiver into a single IC. These ICs, sense stimuli, perform minimal "on-chip" data processing ("raw" sensed data), sense moisture, pressure, temperature, proximity, electrolyte, PH, and more

Recent News

September 2016: Frost & Sullivan Recognizes RFMicron with the 2016 Enabling Technology Leadership Award.

May 2016: SMARTRAC, RFMicron Release Passive RFID Temperature Sensor Technology.

February 2016: ON Semiconductor & RFMicron Unveil Multifaceted IoT Sensor Platform Supporting Battery-Free Operation.

Management

Name	Title
Shahriar Rokhsaz	CEO & President Chairman of the Board
Alan Hansford	VP, Marketing
Ken Jeffries	VP, Sales

Total Funding

$9.7 M

Investors

Texas Emerging Technology

Private Investors

Customers

Automotive OEMs

Sources: Capital-IQ, Company website, Crunchbase

RIGADO

Contact Details

Rigado
3950 Fairview Industrial Drive SE, Suite 100
Salem, OR 97302

www.rigado.com

Phone: (971) 208-9870

Employees: 49

Founded: 2010

Company Overview

Rigado delivers integrated IoT solutions for consumer and commercial markets. Its configurable Gateways and certified Wireless Modules accelerate development, while its cloud-based DeviceOps platform enables secure over-the-air updating. Rigado has key partnerships with NXP/Qualcomm, Nordic Semiconductor and Arrow Electronics, serving over 1,000 customers globally.

Product/Service

- **Configurable IoT Gateway**: Rigado gateways offer edge-compute power in a highly flexible package. Choose from WiFi, Bluetooth, Thread, Zigbee, Ethernet & Cellular options – then customize with your own logo for a turnkey, customized gateway solution
- **R41Z Module:** Based on NXP's KW41Z, is an ultra-low-power, highly-integrated single-chip device that enables Thread with IEEE 802.15.4 and Bluetooth Low Energy (BLE) RF connectivity for portable, extremely low power embedded systems
- **BMD-300/301/350 Modules:** Based on the advanced nRF52832 BLE SoC from Nordic Semiconductor, bringing the latest Bluetooth connectivity coupled with class leading performance
- **DeviceOps Platform**: Rigado gateways and modules include our Jumpstart Tools for fast development, as well as our DeviceOps Platform for encrypted OTA firmware updates. This allows clients to launch quickly and scale for success

Recent News

January 2017: Rigado named IoT breakthrough award winner.

December 2016: Rigado announced customizable IoT gateway for flexible, future-proof connectivity.

October 2016: Rigado announced the R41Z multi-mode thread + BLE module.

Management

Name	Title
Ben Corrado	CEO & Co-Founder
Justin Rigling	CTO & Co-Founder
Chris Corrado	COO & Co-Founder
Greg Rau	CFO
Kevin Tate	CMO

Total Funding

NA

Investors

NA

Customers

Rigado products are used by more than 1,000 customers in consumer, commercial & industrial markets.

Typically, these are OEMs designing and building connected products – such as Commercial Lighting, Asset Tracking or Smart Home solutions.

Many customers come through Rigado's distribution channels, Arrow and Digi-Key, but Rigado also works directly with Tier 1 solution clients.

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Real-Time Innovations
232 East Java Drive
Sunnyvale, CA 94089

www.rti.com

Phone: (408) 990-7400

Employees: 130

Founded: 2005

Company Overview

Real-Time Innovations (RTI) is the Industrial Internet of Things (IIoT) connectivity company. The RTI Connext® databus is a software framework that shares information in real time, making applications work together as one, integrated system. It connects across field, fog and cloud. Its reliability, security, performance and scalability are proven in the most demanding industrial systems. Deployed systems include medical devices and imaging; wind, hydro and solar power; autonomous planes, trains and cars; traffic control; Oil and Gas; robotics, ships and defense.

Product/Service

- **Connext DDS Professional:** Connectivity platform compliant with the Data Distribution Service (DDS) standard. Includes a rich set of productivity-enhancing tools and adapter
- **Connext DDS Secure:** Extends Professional with robust, DDS complaint security capabilities. These include topic-level access control and the ability to secure any transport, including multicast, without TLS
- **Connext DDS Micro:** Small-footprint and portable messaging platform for resource-constrained devices and those without an operating system
- **Connext DDS Cert:** High-assurance messaging solution for systems subject to stringent safety certifications, including DO-178C Level A

Recent News

February 2017: RTI announced the company's leadership in the creation of the Industrial Internet Consortium (IIC)'s Industrial Internet Connectivity Framework (IICF). The IICF was a key milestone; it was the first time a major consortium analyzed the technical connectivity problem for the Industrial IoT.

January 2017: RTI Executives led creation of second Internet Reference Architecture (IIRA), which was published by the Industrial Internet Consortium (IIC).

November 2016: RTI won department of energy funding to research smart grid security leveraging the data-distribution device (DDS) standard.

Management

Name	Title
Stan Schneider	CEO
Gerardo Pardo-Castellote	CTO
Jan Van Bruaene	VP, Engineering

Total Funding

NA

Investors

NA

Customers

Audi
GE
Mevion
NASA
Physio Control
Raytheon
Siemens

Sources: Capital-IQ, Company website, Crunchbase

RtTECH SOFTWARE

Contact Details

RtTech Software
770 St. George Boulevard
Moncton, NB E1E 2C6

www.rttechsoftware.com

Phone: (902) 817-1725

Employees: 25

Founded: 2011

Company Overview

RtTech is a leading provider of SaaS-based industrial analytics software for real-time intelligence and stable operations at the edge and in the cloud.

The Company offers end-to-end, turn-key solutions compatible with legacy and modern process control and connectivity systems.

RtTech develops a suite of purpose-built applications to provide transparency throughout the industrial ecosystem.

- The Cipher platform leverages the latest in edge device technologies and industrial protocols to deliver real-time analytics within any industrial environment
- The RtDUET and RtEMIS industrial applications run in Cipher and provide customers with operational intelligence on performance and energy consumption of industrial assets

Founded in 2011, RtTech was formed as a spin-off of ADM's software division. The Company is headquartered in Moncton, New Brunswick with offices in London and Sydney.

Product/Service

RtTech offers Cipher, an Industrial IoT Platform with two main apps: RtDUET & RtEMIS.

- **RtDUET:** Is a real-time software solution designed to increase productivity through Asset Management, Asset Health Monitoring, and Downtime Tracking
- **RtEMIS:** Is an Energy Management Information System, designed to help industrial facilities reduce energy consumption and increase energy efficiency

Recent News

April 2017: RtTech listed in the 20 fastest growing IoT companies by Insights Success.

March 2017: RtTech Software announced a partnership with Moore Process Controls. In listing Moore as a Value Added Reseller (VAR), RtTech Software would be able to better serve the South African market with comprehensive Energy Management software by leveraging Moore's local industry expertise.

May 2015: RtTech Software named BDC Innovation Award Winner for 2015.

February 2015: RtTech Software raised $3M in Series A funding lead by McRock Capital.

Management

Name	Title
Keith Flynn	President & Founder
Jeff Milton	Operations Manager
Rob Brannan	Sales Manager
Nicole Cousineau	Controller

Total Funding

$3.6 M

Investors

McRock Capital

New Brunswick Innovation

Customers

AGL
Alcoa
Barrick
BHP Billiton
Cargill
Glencore
McCain
Michelin

Sources: Capital-IQ, Company website, Crunchbase

SECURE RF
Securing the Internet of Things®

Contact Details

SecureRF
100 Beard Sawmill Rd., Suite 350
Shelton, CT 06484

www.SecureRF.com

Phone: (203) 227-3151

Employees: 18

Founded: 2004

Company Overview

SecureRF provides quantum-resistant security solutions for wireless sensors, the Smart Grid, NFC, RFID and other low-resource embedded systems.

SecureRF's high-performance asymmetric (Public Key) and symmetric (Private Key) cryptography delivers authentication and data protection solutions for the smallest end-points of the IoT including 32-bit, 16-bit, and even 8-bit processors. They support ARM and RISC-V found in actuators, sensors, and machine-to-machine (M2M) applications.

Additionally, the firm's patented technologies provide strong security and privacy for anti-counterfeiting brand protection and secure supply chain applications.

Product/Service

- **Veridify:** A solution that provides end-to-end security with cloud-based data collection, smartphone applications and tools to make products smarter and while delivering real-time visibility
- **Tags and Sensors:** Provide identification, authentication and data protection. Includes custom designs and form-factors to address secure sensor monitoring and data collection
- **Security Tool Kits for IoT Devices:** The firm's hardware and software development tools address common IoT provider challenges and are easily integrated into new or existing processors, apps, and platforms

Recent News

April 2017: Arrow launched Chameleon96 Community Board targeting IoT developers. The board featured an Intel Cyclone V FPGA and SecureRF quantum-resistant security tools.

February 2017: SecureRF and BaySand, the leader in application-configurable ASICs, stated they had joined forces to provide fast, quantum-resistant authentication and data protection solutions for low-resource IoT devices.

March 2016: SecureRF announced multi-mode sensor LIME tag for the IoT, and an update to its credentialing solution.

March 2016: SecureRF announced Veridify, a cloud based platform and application suite delivering public key infrastructure to tags and devices in the IoT.

Management

Name	Title
Louis Parks	CEO & President
Derek Atkins	CTO & Co-Founder
Dorian Goldfeld	Advisor & Co-Founder
Iris Anshel	Chief Scientist

Total Funding

$7.5 M

Investors

Next Level Venture Partners

Putnam Equity Transpac (Singapore)

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

Sensify

Contact Details

Sensify Security
720 University Ave, Suite 200
Palo Alto, CA 94301

www.sensify-security.com

Employees: 6

Founded: 2016

Company Overview

Sensify Security is a Palo Alto-based IoT security startup that builds higher resistance to cyber threats by enabling operators to enforce access control in a decentralized manner within their operating environments. Its tamper-resistant propagation of security services to gateway-based points of enforcement at the edge offers operators centralized control, policy management, and compliance while maintaining decentralized delivery of services.

Product/Service

- Applies blockchain technology in cybersecurity for the Internet of Things (IoT) that redefines the resilience to threats, cost economics, and scale for securing billions of connected devices
- Provides a path-breaking decentralized approach for authorization of connected sensors, machines, users, and applications. Sensify's unique approach to identity and authentication addresses new access paths between apps, users, and devices, and cost efficiencies for IoT
- Creates a tamper-proof transaction record of all access transactions between users, devices, applications, and data across large-scale IoT deployments

Recent News

February 2017: Sensify Security joins the GE Digital Alliance Partner network to deliver cyber security services to the edges of industrial and commercial deployments.

January 2017: Sensify Security joins the Industrial Internet Consortium to strengthen cyber-defense within industrial IoT operations.

December 2016: IBM launched an app-making ecosystem; a program designed to speed up the development of blockchain-based applications for business. Sensify Security, one of the six startups, that has joined IBM's ecosystem.

July 2016: Sensify Security raised $1.5M in Seed Round Funding.

Management

Name	Title
Susanto Irwan	VP, Engineering & Co-Founder
Roman Arutyunov	VP, Product
Jeff Venable	Chief Security Architect

Total Funding

$1.5 M

Investors

The Hive

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Serious Integrated
576 E. Germann Rd.
Gilbert, AZ 85297

www.seriousintegrated.com

Phone: (480) 646-8300

Employees: 26

Founded: 2008

Company Overview

Serious Integrated is a privately held Chandler, Arizona-based corporation focused on enabling original equipment manufacturers; electronics design firms and prototypers developing graphic/touch front panels. Product offerings include off-the-shelf front panel modules as well as a software and tools environment for the development and deployment of modern graphic/touch user interfaces.

Product/Service

- **The serious Human Interface platform:** A rapid GUI development and deployment system
- **Serious Integrated Modules**: Touch-screen display modules that deliver unprecedented performing for front panel applications in industrial and commercial applications
- **Serious Communications Modules:** Provide connectivity among a collection of disparate communications interfaces and adapt income system/network power
- **Serious Programming Adapters:** Provide support and easy access to USB and/or JTAG signals

Recent News

January 2017: Serious Integrated announced its staff had doubled over the past year and had planned to relocate in early 2017.

September 2016: McRock Capital backed Serious Integrated to fuel IIoT sector growth with $5M of investment.

May 2016: Serious Integrated launched a new family of Serious Integrated Modules.

Management

Name	Title
Terry West	CEO & Founder
Brad Stevens	CFO and Director of Operations
Michael Rap	VP, Business Development

Total Funding

$5.0 M

Investors

McRock Capital

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

SIGFOX SA
425, rue Jean Rostand Labège
Toulouse, Midi-Pyrénées, France

www.sigfox.com

Phone: +33 5 34 31 03 16

Employees: 360

Founded: 2010

Company Overview

SIGFOX SA, a cellular network operator, provides cellular connectivity for Internet of things and machine-to-machine communications in France and internationally. It also offers various devices to connect to the Internet; and provides two-way transmission of data. In addition, the Company provides device-to-cloud connectivity for solutions in various market sectors. Network fully covering 90% of 12 countries, and roll out on going in 20 others.

Product/Service

- **IoT Network and connectivity:** From predictive maintenance, and asset management to crop management or pallet tracking, SIGFOX has connected to more than 8 million objects across the world. SIGFOX serves 29 countries, over 1.7 million kms and 471 million people. SIGFOX operates on 868 and 902Mhz frequency bands

Recent News

November 2016: SIGFOX raised $159M in Series E funding.

June 2016: Atari signed deal with SIGFOX to manufacture branded IoT devices.

June 2015: Samsung gave major boost to SIGFOX's IoT platform with investment and partnership.

Management

Name	Title
Ludovic Le Moan	CEO & Co-Founder
Allen Proithis	President, North America
Christophe Fourtet	Technical Director and Founder

Total Funding

$309.7 M

Investors

Air Liquide
Alto Invest
Bpifrance
Elliott Management Corp.
Henri Seydoux
Idinvest Partners
Intel Capital
IXO Private Equity
Salesforce Ventures
Swen Capital Partners
Tamer Group

Customers

Engie
LVMH
PECO Pallets
Telefonica
Verisure Securitas Direct

Sources: Capital-IQ, Company website, Crunchbase

SIGHT MACHINE
Manufacturing Analytics

Contact Details

Sight Machine
243 Vallejo Street
San Francisco, CA 94111

www.sightmachine.com

Phone: (888) 461-5739

Employees: 59

Founded: 2011

Company Overview

Sight Machine develops a manufacturing analytics platform. It offers an open and agnostic data platform that enables companies to gain real-time visibility and actionable insights for part, machine, line, and plant in a manufacturing enterprise. Its platform also supports multiple data sources from across the infrastructure, including data historian output; RDBMS, MES, and ERP adapters; inspection systems and quality equipment; PLC endpoints; and Excel spreadsheets.

Product/Service

- **The Sight Machine Platform:** Enables companies to gain real-time visibility and actionable insights for every part, machine, line, and plant throughout a manufacturing enterprise
- **AI Data Pipeline:** Converts unstructured data into contextualized data in real time by using unique expert systems and machine learning classifiers
- **Plant Digital Twin:** Customers can create a dynamic mirror of their assets and processes using Sight Machine's digital twin, which produces real time semantic context of process and product data

Recent News

February 2017: Sight Machine announced as part of Fortune Magazine's top 50 start-ups leading the artificial intelligence revolution.

March 2016: Sight Machine raised $15.5M in Series B funding led by GE Ventures.

May 2015: Sight Machine named to Gartner's "Cool Vendors in Manufacturing Operations, 2015."

Management

Name	Title
Jon Sobel	CEO & Co-Founder
Nathan Oostendorp	CTO & Co-Founder
Kurt DeMaagd	VP, Analytics & Co-Founder

Total Funding

$30.0 M

Investors

Draper Nexus Ventures
eLab Ventures
FundersClub
GE Ventures
Huron River Ventures
IA Ventures
Jump Capital
Mercury Fund
O'Reilly AlphaTech Ventures
Orfin Ventures
Pritzker Group Venture Capital
Two Roads Group

Customers

Inteva Products

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

SparkBeyond
HaMahshev St 3
Netanya, Israel

www.sparkbeyond.com

Phone: NA

Employees: 38

Founded: 2013

Company Overview

SparkBeyond has built an AI-powered research engine, capable of finding complex patterns in data by understanding its meaning. The SparkBeyond Discovery Platform combines state-of-the-art artificial intelligence technology with large-scale computing, to accelerate the discovery of breakthroughs hidden in the data. SparkBeyond Discovery Platform automates and scales the creative part of data science, empowering data scientists, decision makers and business analysts with a machine that constantly analyzes the data and surfaces discoveries. SparkBeyond helps accelerate discoveries in life-sciences as part of its pro-bono work. The Company has global presence with offices in 4 countries, and works with leading Fortune 500 clients and partners.

Product/Service

- **A Thinking Machine:** Scans massive amounts of data and sifts it through a range of clarifiers – equations, definitions sentiments, locations – to build the best predictive model with a measurable business goal in mind
- **From Data to Actions:** The AI-powered research engine distills potent insights from an ocean of information so that clients can make the most informed decisions possible
- **Harnessing the Human Hive:** Takes information and combine it with thousands of external sources to reveal hidden patterns and deeper insights

Recent News

May 2016: SparkBeyond named a Gartner Cool Vendor in Data Science.

Management

Name	Title
Sagie Davidovich	CEO & Co-Founder
Ron Karidi	CTO & Co-Founder
Amir Haramaty	CCO

Total Funding

NA

Investors

NA

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Stream Technologies
SkyPark 1, Floor 3, Suite 5, 8 Elliot Place
Glasgow, G3 8EP, UK

www.stream-technologies.com

Phone: +44 (0) 844 800 8520

Employees: 35

Founded: 2000

Company Overview

Stream Technologies are innovators in IoT connectivity and network enablement. Stream's customers include OEM and Enterprise clients, government, MNO's (Mobile Network Operator) and MVNO's (Mobile Virtual Network Operator), as well as smart city operators and solution providers.

IoT-X is Stream's class leading Connectivity Management Platform (CMP). Use IoT-X to manage cellular, satellite and LPWA (including LoRa) connectivity. Fully integrated with Oberthur's M-Connect eUICC platform and also including LoRa WAN network server and LoRa subscription management capability, IoT-X is the world's most agile CMP.

As an MVNO for IoT, Stream provides global cellular/GSM connectivity options.

Product/Service

- IoT-X Connectivity Management Platform for cellular, satellite LPWAN/LoRa
- Global Cellular Connectivity Services for IoT via resilient APN
- LoRa WAN Network Server
- eUICC (eSIM) global capability
- Intelligent Analytics around network-device performance

Recent News

March 2017: Stream completes integration with Oberthur M Connect eUICC platform, myDevices, and Starhome Mach.

February 2017: Stream release ARM mbed integration into IoT-X leveraging IoT-X PIVOT module capability.

January 2017: IoT-X LoRa network server V2 with geo-location capability deployed in Scotland.

Management

Name	Title
Nigel Chadwick	CEO
Kevin McDowall	COO
Alan Tait	CTO

Total Funding

NA

Investors

NA

Customers

Stream enables in excess of 700 global enterprises, including companies listed on the London Stock Exchange and Fortune 500 List.

Sources: Capital-IQ, Company website, Crunchbase

Contact Details

Symbotic
200 Research Drive
Wilmington, MA 01887

www.symbotic.com

Phone: (978) 284-2800

Employees: 633

Founded: 2007

Company Overview

Symbotic is a global provider of integrated supply network automation solutions for warehouses and distribution centers. The Company has developed proprietary and innovative robotics and software to deliver an advanced automation solution to make the supply chain faster, more efficient and more profitable for manufacturers, distributors and retailers of all sizes.

Product/Service

- **Autonomous Mobile Robots:** Can randomly access any-case at any-time in any-sequence at speeds up to 25 miles per hour
- **Seamless and Business-Oriented Software Packages:** Are built to integrate with warehouse management systems
- **Flexible, Scalable, and Modular Structures:** Systems are installed so that conventional warehouses can continue to operate during a transition

Recent News

September 2016: Symbotic won Innovative Technology of the Year Award for Robots.

September 2016: Symbotic featured in Wall Street Journal article: "Fully Autonomous Robots: The Warehouse Workers of the Near Future."

October 2015: Symbotic appointed Chris Gahagan as CEO.

February: Sen. Scott Brown toured Symbotic and discussed greater Boston Area Robotics.

Management

Name	Title
Chris Gahagan	CEO & President
Robert Sullivan	Chief Development Officer
Mike Fandozzi	VP, Software Development

Total Funding

NA

Investors

NA

Customers

Target Corporate Distribution Centers

Sources: Capital-IQ, Company website, Crunchbase

THETARAY

Contact Details

ThetaRay
8 Hanagar Street
Hod HaSharon 4501309, Israel

www.thetaray.com

Phone: +972 (72) 228-7777

Employees: 50

Founded: 2013

Company Overview

ThetaRay is a leading provider of a big data analytics platform, offering solutions for advanced cyber security, Risk detection, financial crime and operational efficiency, protecting financial services sectors and the Industrial Internet of Things against unknown threats. ThetaRay's core technology is based on state of the art algorithms, which power its proprietary Hyper-Dimensional, Multi-Domain Big Data Analytics platform. Organizations whose operations rely on highly heterogeneous and complex environments leverage ThetaRay's unmatched detection and low false positive rates as a see-all power that enables them to unify detection and defeat the unknown.

Product/Service

- **ThetaRay's Solution for Financial Crime:** detects and helps mitigate a wide array of operational risks that Financial Institutions face each day, offering solutions for fraud, anti-money laundering and ATM Security
- **ThetaRay's Cyber Solution for Industrial Sectors:** protects against unknown zero-day malware, targeted APT attacks, and sophisticated Stuxnet-like state sponsored cyber-attacks that target critical infrastructure
- **ThetaRay's Industrial Solution:** detects the first signs of unknown equipment malfunctions, misconfigurations and power outages that can impact critical infrastructure

Recent News

July 2016: ThetaRay Amongst First Third-Party Vendors to Complete GE's Predix™ Onboarding.

June 2016: ING deploys ThetaRay's analytics solution for fraud detection.

October 2015: ThetaRay named 'Most Innovative Industrial Internet Technology' at GE'S Minds + Machines.

Management

Name	Title
Mark Gazit	CEO
Amir Averbuch	Chief Scientific Officer, Co-Founder
Shiri Septon-Etchin	CFO & Deputy CEO

Total Funding

$35.0 M

Investors

Bank Hapoalim

General Electric (GE)

Jerusalem Venture Partners (JVP)

Poalim Capital Markets (PCM)

Customers

General Electric, ING

Sources: Capital-IQ, Company website, Crunchbase

TRINAMIC
MOTION CONTROL

Contact Details

TRINAMIC Motion Control
Waterloohain 5
22769 Hamburg

www.trinamic.com

Phone: + 49 40 51 48 06 0

Employees: 30+

Founded: 2004

Company Overview

Trinamic is a global leader in embedded motor and motion control. Its ICs and microsystems connect the digital and physical worlds.

Trinamic provides key enabling technology to areas such as advanced factory automation, robotics, and digital manufacturing (3D printing, CNC-milling, and laser cutting).

Product/Service

Trinamic develops the world's most sophisticated technology for motion and motor control applications. The Company's state-of-the-art ICs, modules, and mechatronic systems enable today's software engineers to quickly and reliably develop highly precise motors that work efficiently, smoothly, and quietly.

Recent News

February 2017: EETimes: **"**Trinamic surfing 'automation' wave."

November 2016: Trinamic's new generation of stepper motor drivers link optimized power control and simplified application.

October 2015: Microsemi collaborated with Trinamic to introduce EtherCAT Slave Controller for its SmartFusion2 FPGA's.

Management

Name	Title
Michael Randt	Founder
Tobias Wendlandt	Sales Director
Jonas Proeger	Marketing Director
Stephan Kubisch	Head of R&D

Total Funding

NA

Investors

NA

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

UPTAKE

Contact Details

Uptake Technologies
600 W Chicago Ave Suite 620
Chicago, IL 60654

www.uptake.com

Phone: (312) 242-2200

Employees: 700 (approx.)

Founded: 2014

Company Overview

Uptake is a predictive analytics SaaS platform that helps major industries improve productivity, reliability and safety. The Uptake platform powers enterprise-wide operational insights with a suite of solutions, including predictive diagnostics and fleet management such as fuel and energy optimization applications.

Product/Service

Uptake's platform aggregates enterprise and external data and applies cross-industry data science to produce high-value, actionable insights. Uptake's platform is powered by a continuous feedback loop, recommending impactful actions that are then optimized by human intelligence. Features include:

- **Equipment Monitoring:** Connects and monitors your equipment, aggregating telematics signals and contextual data, and making them available to other Uptake apps and services
- **Diagnostic Troubleshooting:** Enables users to identify the root cause of problems, such as equipment failures, using data science models and machine learning to guide users through a step-by-step troubleshooting process
- **Action Recommendation:** Translates insights into action by suggesting specific tasks and activities that minimize downtime and enhance efficiency

Recent News

February 2017: Revolution Growth invested $40 million in Uptake at a $2 billion valuation as part of ongoing Series C round.

January 2017: Named by Business insider as one of 18 of the hottest under-the-radar startups to watch in 2017.

October 2015: Uptake raised $45M in Series B funding led by GreatPoint Ventures.

Management

Name	Title
Brad Keywell	CEO & Co-Founder
Greg Goff	CPO
Michael Bruns	CFO

Total Funding

$145.0 M

Investors

GreatPoint Ventures

Lightbank

New Enterprise Associates

Revolution Growth

Customers

Berkshire Hathaway Energy

Caterpillar and Progress Rail

Other Fortune 500 leaders in aviation, mining and retail

Sources: Capital-IQ, Company website, Crunchbase

VENIAM

Contact Details

Veniam
331 West Evelyn Avenue
Mountain View, CA 94041

www.veniam.com

Phone: (450) 470-3349

Employees: 55

Founded: 2012

Company Overview

Veniam is building the Internet of Moving Things. Veniam turns vehicles into Wi-Fi hotspots and builds vehicular networks that expand wireless coverage and collect terabytes of actionable data. Veniam's game-changing solutions are composed by hardware, software and cloud components that deliver managed services to intelligent transportation systems in New York and Singapore, as well as in the world's largest network of connected vehicles, which includes taxis, waste collection trucks and the entire public bus fleet in Porto, Portugal, offering free Wi-Fi to more than 500,000 active customers. With offices in Silicon Valley, New York, Porto (Portugal), and Singapore, Veniam is moving massive amounts of data between vehicles and the Cloud reliably, flexibly and cost effectively. Its experience of over four years in deploying and operating mesh networks of connected vehicles in Porto, Singapore and New York has given it critical insights to deliver the networking platform of choice for future mobility services based on autonomous vehicles.

Product/Service

- **Mobile Wi-Fi:** Provide best-in-class mobile Wi-Fi connectivity for passengers on the move, and makes use of Veniam's innovative mesh networking technology and vehicle to vehicle communication to offer reliable connectivity to fleets of moving vehicles, captive portal management for advertising and rider engagement, and analytics on the service, the riders and more
- **Live Fleet:** Allows customers to connect all of their vehicles and enable real time tracking a fleet
- **Live Port:** Ensures connectivity, tracking, and metrics of ships, cranes, trucks and other mobile assets
- **Live City:** Allows municipalities to build more cost-efficient city services and expand wireless internet coverage for citizens

Recent News

September 2016: Veniam and StarHub deployed the first mesh network of connected vehicles in Asia, namely at National University Singapore's Kent Ridge campus.

July 2016: Veniam deployed the first mesh network of connected vehicles in the US, namely in Downtown Manhattan (NYC).

June 2016: Veniam was lauded by CNBC as one of the 50 most forward-thinking companies in America and won the TU Automotive Best Auto Mobility Product/Service Prize.

February 2016: Raised $22M in Series B financing round led by Verizon Ventures.

October 2015: Won the 'best new venture' at the WBA 2015 Wi-Fi Industry Awards.

Management

Name	Title
João Barros	CEO & Founder
Maria João Souto	CFO
André Cardote	Director of Engineering
Shadi Mahassel	VP, Product

Total Funding

$26.9 M

Investors

Cane Investments
Cisco Investment Arm
Liberty Global Investment Arm
Orange Investment Arm
True Ventures
Union Square Ventures
Verizon Investment Arm
Yamaha Motors Investment Arm

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

WIREPAS

Contact Details

Wirepas
Kauhakorvenkatu 52
Tampere, Finland 33720

www.wirepas.com

Phone: +358 40 544 4026

Employees: 35

Founded: 2010

Company Overview

Wirepas is focused on providing the most reliable, optimized, scalable and easy to use device connectivity for its customers. Wirepas Connectivity is a de-centralized radio communications protocol that can be used in any device, with any radio chip and on any radio band. With Wirepas Connectivity there is no need for traditional repeaters because every wireless device is a smart router of the network. The connected devices form the network - easy as that. Wirepas has its headquarters in Tampere, Finland and offices in France, Germany, South Korea, the UK and the United States.

Product/Service

- Wirepas Connectivity for Electricity and Water Meters: Enable wireless multi-hop mesh connectivity and aggregation of consumption data
- Wirepas Connectivity for Beacons: Provide remote fleet management solution for beacons, without extra hardware. With Wirepas Connectivity beacons are always connected and available remotely
- Wirepas Connectivity for Sensors: Offer high energy-efficiency results in long battery-operated lifetime and unlimited scalability of the connectivity supports the sensor installation size or coverage
- Wirepas Connectivity for Lighting: Offers a de-centralized connectivity for large-scale outdoor and indoor lighting and also for the connected beacons and sensors

Recent News

March 2017: Fujitsu sensor beacons with Wirepas Connectivity offered an easy-to-use IoT module.

January 2017: Andrew Gilbert appointed as new Chairman for Wirepas.

November 2016: Wirepas made top 10 for Cleantech Companies by the Global Cleantech Cluster Association (GCCA).

November 2016: Wirepas and m2ocity partnered for Smart City IoT applications.

Management

Name	Title
Teppo Hemiä	CEO
Ville Kaseva	CTO
Sebastian Linko	VP, Marketing and Communications
Youssef Kamel	VP, Business Development

Total Funding

$8.4 M

Investors

ETF Partners

Inventure Oy

Management shareholders and private investors

Vito Ventures

Customers

NA

Sources: Capital-IQ, Company website, Crunchbase

WORLD SENSING

Contact Details

WorldSensing SL
Aragó, 383 4th floor
Barcelona, Spain 08013

www.worldsensing.com

Phone: (+34) 93 418 05 85

Employees: 60

Founded: 2008

Company Overview

WorldSensing is a market leader in Internet of Things (IoT) solutions. The Company has built on its expertise in low-power wireless sensing networks and has created comprehensive vertical solutions in sectors where IoT is making a measurable impact. Worldsensing raised a first round of pre-seed capital in 2010. A seed investment round was closed in 2013 with a pool of investors including Fundación Jose Manuel Entrecanales (FJME) and IESE Business School's Finaves fund. A series A round was completed in 2015, led by FJME, Kibo Ventures and Mitsui & Co. Cisco Ventures and Endeavor also participated in this round. Today, the company has offices in Barcelona and London, has customers in more than 45 countries around the world and has a team of more than 60 professionals.

Product/Service

- **For mining, construction and critical infrastructure monitoring:** The company's products enable operators to make operations more efficient and prevent possible risks to assets by monitoring their status in real time. The products include battery-powered long-range wireless connectivity, designed for challenging environments, and the software to collect and interpret the data
- **For cities:** The company's portfolio includes intelligent parking and traffic flow monitoring systems. World Sensing now also offers a powerful, end-to-end, agile IoT solution that connects sensor-based data, systems, and people to generate real-time, geo-located insights. This enables city operators to synchronize urban operations by correlating data from different systems that the city runs on

Recent News

January 2016: Ex-General Manager B2B of Orange Spain joined as COO.

November 2015: Series A round with Kibo Ventures, Cisco, Mitsui & Co and Endeavor.

October 2014: Worldsensing's CEO was presented as the first Spanish Endeavor Entrepreneur during the Launch Ceremony of Endeavor Spain.

Management

Name	Title
Ignasi Vilajosana	CEO & Co-Founder
Raoul Roverato	COO
David Deprez	CFO & Head of Business Development

Total Funding

NA

Investors

Cisco

Endeavor

Kibo Ventures

Mitsui & Co

Customers

More than 200 customers in 45 countries including:

- Cities and public authorities in Spain, France, Italy, Belgium, the UK, Colombia, Mexico, Panama, UAE, Qatar, Singapore
- More than 20 mining companies in Europe, North America, Latin America and Asia Pacific
- Construction companies and infrastructure operators around the world

Sources: Capital-IQ, Company website, Crunchbase

zedi

Contact Details

Zedi
902 11th Avenue SW
Calgary, Alberta, Canada T2R 0E7

www.zedisolutions.com

Phone: (403) 444-1100

Employees: 420

Contractors: 230

Founded: 1987

Company Overview

Zedi is a leading oil and gas technology and services company in the field of production operations. Zedi's proven value is in integrating a complete technology solution including Sensors, M2M, Cloud, and Analytics, to provide visibility into remote asset performance. To do this, Zedi combines proprietary IoT Gateway field technology including LPWA expertise together with a cloud platform that integrates best-in-class third party technology together with Zedi's own proprietary solutions. From its leading base in the Oil and Gas industry, Zedi is now exploring opportunities in the agrifood and clean-tech microgrid verticals.

Product/Service

- **Software Solutions:** Powered by Zedi's IoT Platform, Zedi offers a suite of SaaS applications that provide real-time insights into production operations assets, helping customers reduce cost, avoid downtime, and improve revenue and profitability
- **Automation Solutions:** Zedi combines proprietary IoT Gateway technology together with third party sensors or controllers to engineer, furnish, and install a complete measurement and automation solution in the field
- **Measurement Solutions:** Zedi has significant technical expertise to support other aspects of production operations, helping customer find ways to leverage data to make better business decisions

Recent News

March 2017: Zedi and the City of St. Albert (Edmonton, Alberta, Canada) announced a joint Smart Cities trial.

February 2017: Zedi's IIoT platform surpassed 1.25 million sensors.

October 2016: Zedi announced expansion of lab services.

Management

Name	Title
Matt Heffernan	CEO & President
James Freeman	CTO
Grant Exner	CFO

Total Funding

Cash-flow positive and funded through Retained Earnings

Investors

Privately-held after a management buy-out in February 2014

Customers

1,200 independent Oil & Gas producers in North America
One major International Service Company

Sources: Capital-IQ, Company website, Crunchbase

ZingBox

Contact Details

ZingBox
465 Fairchild Drive, Suite 209
Mountain View, CA 94043

www.zingbox.com

Phone: (650) 422-3624

Employees: 25

Founded: 2014

Company Overview

ZingBox is a real-time IoT security solution that protects enterprises from cyber and insider threats. ZingBox discovers, identifies and classifies assets into IoT categories. It then learns and generates a baseline of normal device behavior and identifies its risk profile. ZingBox detects anomalous behavior to provide real-time policy enforcement.

Product/Service

- **Real-Time Visibility:** Provides unprecedented visibility and insights into the security posture of customers' IoT infrastructure
- **Automated Threat Detection:** Learns the normal behavior of connected devices and identifies deviations from expected behavior
- **Mitigation and Control:** Deployed out-of-band and seamlessly integrates with existing enterprise security controls; providing real-time policy enforcement

Recent News

March 2017: Healthcare - ZingBox featured in the Wired Magazine's article "Medical Devices Are the Next Security Nightmare."

February 2017: ZingBox unveiled its IoT Guardian security solution, an IoT offering that used Deep Learning algorithms to discern a device's unique personality and enforce acceptable behavior.

January 2017: SoftBank partnered with ZingBox to bring its IoT security solution to the global market.

June 2016: ZingBox named as hot security startups to watch by NetworkWorld.

June 2016: ZingBox raised Series A funding.

December 2014: ZingBox raised Angel round funding.

Management

Name	Title
Xu Zou	CEO & Co-Founder
May Wang	CTO & Co-Founder
Jianlin Zeng	VP, Engineering & Co-Founder
Mayuresh Ektare	VP, Product Management

Total Funding

NA

Investors

Envision Ventures

GSR

Oriza Ventures

Stanford StartX Fund

Customers

40+ deployments

Sources: Capital-IQ, Company website, Crunchbase

Woodside Capital Partners (WCP) – Who We Are

Woodside Capital Partners is a global, independent investment bank that delivers world-class strategic and financial advice to emerging technology growth companies

- Founded in 2001: over $8 billion in transaction value
- Sell-side/buy-side M&A, strategic partnership and corporate finance advisory
- Sector focuses:

– Internet of Things/Industry 4.0	– Semiconductors	– Digital Entertainment
– Artificial Intelligence	– Cloud/Enterprise Software	– Energy Tech/Enabling Materials
– Advanced Driver Assistance Systems	– Cyber Security	– Communication/Networking

- Silicon Valley-based, with offices in London – 1/2 of transactions are cross-border
- WCP Research team offers technology research serving buy-side institutional investors and technology industry executives
- 30 professionals; backgrounds as entrepreneurs/CEOs and from top investment banks

Selected WCP IoT Transactions

WiMM LABS – Sale of Company – Google	FUJITSU Semiconductor Wireless Products, Inc. – Sale of Business Unit – intel	TagArray – Sale of Company – maxim integrated
Android Smartwatch	Wireless - LTE	Asset Tracking
discera – Sale of Company – MICREL	CYMBET Corporation – Capital Raise – Island Shore Investments	CAVIUM – Sale of MontaVista Automotive Assets – Mentor Graphics
MEMS for Timing	Energy & Power Management	Connected Car
GainSpan – Capital Raise – NXP / freescale	Silicon Clocks – Strategic Investment – Silicon Labs	ChipSensors – Sale of Company – Silicon Labs
Wireless IoT Solutions	Sensors & Clocks	Humidity Sensors

11. Appendix: Industrial IoT M&A Transactions

Date	Buyers	Target	Transaction Value ($M)	EV/Revenue Multiple (x)	EV/EBITDA Multiple (x)	Business Description
04/12/2017	Vmware	Wavefront	NA	NA	NA	Wavefront operates a cloud-based analytics platform for managing data centers.
04/04/2017	ABB	Bernecker + Rainer Industrie Elektronik	NA	NA	NA	Bernecker + Rainer Industrie Elektronik GmbH provides automation solutions.
03/27/2017	Software Aktiengesellschaft	Cumulocity GmbH	NA	NA	NA	Cumulocity GmbH develops software solutions based on cloud technology for the machine to machine (M2M) market.
02/20/2017	ARM	Mistbase AB	NA	NA	NA	Mistbase AB wireless communication solution in the field of Internet of things (IoT).
02/09/2017	Orbotech	Applied Microstructures	$16.9	NA	NA	Applied Microstructures produces technology and equipment used to fabricate microelectronics devices found in smartphones, computers, automobiles, and products that enable the Internet of Things.
02/09/2017	Motivate	8D Technologies	NA	NA	NA	8D Technologies designs and develops wireless, machine-to-machine, and multi-functional point of sale (POS) solutions for bike share and parking systems.
02/08/2017	ETAS Embedaded Systems Canada	TrustPoint	NA	NA	NA	TrustPoint Innovation Technologies develops products and solutions to address the security needs for the Internet of Things and machine-to-machine communication markets.
02/01/2017	Telit Communications	GainSpan	$8.0	NA	NA	GainSpan provides wireless connectivity solutions for Internet of Things applications.
01/30/2017	Technische Werke Ludwigshafen AG	WEBfactory GmbH	NA	NA	NA	WEBfactory GmbH provides web-based automation software for machine and plant construction.
01/26/2017	WIKA Alexander Wiegand SE	Belden, Mobile Machine Business	$39.0	NA	NA	Belden Mobile Machine Control Solutions Business comprises a business unit which manufactures control systems, load moment indicators, and sensors for mobile equipment.
01/24/2017	Cisco	AppDynamics	$4,032.7	18.9x	NA	AppDynamics provides an integrated suite of software application and IT infrastructure monitoring and analytics products.
01/23/2017	International Business Machines	Agile 3 Solutions and Ravy	NA	NA	NA	Agile 3 Solutions is building an innovative suite of products to aid clients in transforming their business operations due to today's complex, challenging, and globally competitive economic climate.
01/09/2017	Digi International	SMART Temps	NA	NA	NA	SMART Temps, a provider of real-time foodservice temperature management for restaurant, grocery, education and hospital settings as well as real-time temperature management for pharmacy, blood bank and laboratory
12/22/2016	TalkPool AB	On Yield	NA	NA	NA	On Yield develops Internet-of-Things sensors and solutions.
12/14/2016	Nagarro	Mokriya	NA	NA	NA	Mokriya develops enterprise mobile applications and software solutions for mobile and Internet of Things.
12/12/2016	Teledyne Technologies	e2v Technologies plc	$812.7	2.7x	12.6x	e2v Technologies plc designs and manufactures technology for high performance systems and equipment.
12/02/2016	Software Aktiengesellschaft	Zementis	NA	NA	NA	Zementis provides on-premise and cloud based software solutions for the agile deployment, integration, and execution of predictive analytics.
12/01/2016	Hammond, Kennedy, Whitney	Xirgo Technologies	NA	NA	NA	Xirgo Technologies develops and supplies customized solutions for wireless machine-to-machine applications.
11/29/2016	API Maintenance Systems A/S	AXXOS Industrisystem	NA	NA	NA	AXXOS Industrisystem provides solutions to monitor, analyze, and visualize the production.
11/24/2016	iSign	GFS Technology	NA	NA	NA	GFS Technology develops and delivers a security platform that enables enterprises to manage and control mobile devices based on their security policies.
11/15/2016	General Electric	Bit Stew Systems	$153.0	NA	NA	Bit Stew Systems provides a data intelligence platform that solves the data integration needs of utilities, oil and gas, aviation, and manufacturing industries.
11/15/2016	iGEM Communications	Globalgig	NA	NA	NA	Globalgig offers mobility, data, voice, and IoT services.
11/15/2016	General Electric	Wise.io	NA	NA	NA	Wise.io delivers better customer experience through machine learning.
11/14/2016	Siemens	Mentor Graphics	$4,544.0	3.7x	23.3x	Mentor Graphics provides electronic design automation software and hardware solutions to design, analyze, and test electro-mechanical systems, electronic hardware, and embedded systems software.
11/14/2016	General Electric	ServiceMax	$915.0	NA	NA	ServiceMax develops cloud-based field service software solutions that help companies to manage contracts, scheduling, and parts.
11/14/2016	Trakopolis IoT	Verigo, Electronic Logbook Assets	$1.1	NA	NA	Electronic Logbook Software Assets of Verigo comprises platform for the fleet operators.
11/11/2016	Belden	Digi	$359.1	1.1x	10.0x	Digi provides Internet of Things networking hardware products and solutions that enable the connection, monitoring, and control of local or remote physical assets by electronic means.
11/01/2016	Intel	MAVinci GmbH	NA	NA	NA	MAVinci GmbH develops and manufactures unmanned aircraft and surveying systems for the surveying and geo industries.
10/31/2016	General Electric	Baker Hughes	NA	NA	NA	Baker Hughes supplies oilfield services, products, technology, and systems to the oil and natural gas industry worldwide.

Industrial IoT M&A Transactions (continued)

Date	Buyers	Target	Transaction Value ($M)	EV/Revenue Multiple (x)	EV/EBITDA Multiple (x)	Business Description
10/27/2016	Analog Devices	Innovasic	NA	NA	NA	Innovasic develops, manufactures, and supplies semiconductor products and software solutions for customers with long product life-cycles.
10/21/2016	Schneider Electric SE	Applied Instrument Technologies	NA	NA	NA	Applied Instrument Technologies designs, manufactures, and services process analytical technology solutions for quantitative and qualitative analysis applications.
10/11/2016	The Hartford Steam Boiler Inspection	Meshify	NA	NA	NA	Meshify develops electronic-device management software for cross-platform measurement, monitoring, and control.
10/03/2016	Rockwell Automation	MAVERICK Technologies	NA	NA	NA	MAVERICK Technologies provides industrial automation, enterprise integration, and strategic manufacturing solutions for clients in the manufacturing and process industries worldwide.
10/03/2016	Emerson	Permasense	$52.1	NA	NA	Permasense engages in the research and development of corrosion monitoring systems and sensor devices for the oil and gas industry.
09/29/2016	Serma Safety & Security	Opale Security Sarl	NA	NA	NA	Opale Security Sarl offers information technology (IT) security consulting services for IT and Internet of Things (IoT) systems.
09/28/2016	SAP SE	PLAT.ONE	NA	NA	NA	PLAT.ONE is completely data-aware with rich data management rules, semantics, security and native storage using Hadoop and major SQL databases.
09/19/2016	MSA Advanced Detection	Senscient	NA	NA	NA	Senscient designs, manufactures, delivers, and installs enhanced laser diode spectroscopy (ELDS) gas detection sensors for industrial applications.
09/19/2016	Graphite Capital Management	Beck & Pollitzer Engineering	NA	NA	NA	Beck & Pollitzer Engineering provides engineering services to manufacturing and industrial sectors.
09/19/2016	Webroot	CyberFlow Analytics	NA	NA	NA	CyberFlow Analytics develops and provides cyber security solutions for end customers and managed security service providers to secure enterprise networks and the expanded Internet of things (IoT).
09/14/2016	General Electric	Meridium	NA	NA	NA	Meridium provides asset performance management software and services worldwide.
09/12/2016	Rockwell Automation	Automation Control Products	NA	NA	NA	Automation Control Products develops and provides centralized thin client and remote desktop server management software solutions for Fortune 100 and Fortune 500 companies.
09/12/2016	Verizon	Sensity Systems	NA	NA	NA	Sensity Systems a high-speed, sensor-based, multiservice, open networking platform that enables light owners to capitalize on the LED conversion process.
09/06/2016	GE Aviation	Arcam AB	$311.3	9.4x	164.8x	Arcam AB manufactures electron beam melting systems for use in additive manufacturing, which create solid parts from metal powders.
09/05/2016	SoftBank	ARM	$31,458.1	22.0x	50.2x	ARM designs microprocessors, physical intellectual property (IP), and related technology and software.
09/04/2016	MAVERICK Technologies	CQS Innovation	NA	NA	NA	CQS Innovation provides control and information systems for manufacturers of medicines, chemicals, and primary metals.
08/30/2016	GE Transportation	ShipXpress	NA	NA	NA	ShipXpress provides cloud-based software solutions, which enable transportation, industrial, and commodities businesses to efficiently operate and collaborate with their supply chain partners.
08/30/2016	Emerson Electric	Locus Traxx and PakSense	NA	NA	NA	Locus Traxx Technologies develops and distributes real-time shipment information solutions.
08/30/2016	Centrica	FlowGem	$17.0	NA	NA	FlowGem detects water leaks through Internet of Things (IoT).
08/23/2016	TELE2	Kombridge	NA	NA	NA	Kombridge AB offers a platform as a service for M2M communication solutions worldwide.
08/19/2016	CompuCom	Extensys	NA	NA	NA	Extensys, Internet of Things provides Internet of Things and managed IT services.
08/17/2016	Würth Elektronik eiSos GmbH	Amber Wireless GmbH	NA	NA	NA	Amber Wireless GmbH is an electronics company that designs, manufactures, and supplies wireless connectivity solutions.
08/16/2016	Emerson Electric	Pentair plc, Valves & Controls Business	$3,150.0	1.8x	NA	Pentair plc, Valves & Controls Business comprises the industrial valves and controls manufacturing business of Pentair plc.
08/16/2016	Magnitude Software	Simba Technologies	NA	NA	NA	Simba Technologies develops data-access connectivity and analytics solutions for relational and multidimensional data sources.
08/16/2016	BullGuard	dojo labs	NA	NA	NA	Dojo-Labs develops a security technology that connects to client's network and acts as the essential layer between their smart devices and threats to their security and privacy.
08/15/2016	The Carlyle Group	NetMotion Wireless	NA	NA	NA	NetMotion Wireless develops mobility management software to manage and secure wireless data deployments for enterprises and organizations with mission-critical connectivity requirements.
08/04/2016	Jilin Zixin Pharmaceutical	Fytagoras B.V.	$0.2	0.2x	NA	Fytagoras B.V. is a scientific company that specializes in the fields of sensor technology, seed technology, and enhancement and content materials.
08/03/2016	EMERAM Capital Partners GmbH	Xovis AG	NA	NA	NA	Xovis AG develops, manufactures, and distributes a portfolio of 3D person tracking sensors and software solutions primarily for airport and retail industries.
08/01/2016	Verizon Communications	Fleetmatics Group PLC	$2,377.6	7.0x	32.9x	Fleetmatics Group PLC provides software-as-a-service mobile workforce solutions for small and medium-sized businesses (SMBs) worldwide.

Industrial IoT M&A Transactions (continued)

Date	Buyers	Target	Transaction Value ($M)	EV/Revenue Multiple (x)	EV/EBITDA Multiple (x)	Business Description
07/27/2016	Infinite RF Holdings	L-Com	NA	NA	NA	L-Com designs and manufactures wired and wireless connectivity products for electronics and data communications industries.
07/21/2016	Zapata Industries SAS	Implant Sciences	NA	NA	NA	Implant Sciences develops, manufactures, and sells sensors and systems for the security, safety, and defense industries.
07/07/2016	Jinan Hanon Instruments	Gesellschaft für analytische	NA	NA	NA	Gesellschaft für analytische Sensorsysteme mbH engages in the development and the sale of analytic sensor systems.
07/05/2016	MTS	PCB	$580.0	3.2x	13.5x	PCB manufactures sensors and instrumentation for measuring static and dynamic pressure, force, load, torque, shock, and vibration.
07/05/2016	Ennoconn	American Industrial Systems	$5.1	NA	NA	American Industrial Systems designs, manufactures, and supplies open architecture, embedded computing systems, and touch panel solutions.
06/30/2016	AcuityBrands	DG L ogik	NA	NA	NA	Dglogik develops software solutions that enable and visualize the Internet of Everything (IoE).
06/22/2016	Omni Ray AG	Dietrich + Blum AG	NA	NA	NA	Dietrich + Blum AG distributes automation, sensorics, components, and connectivity products.
06/21/2016	Verizon Telematics	Telogis	NA	NA	NA	Telogis provides a cloud-based location intelligence software platform.
06/21/2016	Space-Time Insight	GoFactory	NA	NA	NA	GoFactory provides an IoT platform that enables industry and enterprise customers to connect their assets to their workforce.
06/14/2016	Cyan	Connode	$10.2	3.1x	36.0x	Connode manufactures wireless communication products for the Internet of things.
06/12/2016	Xenon Private Equity; AGIC Capital	Gimatic SpA	NA	NA	NA	Gimatic SpA manufactures pneumatic components, interlocking components, electric actuators, and sensors.
06/06/2016	Heptagon	RF Digital	NA	NA	NA	RF Digital designs and manufactures RF module such as wireless RF transmitter, receiver, and transceiver modules.
06/01/2016	Nokia	Withings	$190.0	NA	NA	Withings is known for design and innovation in connected health devices, such as the first Wi-Fi scale on the market.
05/18/2016	ARM Holdings plc	Apical	$350.0	NA	NA	Apical develops imaging and video processing technology to the manufacturers of smartphones and other devices.
05/18/2016	ARM Limited	Apical	$350.0	NA	NA	Apical develops imaging and video processing technology to the manufacturers of smartphones and other devices.
05/05/2016	eBay	Expertmaker	NA	NA	NA	Expertmaker develops and deploys cloud-based data technology solutions that helps automate and optimize data driven decisions and processes for retail, manufacturing, and the Internet of Things (IoT) markets.
05/03/2016	Microsoft	Solair	NA	NA	NA	Solair develops a platform for enterprises to develop IoT applications from sensors, through the edge, to the cloud.
04/29/2016	KATHREIN-Werke KG	noFilis AutoID GmbH	NA	NA	NA	noFilis AutoID GmbH develops a software suite for Internet of Things (IoT) integration and track and trace visualization.
04/28/2016	Cypress Semiconductor	Broadcom, Wireless Internet of Things	$550.0	2.9x	NA	Wireless Internet of Things Business and Related Assets of Broadcom were acquired by Cypress Semiconductor.
04/21/2016	GE	Daintree Networks	$100.0	NA	NA	Daintree Networks develops open networked wireless products and software solutions for lighting and control, monitoring, and optimization of commercial buildings and industrial facilities.
04/21/2016	Cryptosoft	Device Authority	NA	NA	NA	DeviceAuthority offers technology and products to enable high-assurance authentication for machine-to-machine (M2M) and multi-factor security applications.
04/18/2016	Avant	TempoIQ	$3.2	NA	NA	TempoIQ provides the monitoring, analysis, and storage of sensor data for clients' applications.
04/07/2016	Qorvo	GreenPeak Technologies	NA	NA	NA	GreenPeak Technologies BV, a fabless semiconductor/system company, develops ultra-low power wireless data communication controller chips for smart home applications and consumer electronics.
04/06/2016	International Business Machines	Resilient Systems	NA	NA	NA	Resilient Systems is the leading provider of incident management software empowering organizations to thrive in the face of cyberattacks and business crises.
04/06/2016	Wind River	Arynga	NA	NA	NA	Arynga develops vehicle software management solutions.
04/05/2016	Intel	YOGITECH S.p.A	NA	NA	NA	YOGITECH S.p.A provides services and solutions to silicon vendors and system integrators to meet their functional safety requirements.
03/27/2016	Brocade	Ruckus Wireless	$1,299.6	2.7x	61.1x	Ruckus Wireless provides Wi-Fi solutions to service providers and enterprises worldwide.
03/18/2016	National Oilwell Varco	Trac ID Systems AS	NA	NA	NA	Trac ID Systems AS develops and markets system solutions for wireless identification, monitoring, and communication for oil and gas, maritime, and aquaculture industries.
03/17/2016	Analog Devices	SNAP Sensor SA	NA	NA	NA	SNAP Sensor SA designs and manufactures image sensors for digital cameras, cellular phones, and security monitoring.

Industrial IoT M&A Transactions (continued)

Date	Buyers	Target	Transaction Value ($M)	EV/Revenue Multiple (x)	EV/EBITDA Multiple (x)	Business Description
03/09/2016	Kore	Wyless	NA	NA	NA	Wyless provides data connectivity and managed Internet of Thing services for Fortune 500 companies and startups worldwide.
03/04/2016	Cisco	Leaba Semiconductor	$320.0	NA	NA	Leaba is a fabless semiconductor company operating in stealth mode to provide innovative solutions for significant infrastructure challenges.
03/01/2016	Insieme Networks	CliQr Technologies	$260.0	NA	NA	CliQr Technologies develops a single platform for modeling, deploying, and managing applications across physical, virtual, and cloud environments.
03/01/2016	Industrial & Financial System AB	MainIoT Software Oy	$8.0	1.5x	NA	MainIoT Software Oy designs and develops software for Enterprise Asset Management (EAM) and Enterprise Service Management (ESM) and related master data management solutions.
02/18/2016	International Business Machines	Truven Health Analytics	NA	NA	NA	Truven Health Analytics delivers unbiased information, analytic tools, benchmarks, and services to the healthcare industry.
02/12/2016	Amazon Web Services	NICE SRL	NA	NA	NA	NICE SRL provides enterprise grid and cloud solutions for companies and institutions.
02/03/2016	Cisco	Jasper Technologies	$1,400.0	NA	NA	Jasper Technologies provides a cloud-based Internet of Things (IoT) platform that enables various companies to launch, manage, and monetize IoT services on a global scale.
02/01/2016	InnoWave Technologies	Thought Creator	NA	NA	NA	Thought Creator provides strategic planning, network architecture, security, outsourcing and IT management.
01/26/2016	Sony	Altair Semiconductor	$212.0	4.7x	NA	Altair Semiconductor, a fabless semiconductor company, develops ultra low power mobile WiMAX silicon solutions for handsets and handheld devices.
01/19/2016	Rigado	Rivetry	NA	NA	NA	Rivetry operates as an Internet of Things focused product development company.
01/19/2016	Microchip	Atmel	$3,501.2	2.6x	20.5x	Atmel designs, develops, manufactures, and sells semiconductor integrated circuit products.
01/15/2016	International Business Machines	IRIS Analytics	NA	NA	NA	IRIS Analytics GmbH, a software and consulting company, develops and markets the IRIS fraud prevention software products and related services to financial service institutions.
01/07/2016	Yokogawa	Industrial Evolution	NA	NA	NA	Industrial Evolution provides real-time data services. It specializes in services that capture, store, transform, exchange, and present real-time process data.
01/06/2016	Harman	TowerSec	$75.8	NA	NA	TowerSec operates as an automotive cyber security vendor which develops and provides on-board cyber security software to oOEMs, suppliers, and aftermarket telematics manufacturers.
01/04/2016	Intel	Ascending Technologies GmbH	NA	NA	NA	Ascending Technologies GmbH develops and manufactures autopilot systems, unmanned aircraft systems, and multi-rotor technology for professional, commercial, civil, and research UAS applications.
12/31/2015	Silergy	Maxim Integrated, Smart Meter	$105.0	NA	NA	Maxim Integrated, Smart Meter and Energy Monitoring Business comprise smart meter and energy monitoring equipment manufacturing business.
12/22/2015	PTC	Kepware	$118.0	5.9x	NA	Kepware develops software solutions that help bridge the communication gap between diverse hardware and software applications for the industrial automation industry worldwide.
11/03/2015	Fleetmatics Group PLC	Visirun SPA	NA	NA	NA	Visirun SPA provides Software-as-a-Service based fleet management solutions to customers in Italy and internationally.
10/28/2015	Scientific Digital Imaging	Sentek	$3.1	0.8x	NA	Sentek manufactures pH and conductivity sensors, and other electrochemical sensors for water based applications.
10/26/2015	Cisco	ParStream	NA	NA	NA	ParStream GmbH develops and implements high-performance analytical database systems. The company offers ParStream, a big data analytics platform that enables interactive business analysis on dynamic big data.
10/21/2015	Emerson Electric	IntelliSAW	$5.0	NA	NA	IntelliSAW manufactures surface acoustic wave technology based asset monitoring solutions for electric power transmission and distribution assets.
10/08/2015	Sears Holdings	SNUPI Technologies	NA	NA	NA	SNUPI Technologies provides home safety, security, and loss prevention solutions for homeowners.
09/23/2015	Autodesk	netfabb GmbH	$44.2	NA	NA	netfabb GmbH develops software solutions for industrial additive design and manufacturing.
09/17/2015	Alcatel-Lucent	MFORMATION SOFTWARE	NA	NA	NA	MFORMATION SOFTWARE TECHNOLOGIES provides M2M management, Internet of Things, and carrier solutions to connected devices operators, service providers, device manufacturers, enterprises, and automotive manufacturers.
09/08/2015	Minebea	Paradox Engineering SA	NA	NA	NA	Paradox Engineering SA designs and develops solutions and services for industrial condition monitoring, oil and gas, machine-2-machine, home area networks, internet of things (IoT), and engineering and telemetry projects.
08/27/2015	Autodesk	SeeControl	NA	NA	NA	SeeControl develops and operates an enterprise Internet of Things (IoT) cloud service that helps manufacturers to connect, analyze, and manage their products.
08/11/2015	Infor	GT Nexus	$675.0	5.0x	NA	GT Nexus develops and operates a cloud supply chain platform that is used by companies to monitor and orchestrate global supply chains.
08/04/2015	Zebra Technologies	ITR Mobility	NA	NA	NA	ITR Mobility develops and provides cross-platform enterprise applications for businesses.
06/23/2015	Sierra Wireless	MobiquiThings SAS	$15.7	NA	NA	MobiquiThings SAS operates as a mobile operator that provides machine-to-machine multi-operator connectivity options to customers.

Industrial IoT M&A Transactions (continued)

Date	Buyers	Target	Transaction Value ($M)	EV/Revenue Multiple (x)	EV/EBITDA Multiple (x)	Business Description
05/05/2015	PTC	ColdLight Solutions	$103.8	NA	NA	ColdLight Solutions develops a Software-as-a-Service and cloud-based predictive analytics platform.
04/16/2015	ARM Limited	Wicentric	$3.2	NA	NA	Wicentric is a Bluetooth Smart stack and profile provider.
04/14/2015	Microsoft	Datazen Software	NA	NA	NA	Datazen Software provides mobile business intelligence and data analytics solutions.
03/17/2015	365 Agile	Wireless Things	$0.7	1.7x	NA	Wireless Things manufactures electronic components for the Internet of things (IoT) applications.
03/12/2015	Amazon.com	2lemetry	NA	NA	NA	2lemetry operates an Internet of Things (IoT) platform and technology company.
02/25/2015	Avago Technologies Wireless (U.S.A.)	Emulex	$768.2	1.4x	21.6x	Emulex provides network connectivity, monitoring, and management products for networks that support enterprise, cloud, government, and telecommunications.
02/16/2015	Actico Gmbh	ProSyst Software GmbH	NA	NA	NA	ProSyst Software is a software vendor that offers the middleware for the Internet of Things (IoT).
02/06/2015	Palantir Technologies	FT Technologies	NA	NA	NA	FT Technologies offers a suite of software and hardware technologies to retailers.
02/03/2015	Silicon Laboratories	Bluegiga Technologies Oy	$60.8	NA	NA	Bluegiga Technologies Oy designs and develops wireless connectivity solutions to OEMs, device manufacturers, and system integrators.
01/27/2015	Lattice	Silicon Image	$572.0	1.6x	13.7x	Silicon Image provides video, audio, and data connectivity solutions for the mobile, consumer electronics (CE), personal computer (PC), and enterprise markets.
01/20/2015	ORBCOMM	InSync Software	$16.0	NA	NA	InSync Software provides Internet of Things (IoT) enterprise solutions for radio frequency identification (RFID), GPS, and sensor-driven asset tracking applications to enterprises, end users, and managed service providers.
12/30/2014	WOORIRO	CJS	$5.7	0.4x	NA	CJS distributes and provides Internet of Things (IoT), security, system integration, and multi media related products and solutions.
12/22/2014	Sierra Wireless	Wireless Maingate	$90.0	NA	NA	Wireless Maingate provides machine-to-machine (M2M) connectivity and data management services to customers.
12/18/2014	Private Buyer	Rentian Technology	$111.3	NA	NA	Rentian Technology offers data management services and integrated Internet-of-things (IoT) solutions for centralized industrial supply chains, and corporate and enterprise customers.
11/04/2014	Emerson Process Management	Rosemount Specialty Products	NA	NA	NA	Rosemount Specialty Products designs, develops, and manufactures pressure and temperature sensors.
09/30/2014	Schneider Electric SE	InStep Software	NA	NA	NA	InStep Software provides real-time performance management and predictive analytics software solutions.
09/30/2014	Elster Group SE	Eclipse	$158.0	1.3x	NA	Eclipse provides combustion systems and services for industrial processes.
09/19/2014	Huawei	Neul	$25.0	NA	NA	Neul develops and supplies wireless network-as-a-service (NaaS) technology to allow mobile network operators and fixed line operators to provide low power network service to connect small and low-power devices to the cloud.
09/02/2014	TE Connectivity	American Sensor Technologies	NA	NA	NA	American Sensor Technologies manufactures and markets micro-electro mechanical structure (MEMS) pressure sensors, transducers, and transmitters for gauge, absolute, and differential pressure measurement.
07/30/2014	Belden	ProSoft Technology	$105.0	2.1x	NA	ProSoft Technology develops communication and connectivity solutions that link/bridge dissimilar automation products.
07/28/2014	Stadium Group	United Wireless	$23.8	NA	NA	United Wireless specializes in the design and manufacture of machine-to-machine (M2M) wireless solutions that support wireless connectivity between devices across wireless technology, primarily cellular networks.
07/23/2014	PTC	Axeda	$175.5	NA	NA	Axeda develops a cloud-based service and software for managing connected products and machines and implementing machine-to-machine (M2M) and Internet of Things (IoT) applications.
06/18/2014	TE Connectivity	Measurement Specialties	$1,653.5	3.9x	22.3x	Measurement Specialties designs, develops, and manufactures sensors and sensor-based systems for original equipment manufacturers and end users.
06/16/2014	PTC	Atego Group	$50.0	2.5x	NA	Atego Group supplies systems engineering, and embedded/real-time software development tools and solutions.
06/04/2014	ams	AppliedSensor Sweden AB	NA	NA	NA	AppliedSensor Sweden AB designs, manufactures, and sells metal oxide semiconductor (MOS) Sensors and gas sensor components and modules for automotive, appliance, building automation, consumer, sensor, and HVAC's.
05/30/2014	WIKA Alexander Wiegand; Ludgate	Micropelt GmbH	NA	NA	NA	Micropelt GmbH develops and manufactures energy harvesting powered systems, such as micro-actuators and sensors.
05/19/2014	u-blox Holding AG	connectBlue AB	$28.1	NA	NA	connectBlue AB designs, develops, manufactures, and supplies wireless solutions for industrial, medical, measurement/data acquisition, Internet of Things, and quality assurance applications.
05/09/2014	General Electric Company	Wurldtech Security Technologies	NA	NA	NA	Wurldtech Security Technologies provides security solutions against the threat of cyber attack on critical infrastructure.
05/02/2014	Fujitsu Services	GlobeRanger	NA	NA	NA	GlobeRanger develops and operates Internet of Things (IOT) and sensor platform for development, deployment, and management of RFID, mobile, and sensor-based solutions.

Industrial IoT M&A Transactions (continued)

Date	Buyers	Target	Transaction Value ($M)	EV/Revenue Multiple (x)	EV/EBITDA Multiple (x)	Business Description
04/03/2014	PAI Partners; The Carlyle Group	Custom Sensors & Technologies	$900.0	1.5x	NA	Custom Sensors & Technologies designs and manufactures control and motion products.
02/18/2014	LORD	Stellar Technology	NA	NA	NA	Stellar Technology engages in the design, manufacture, and service of pressure transducers and transmitters, load cells, force and torque sensors, and displacement sensors.
02/05/2014	Telefonaktiebolaget LM Ericsson	MetraTech	NA	NA	NA	MetraTech accelerates commerce by providing an unlimited ability for customers to innovate how financial relationships are created, structured and managed.
01/20/2014	Balluff GmbH	Balluff STM GmbH	NA	NA	NA	Balluff STM GmbH develops and manufactures optical sensors.

75th Percentile	**$574.0**	**3.8x**	**32.9x**
Mean	**1,054.7**	**3.5**	**37.5**
Median	**108.1**	**2.1**	**22.3**
25th Percentile	**17.0**	**1.4**	**13.7**

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