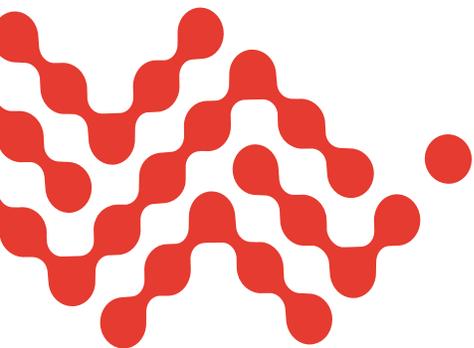




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## What is Data Orchestration and Why it is Shifting the Paradigm for Industrial IoT

According to IoT Analytics, there were a total of 7 billion IoT devices deployed worldwide in 2018; by 2025, this figure is forecast to grow to 22 billion<sup>1</sup>. It is no surprise that the IoT market is seeing such rapid growth. Collecting and analyzing data from physical assets has huge potential to increase a company's productivity and streamline its operations. The IoT can also support exciting new usage-based business models and transform the customer experience.



Even as the IoT landscape is bristling with possibility, the arena of the original equipment manufacturing industry is yet to witness its transformative effects. Indeed, analysts have argued that the IoT in the context of industry – ie the Industrial IoT (IIoT) – ought to be making a greater impact on industrial companies' bottom lines. One of the main reasons why outcomes of IoT adoption haven't met expectations is because of the various challenges inherent in dealing with the avalanche of data streaming from the millions of fixed and mobile assets deployed around the world. Companies are likely to find themselves buried in data, which is coming in far too quickly to analyze, process and act on.<sup>2</sup> Further, IoT adoption amongst industrial companies is further complicated by the daunting challenge of actually building an IoT infrastructure, and the difficulties involved in making different parts of the infrastructure – the devices, network connectivity, and cloud applications – work together.

It's these central problems that stand in the way of successful IoT implementations and keep a majority of IoT projects from moving beyond the ideation stage. Against the backdrop of these factors, this white paper seeks to:

1. Examine common problems in building an IoT infrastructure: Difficulties associated with sourcing different parts of the infrastructure from different vendors, and problems around the lack of interoperability between operations technology (OT) and information technology (IT), which frustrates efforts to kick Industrial IoT projects off the ground.
2. Challenges associated with processing, and acting on, voluminous quantities of data; looking at recent innovations in the IoT landscape, particularly distributed data orchestration at the deep edge, and how such advances can help obtain and act on the right data at the right time.
3. Make a case for how an "all-in-one" (or "single-throat-to-choke") approach, along with distributed data orchestration, can be used to circumvent these problems and accelerate time to market. Specifically, this white paper will look at how Sierra Wireless Octave™, the all-in-one edge-to-cloud solution for connecting industrial assets, can help companies overcome the challenges that the Industrial IoT presents, and how to use this technology to increase efficiencies, prove ROI, and improve the bottom line.

## Driving the New Age of IoT

The earliest instantiation of the IoT can be traced back to a vending machine at Carnegie Mellon University. Graduate students at the university created a rudimentary device that allowed them to ascertain if the vending machine had any cold cans of soda pop available<sup>3</sup>. Since then, the IoT has grown beyond the expectations of its early pioneers. This new age of innovation in IoT has been enabled by two major developments:



- **NEW CELLULAR STANDARDS DESIGNED FOR IOT:** 3GPP Low-Power Wide-Area (LPWA) cellular technology provides a standardized, affordable path to extend the IoT to practically limitless use cases. New LPWA cellular standards offer a means to collect sensor and asset data from remote devices that rely solely on battery power. They expand coverage to anywhere that LTE networks reach – effectively anywhere in the world – while reducing connectivity costs with solutions designed and priced specifically for IoT applications. According to ABI research, LPWA network connections will expand from 27 million in 2016 to over 3 billion by 2025.<sup>4</sup>
- **THE EMERGENCE OF THE ‘DEEP EDGE’:** For the IoT to fuel business transformation, the industry has to rethink where the intelligence in distributed IoT applications should live: In the device? At the network edge? In the cloud? The answer: All of the above. New ‘deep edge’ IoT technology intelligently distributes data processing capabilities across cloud, local edge networks and IoT endpoints themselves. It allows enterprises to deploy sophisticated IoT applications, even when using small, constrained endpoints that are deeply embedded in the assets they are tracking.

## Bottlenecks and Roadblocks

Despite the recent advances in technology and capabilities, IoT implementation remains difficult for most companies – research by Cisco suggests that three out of every four deployments fail.<sup>5</sup> Real-world IoT implementations are still very challenging primarily due to two reasons: The massive complexity involved in creating, managing and updating IoT applications, and the difficulties companies face when extracting, analyzing, and acting on huge amounts of data.

### SOLVING THE COMPLEXITY OF INDUSTRIAL IOT

IIoT applications are incredibly complex. Gathering data from the edge, across a diverse and distributed range of endpoints is a major challenge even for tech-savvy organizations with large budgets and engineering resources. IIoT applications require significant end-to-end infrastructure in order to transmit and process the data they produce and integrate it into systems such as enterprise resource planners (ERP)



and customer relationship management (CRM) systems. It can take a company years to build out the systems to connect its remote assets as the process requires sophisticated expertise in a number of areas (see Table 1.) Alternatively, the company may have to partner with several different vendors for all of the different elements required to build an IoT solution, creating a disjointed, inflexible architecture that is difficult to manage.

#### MANAGING THE DATA TSUNAMI

Even if a company manages to get all of its IoT infrastructure in place and working efficiently, it still has the problem of handling vast volumes of data processed from thousands, hundreds of thousands or even millions of devices – whatever the case may be. According to Deloitte, designing and building enterprise-scale IoT solutions requires a balance of both edge and cloud processing.<sup>6</sup> If a company only relies on cloud processing, it could face cost, bandwidth and latency issues, as it must transmit huge amounts of unfiltered information. By contrast, relying only on edge processing can cause immense complexity, as huge numbers of devices would need to be managed and updated. Security also becomes more difficult due to the large amount of possible attack points. What is required is a solution that allows data to be efficiently processed both in the cloud and at the edge, using the same framework.<sup>7</sup> Companies should be able to easily orchestrate the flow of IoT data from the cloud to the edge and back. But most vendors offer only cloud or edge integration, but never both together.

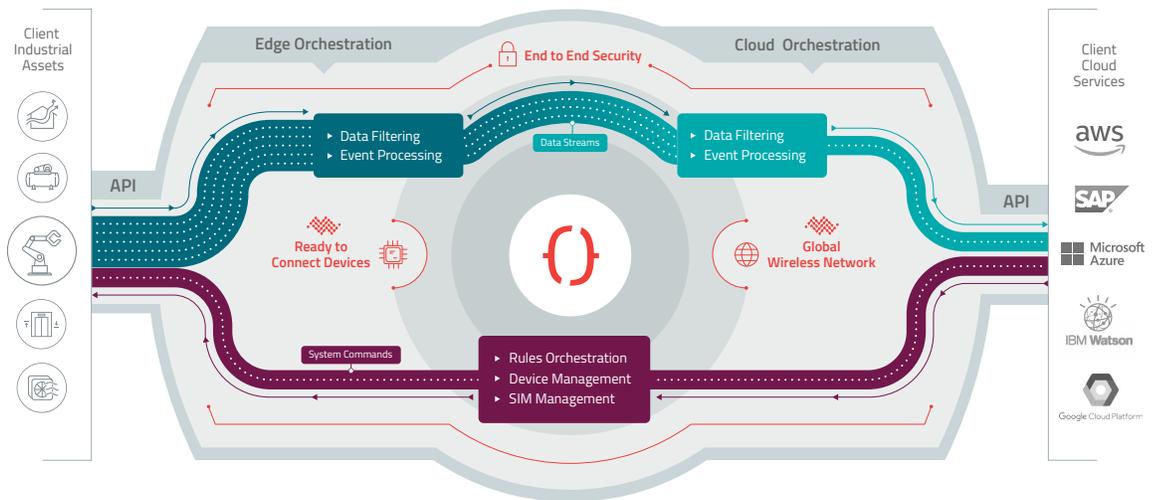
This is especially important when considering power consumption. Although LPWA technologies are significantly more energy-efficient than legacy connectivity options, they still consume some power when transmitting data. If devices are meant to be deployed in the field for up to 10 years, then it is imperative that they are capable of long battery life. Data needs to be intelligently processed so the device's power is not consumed unnecessarily. This requires a data orchestration system that allows companies to remotely control and easily change what information is collected and processed at the edge.

## Accelerate Data-Driven Transformation with Octave™

Sierra Wireless Octave™, the all-in-one edge-to-cloud solution for connecting industrial assets, has proven to be a catalyst for data-driven transformation. Octave lets industrial companies securely extract, orchestrate and act on data from their industrial equipment to their cloud infrastructure, while efficiently managing their connected machines. In essence, Octave solves both the complexity challenge and the data orchestration challenge, whilst also offering reliable end-to-end security.

### THE ADVANTAGES OF AN ALL-IN-ONE EDGE-TO-CLOUD SOLUTION FOR THE INDUSTRIAL IOT

What makes Octave unique is that it is an all-in-one edge-to-cloud solution. This means that it integrates all the elements that companies need for their IoT applications including device modules and gateways, wireless connectivity, and cloud APIs. By choosing a pre-built, out-of-the box infrastructure, companies can focus their development away from complex device and connectivity choices, and more on innovation. Octave can also extract information from a wide variety of equipment types, using both modern and legacy communication protocols. As it is based on 'deep edge' technology, it allows companies to optimize and orchestrate data from the edge to the cloud.



### Advanced Data Orchestration

Octave uses a JavaScript-based filtering engine to process data at the network edge before sending it to the cloud. This acts as a flexible, fully configurable "data center" for managing and prioritizing asset data. It provides the intelligence to buffer, filter, correlate, store and forward readings from edge devices so that companies have exactly the data they need, exactly when they need it. As a result, Octave gives developers control over the entire data layer stack. They can dynamically determine which data will be processed, extracted and transmitted from their IoT assets, on an

ongoing basis.

Once asset data has been correlated or forwarded, Octave provides the tools to easily assemble it into “event streams,” the organizing unit for managing IoT data in the cloud. Unlike conventional IoT solutions that limit developers to inflexible, even hardcoded logic, Octave allows developers to publish and subscribe to whichever filtered streams make sense for a given purpose. They can easily change this logic to refine or expand the application.

Indeed, the ability to change data processing rules at the edge on a real time basis – something which is otherwise accomplished using a firmware over the air (FOTA) update – is what makes Octave and its data orchestration abilities unique. This is important as companies often only know the optimal formula for shaping their data transmissions after they have deployed their devices. Also, the exact data required may differ over the lifespan of the asset, as business priorities change. Being able to easily change edge device rules and configurations, and update the applications when needed, is a major advantage. It allows companies to ensure that only the data that is relevant is sent – both now and in the future. This prevents battery depletion and keeps devices operational. It also makes maintenance easier and less costly. As a result, Octave makes it much easier to manage the long deployment lifecycles of IoT systems.

In addition, by having the device, network and cloud API in the same layer, Octave’s data orchestration allows IoT data to be seamlessly integrated into all major ERP or CRM systems for analysis. The goal of IoT deployments is to enable companies to glean meaningful insights from their assets. With Octave, companies no longer have to worry about re-inventing their infrastructure; they can concentrate on acting on the data that matters to them. Octave also offers an aggregated view and control over all equipment from a single interface. Manufacturers can control both their data and device from the cloud, giving them the flexibility to fit their unique needs.

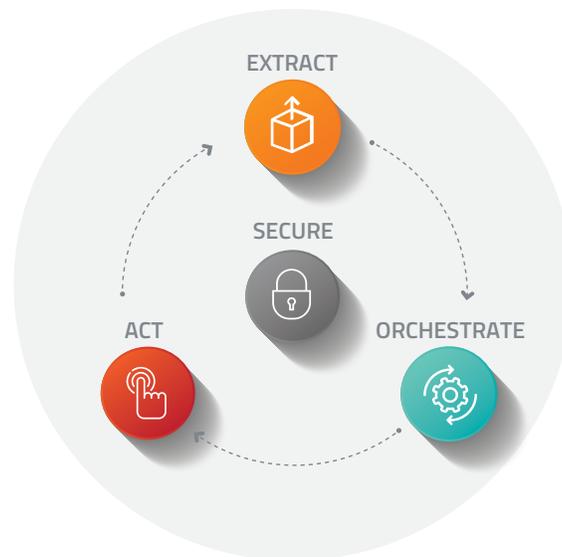


## SCALING FROM PROOF OF CONCEPT TO COMMERCIAL DEPLOYMENT HAS NEVER BEEN SO EASY

It is challenging and time consuming for companies to build out their own IIoT infrastructure. It requires a large amount of expertise across different areas, which many firms will not have. Also, typically there is a need for custom integration between the device, the edge network, the connectivity layer and the platform. And once the system is up and running, companies then have to manage the ongoing costs of data usage, software, support and maintenance. They will need a life-cycle management strategy for monitoring and maintaining the devices in the field for five-plus years.

Alternatively, some companies will buy off-the-shelf solutions for specific applications. But this leaves them with having to manage multiple partners responsible for different elements of the IoT infrastructure. The result is an architecture that is disjointed and broken down into silos, with little flexibility. Having multiple vendors and solutions in place can also increase costs.

Octave is a single IoT solution, covering everything from the equipment at the edge, to the cloud. This reduces time-to-market and creates a more efficient, cohesive operating environment. By offering a single point of management for device and SIMs, ongoing administration is also much easier.



## INDUSTRIAL IOT DEVELOPMENT MADE SIMPLE

The Octave platform is designed to be user-friendly. It allows developers to program from one integrated web console using an easy programming interface and one common JavaScript framework. It also provides a well-documented development toolkit, and attempts to eliminate all complexities, so developers can iterate fast.



In fact, the first devices can typically be connected within hours. And, crucially, developers are able to optimize back-end code after the solution is launched. Octave is also cloud-agnostic, supporting major cloud service providers including Amazon Web Services, Microsoft Azure, Google Cloud and SAP.

Industrial IoT solutions like Octave have the potential to greatly simplify IIoT development, in the same way that the rise of comprehensive cloud solutions have done for computing. By taking away the complexity in connecting, configuring, maintaining and scaling computer infrastructure, companies like Amazon and Microsoft have allowed enterprises to focus on building applications and collecting and analyzing data.

#### DE-RISK YOUR INDUSTRIAL IOT DEPLOYMENT

Sierra Wireless has over 25 years' experience in the IoT. Given the enormous difficulties and high failure rates surrounding IIoT projects, it makes sense to partner with a company that has the expertise and experience to deliver. In that context, Sierra Wireless Octave is a "single-throat-to-choke" as it eliminates the need to coordinate between multiple vendors to manage the various parts of their IIoT infrastructure. The ease and simplicity that an all-in-one edge-to-cloud solution brings cannot be underestimated – for too long, companies have had to go to multiple hardware vendors and SIM suppliers, which brings enormous operational and logistical difficulties. As Octave is optimized for cellular networks across the world, it makes scaling much easier. Octave is ready to connect and manage billions of things.

#### WITH OCTAVE, SECURITY ISN'T SOMETHING YOU HAVE TO DO - IT'S SOMETHING YOU GET

Implementing security in real-world IIoT installations is still hugely complex. This becomes even more challenging when a company has large numbers of devices, with data being processed at the edge, as it exponentially increases the surface area for cyber attacks.<sup>8</sup>

Sierra Wireless is highly experienced in IIoT security. We offer a data vault and secure end-to-end data transmission from the edge to the cloud. We ensure that no data

is accepted from, or sent to, unauthenticated sources or destinations. Sierra also provides increased control over connected assets, to prevent them from becoming weak points in the security chain. This includes touch provisioning (certified modules are pre-provisioned with certificates at the time of manufacturing), automated onboarding with security keys to authenticate connected devices (secure boot) and secure device updates. The result is your developers get a system with built-in trust, so they can focus on building great applications instead of reinventing security infrastructure. In other words, data security isn't something that companies would have to ensure, it's something that comes with Octave.

## Start with Sierra

The IIoT is the next step in your journey. It offers unprecedented opportunities for customer service and business model transformation. The key to success is working with a provider that brings scalability, speed, and security in one easily deployable package.

Learn more at: [www.sierrawireless.com/octave/](http://www.sierrawireless.com/octave/)

### About Sierra Wireless

Sierra Wireless (NASDAQ: SWIR) (TSX: SW) is an IoT pioneer, empowering businesses and industries to transform and thrive in the connected economy. Customers Start with Sierra because we offer a device to cloud solution, comprised of embedded and networking solutions seamlessly integrated with our secure cloud and connectivity services. OEMs and enterprises worldwide rely on our expertise in delivering fully integrated solutions to reduce complexity, turn data into intelligence and get their connected products and services to market faster. Sierra Wireless has more than 1,300 employees globally and operates R&D centers in North America, Europe and Asia.

For more information, visit [www.sierrawireless.com](http://www.sierrawireless.com).

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