Sensing problems before they occur, with big data analytics

Sensus can proactively identify IoT device performance trends and respond faster to customers using big data

Business need
Sensus needed to increase its data set size to be able to more easily visualize meter sensor performance problems.

Solution
The company implemented a data cluster and a data lake, based on Dell, Hadoop and Intel® technologies, which consolidate manufacturing, testing and other data streams.

Benefits
- Quickly analyzes data from 17 million gas, electric and water meter sensors
- Proactively identifies device problems, helping prevent future device failures
- Uses real-time device data to redefine, validate and create better communication networks
- Enables tenfold improvement in investigation response time and processes ad hoc queries in under a minute
- Uses data to design and deliver higher-quality products

Solutions at a glance
- Big Data
- Internet of Things
- Servers

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Each day, more than 17 million smart devices across North America capture data about gas, water and electric use. The Internet of Things (IoT) devices, operated by solution provider Sensus, send data to a back-end system used by utilities and other Sensus customers. With the data, these customers can monitor usage and better conserve resources.

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> *Director, RMA, Sensus*

In recent years, Sensus has sought to give its customers deeper insights by increasing the size of its data sets. "Our network is capable of holding 60 days' worth of data, but that's just a snapshot in time when you're looking at device performance," says Mike McGann, vice president of quality at Sensus. "Many of these products will be in the field for 20 years, so we need to be able to assess that performance over time — not just for how they perform in the first year, but how they are performing in year 10."

Seeking to become proactive, not reactive
Specifically, Sensus wanted to gain more proactive capabilities around its Returned Materials Authorization (RMA) application, which analyzes problematic devices returned to Sensus by customers. "We wanted to help our customers understand the issues they were experiencing before they were even able to identify them on their own," says Anne Mushow, director of RMA at Sensus.

For Sensus, becoming more proactive by expanding data sets was a major challenge, because it relied on 300 separate databases for device data. "We had a ton of information from many disparate sources, and we had to manually do analysis on each database," says Mitchell Hensley, technical product manager of analytics at Sensus. Adds Mushow, "Being able to look at large data sets from sources like manufacturing data and actual customer data was key, but we needed to

incorporate all that data into one easily usable location."

In addition, Sensus needed to respond to customers' requests to read meters more frequently. "Our customers used to ask for one read a month or one meter read per day. Now they want reads once an hour, or even every five minutes on some meter configurations," says Geoff Haisty, senior principal software engineer at Sensus. "That has dramatically increased the amount of data that we store. When you go from one read per day to one per hour, that's 24 times the amount of data."

Improving analytics with a Dell and Intel big data solution
A longtime Dell customer, Sensus once again chose to partner with Dell on a Hadoop big data solution. Sensus attended a Dell Solution Center for an in-depth briefing and discussion about its big data strategy. Following this, Sensus decided to deploy a new big data solution based on Dell PowerEdge R730 and R730xd servers with Intel® Xeon®

Products & Services

Hardware
Dell PowerEdge R730 and R730xd rack servers with Intel® Xeon® processors E5-2600 series

Partner
Cloudera for Hadoop

processors E5-2600 series. "We have an ongoing relationship with Dell, and Intel, to serve the hardware needs of Sensus and our customers," says Haisty. "Dell works closely with us not only to understand what our needs are, but also to project the hardware roadmap that is coming up. We chose the Intel processors because of their speed and efficiency, and we specifically worked with Dell to get the latest hardware and the latest chips from Intel because of the amount of computing capacity we knew we would need."

The PowerEdge R730xd is the backbone of a new Sensus big data cluster and data lake. The company uses the cluster to ingest manufacturing, testing and RMA data streams, as well as supply chain data. "We've created a data lake for the company to use as a resource," Hensley says. "It isn't owned by my department or owned by the engineering department. It's a companywide resource that allows other departments within the company to create new applications, design new processes and be more efficient, because now they have powerful data to use to make those decisions."

The company uses an Apache Hive query engine with Spark SQL to give data analysts the ability to do real-time processing. Sensus uses the solution as a test bed, analyzing usage and performance data from hundreds of thousands of meters. "We use the data lake to look for similar behaviors and information we can leverage to look for patterns. This helps us make faster decisions on whether that particular device should be changed or redesigned to account for how it's being used in the field," says Hensley.

Using big data to proactively identify performance trends
Sensus can now use a proactive approach to identifying device performance for its customers because the big data solution can support a higher volume of data. "We can expand 60 days' worth of data to an infinite amount of data using the Dell and Intel solution, which helps us spot performance trends in the 17 million smart points we have deployed," says McGann. "That helps us prevent issues in the devices."

The company can also be more proactive about its RMA application. "When you're trying to understand performance variation and investigate what caused an issue for a customer, having the full history we can get now with the Dell solution is absolutely key," says Mushow. "Data is important because numbers don't lie. The Dell and Intel solution allows us to get to the facts. And the way that would affect the customer is if we had a loss of communication, for instance. We can look at the signal-to-noise ratio trend over the full history of that unit, and if it was something in the environment or the actual unit performance that caused the problem."

Building better communications networks
Sensus plans to use its proactive capabilities to improve its device communication infrastructure. "One of the ways we're transforming the business at Sensus from a reactive to a proactive model is by utilizing our Dell data lake in other applications and design tools," says Hensley. "Our communications network team is taking the data we've collected and using it to validate theoretical designs of networks they've done in the past. So now they have real-time data from real devices about how they're performing in their environment, which enables them to redefine, validate and create better-quality networks in the future."

Responding faster to customers
Using its big data solution, Sensus has seen a tenfold improvement in the response time of its RMA investigations. Additionally, the company can process ad hoc queries faster than before. "We have about 200 terabytes of data in our

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With faster analysis, the organization is now able to get performance data more quickly than before. "Before, it might have taken us a week or two to process data because we were doing it manually and pooling it from different systems," McGann says. "Now, our project managers can instantly get a customer's full data set. Having this data at our fingertips makes us a lot quicker on response time and allows us to provide faster and more accurate results, with defined metrics, to the business so that we make really good decisions with real data."

Designing and delivering better products

The company is also able to design and deliver more-effective products to its customers. "We work very closely with our product marketing teams as we're going through the trends and the analytics, and it really helps them shape the next set of requirements for products that we want to develop for our customers," McGann says. "Our manufacturing partners benefit from this data as well, and we're able to communicate with them much more quickly when we are seeing trends, showing them the data and driving process improvements right there on the factory floor. We've been able to improve the quality of our new products coming out of the factory based on the data analytics we've been doing with the

Dell big data solution."

Relying on its analytical platform, Sensus is poised to take advantage of new opportunities in the future. "Where we hope to take this Dell and Intel solution is to open doorways to recognize potential services we can provide to our customers," says McGann. "We can now look at trends in performance and moving forward, push that envelope to become more predictive, which will help utilities leverage the benefits of better data."

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