RF Code Delivers Millions of Dollars in Annual Power & Cooling Savings for CenturyLink

CLIENT PROFILE

CenturyLink Technology Solutions is the second largest telecommunications company in the US and is recognized as a leader in the network services market by technology industry analyst firms, including Gartner. As a global provider of cloud infrastructure, co-located and hosted IT solutions for enterprise customers, CenturyLink provides data, voice and managed services through its high-quality advanced fiber optic network and multiple data centers.

The company currently manages over 55 data centers in North America, Europe and Asia. CenturyLink, based in Monroe, LA, is an S&P 500 and Fortune 500 company.

More information about CenturyLink is available at http://www.centurylinktechnology.com/.

> *"With RF Code, we have automated control, real-time data and a precise method to manage our data centers."*
> - Joel Stone, Vice President of Global Data Center Operations, CenturyLink Technology Solutions

OBJECTIVE: TO DRIVE ENERGY EFFICIENCY AND REDUCE COSTS

A conversation in 2011 between Joel Stone, Vice President of CenturyLink's Global Data Center Operations and John Alaimo, CenturyLink Data Center Systems Engineer, raised an interesting question: 'How can we lower the amount we are spending on powering and cooling our data centers?'

At the time CenturyLink was spending over $80 million every year on electricity in its data centers. This meant the question was more than just rhetorical: it was essential and business-critical to find an answer.

The solution began with inlet temperatures. Measurements showed that discharge temperatures were averaging 55°F, which fell a long way short of ASHRAE guidelines (guidance related to heating, ventilation, and air conditioning that helps ensure efficient data center power and cooling management).

With inlet temperatures that low it was clear the air in the data center was being overcooled, wasting power and money in the process. To combat this, a goal was set to raise server inlet temperatures to a more financially sustainable 75°F.

When the engineering team took its own readings, they found major temperature disparities across its data centers, with variations as high as 10°F, but the limited, inadequate temperature monitoring equipment in place meant it was impossible to gain accurate visibility and even harder to implement consistency across its facilities.

CenturyLink was already aware that for every 1°F that rack air intake temperatures were raised, 2% of its annual power costs could be saved. However, a balance had to be struck between raising temperatures to reduce costs and avoiding the risks from overheating the data center, which could potentially compromise the reliability of IT equipment, its customer Service Level Agreements (SLAs) and its entire business continuity.

"We knew there were some 'low hanging fruit' options we could take, but they wouldn't have been enough," commented Stone. "Hot and cold aisle separation as well as blanking panels were obvious places to start, but without continuous visibility into the data center's temperatures, those measures alone would not allow us to achieve our desired results. We have to be extremely precise about our data center operations, so we looked for an environmental monitoring solution that would mirror this."

SELECTION PROCESS

CenturyLink was specific in its requirements. Having considered a wireless solution five years previously when the technology was less mature, it looked at the market again and this time decided the technology was now essential for a successful deployment. This is due to clear advantages including:

- Ease and speed of deployment of sensors and supportive equipment
- Independence from power – no need to run power infrastructure to every sensor
- Ability to scale sensors in line with data center growth
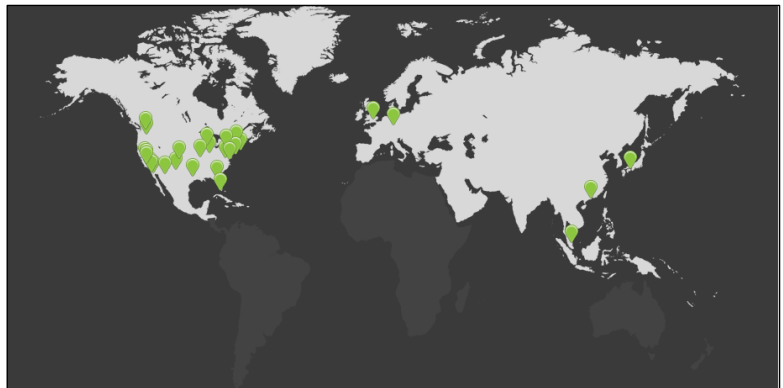
CenturyLink has over 55 state-of-the art global data centers across North America, Europe and Asia with more than 2 million square feet of raised floor space.

The company needed a wire-free solution with long-lasting battery life, 100% accurate sensors and a secure network for audit purposes. Also important was the solution's flexibility during deployment and integration with CenturyLink's existing Building Management System (BMS).

"There were fundamental issues around raw cost and charging back to the organization," said Alaimo. "We evaluated a range of monitoring solutions and found RF Code was the superior technology. It was the only product to fully meet all our needs."

RF Code worked with CenturyLink to plan and deploy a solution. Wire-free RF Code sensor tags (each only the size of a match-book) were mounted at each of the server rack inlets, and a dedicated Power over Ethernet (PoE) network was set up to connect and power the RF Code readers positioned in the data center ceiling.

Protected further by an uninterruptable power supply, the standalone, secure system was also fully integrated into the facility's BMS.

"Many data centers are still controlled manually, but with RF Code we have automated control, real-time data and a precise method to manage our data centers," continued Stone. "Another advantage is that, because we are a co-location operator, many of our customers are focused on their SLAs. We now have accurate sensors to give us the data we need to meet our SLA requirements without impacting on the customer's environment."

CHALLENGES

CenturyLink selected a single project site for the first implementation, a 65,000 square foot data center in Los Angeles that also incurred particularly high annual energy costs.

The challenge within this specific data center was addressing the apparent inefficiencies around server-level temperatures and the humidity evident across the facility.

The team began by gradually raising AHU supply air temperatures to reduce humidification. With RF Code's system providing real-time visibility of the data center environment, CenturyLink was able to interpret the data provided and make adjustments to optimize the environment safely and within recommended ASHRAE limits.

VALUE OF THE SOLUTION

Its cautious approach during the first stage of deployment involved the collection of sensor data, careful analysis of the effects of raising the temperatures and then manual adjustments to the cooling systems.

With increased visibility across the data center, CenturyLink identified hot spots and made adjustments to equipment accordingly, which involved the resetting of CRAH supply air temperatures.

Once the team was confident the data was accurate, they integrated the real-time data into their BMS system, which can now make automated adjustments to environmental conditions.

Prior to rolling out the RF Code sensors, AHU supply air temperature measured 55°F, and average server inlet temperature averaged 67°F. Following the implementation, these figures had safely risen to 68°F and 76°F respectively.

| Classes (a)	Equipment Environmental Specifications							
	Product Operations (b)(c)					Product Power Off (c) (d)		
	Dry-Bulb Temperature (°C) (e) (g)	Humidity Range, non-Condensing (h) (i)	Maximum Dew Point (°C)	Maximum Elevation (m)	Maximum Rate of Change(°C/hr) (f)	Dry-Bulb Temperature (°C)	Relative Humidity (%)	Maximum Dew Point (°C)
Recommended (Applies to all A classes; individual data centers can choose to expand this range based upon the analysis described in the ASHRAE paper)								
A1 to A4	18 to 27	5.5ºC DP to 60% RH and 15ºC DP						
Allowable								
A1	15 to 32	20% to 80% RH	17	3050	5/20	5 to 45	8 to 80	27
A2	10 to 35	20% to 80% RH	21	3050	5/20	5 to 45	8 to 80	27
A3	5 to 40	-12°C DP & 8% RH to 85% RH	24	3050	5/20	5 to 45	8 to 85	27
A4	5 to 45	-12°C DP & 8% RH to 90% RH	24	3050	5/20	5 to 45	8 to 90	27
B	5 to 35	8% RH to 80% RH	28	3050	NA	5 to 45	8 to 80	29
C	5 to 40	8% RH to 80% RH	28	3050	NA	5 to 45	8 to 80	29

ASHRAE 2011 updated temperature and humidity ranges for data centers (Source: ASHRAE Technical Committee 9.9, 2011)

Not only did this bring temperatures within ASHRAE guidelines and enable CenturyLink to meet its SLAs, it also provided the company the environmental data it needed to open its Economizer window, allowing for **thousands of additional hours of free cooling.**

RESULTS AND NEXT STEPS

Based on its current data center footprint and power costs, CenturyLink identified **annual savings of $2.9 million.**

This figure is expected to rise as power costs increase and as outsourcing drives greater asset density in the data center. The more data the global economy sends to the data center, the more organizations like CenturyLink will see the benefits of optimization. The company's investment in optimization and power sustainability will continue to yield savings as growth continues.
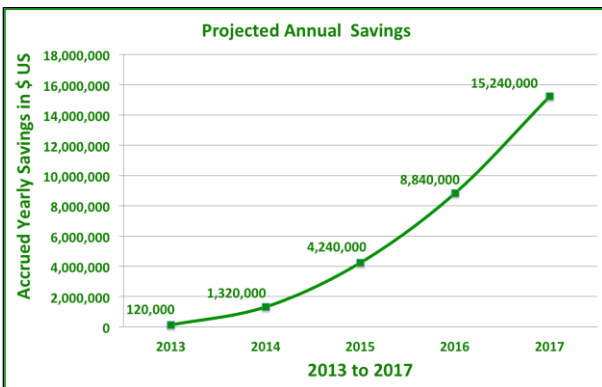
As CenturyLink completes their RF Code deployment worldwide, enhanced data center visibility and efficiency will deliver accumulated value and savings year after year.

The cost for its initial project - the Los Angeles facility - was $110,000, 40% of which was the custom integration with the BMS system.

The savings the company made by raising temperatures during 2013 were **$120,000 – a return on investment within just 11 months.**

CenturyLink is now implementing RF Code at a **further 11 sites**, and will complete deployment of the RF Code solution by the end of 2014. A streamlined deployment process,

developed with RF Code, allows its implementation teams to roll out the solution quickly and efficiently.

Once the 2014 deployments are complete, **CenturyLink is forecasting savings of $1,205,000 for this year alone, with savings accruing each year thereafter**. As CenturyLink continues its analysis of the RF Code data, makes further efficiency improvements, and extends its rollout of the RF Code solution to the rest of its 55+ data centers around the world it expects to identify even more savings.

But the value of the solution extends beyond lowering operational expenses: CenturyLink customers are realizing additional value. Alaimo concluded, "The benefits are not only cost related. We can now demonstrate we are meeting our SLAs because we have so much more data within our facilities. ASHRAE's guidelines recently standardized on sensors, with three sensors installed in every third rack, and this matches our own system. Not only are we saving vast energy and expenditure on cooling, we are able to mitigate risks and have greater visibility of the environment."

ABOUT RF CODE

RF Code is the world's fastest growing, leading provider of distributed IT environmental monitoring and asset management solutions. Its patented tracking and sensor technologies are deployed by many of the Fortune 250 and help manage the global data centers of some of the largest IT service providers.

RF Code is an essential component of the asset management, risk and compliance assurance and automated control systems in healthcare, IT services, industrial supply chains, and natural resources/oil and gas industries. RF Code is a privately held company whose investors include Yet2Ventures and Intel Capital. The company is headquartered in Austin, TX, with offices and partners in the UK, EMEA, Australia, Asia and South America. http://www.rfcode.com.

ABOUT THE INDUSTRIAL INTERNET CONSORTIUM

RF Code has been a member of the Industrial Internet Consortium since May 2016. The Industrial Internet Consortium is a global public-private organization of over 250 members, formed to accelerate the development, adoption and wide-spread use of interconnected machines and devices, intelligent analytics, and people at work. Founded by AT&T, Cisco, General Electric, IBM and Intel in March 2014, the Industrial Internet Consortium catalyzes and coordinates the priorities and enabling technologies of the Industrial Internet. Visit www.iiconsortium.org.