Casa Smed Ditches DALI for Bluetooth

Background

How do you plan, provision, program and verify the control of 220 networked lights from scratch in 2 days, all while solving thermal issues and training a new controls integrator? This was Xicato's challenge in our first residential project using XIM Gen4.

In late 2016, Mogens Smed, CEO and Director of DIRTT Environmental Solutions, contacted his friend Rolf Hurbin, CEO of Senso Lighting, to help him in the design and implementation of "Casa Smed", his new rustic-modern home south of Calgary in Alberta, Canada.

Choosing the Lights

Casa Smed incorporates prefabricated building modules from DIRTT, including exposed wood plank and beam construction, with wood floors, a large stone fireplace, wood and leather furniture, a large marble counter, and multiple works of art on the walls. Senso Lighting created custom Latona 5 recessed downlight fixtures to fit into the wood plank ceiling. To properly display these rich, varied materials, they chose Xicato Artist Series in 3000K, which provides halogen-quality lighting with TM30 fidelity index (Rf) of 96 and gamut index (Rg) of 103.

Casa Smed great room, showing Senso Lighting Latona 5 downlights with Xicato XIM Artist Series shining on rich wood, stone, marble and leather surfaces.

Controls: Designing the Smart Home

DIRTT is heavily focused on innovation in the construction of high quality buildings, and Mogens wanted his new home to incorporate the latest Smart Home technology. Rolf recommended Xicato's XIM Gen4, which not only integrates a deep, smooth dimming driver, but offers the choice of DALI or Bluetooth control.

But Mogens wanted to control everything. So he hired Greg Fukushima of GiCor Home Technologies, who worked with electrical contractor James Robinson of Wave Technical to design and implement a sophisticated, multi-application control system. Greg designed a complex, multi-vendor system that included:

- Amazon Alexa™ voice controls
- Control4 smart home central controllers
- Lutron RadioRA2 bedside controls for audio, window shades, and ceiling fans
- Zigbee motion sensors in the bathroom to control bathroom lighting
- Adeo DALI controllers

Alexa, Zigbee, and RadioRA all talked to the Control4 system, which issued the appropriate commands to the various devices. The original concept was to use DALI to control the lighting. But there were problems.

Problems with DALI

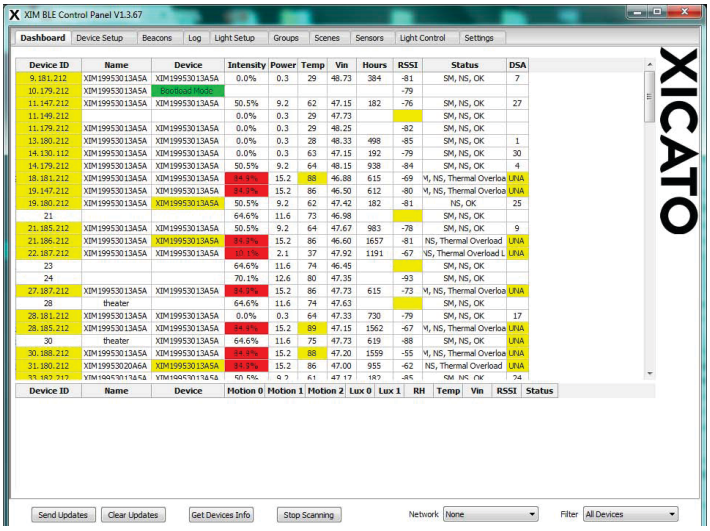
Greg and James had a devil of a time getting the DALI system to work. Was it the cables? Was it a DALI addressing issue? Was it power? Was it the Adeo controller? Was it the Control4 programming? In all, they spent 2 months trying to debug the system. No success. Much frustration.

So Dylan Halliday, Controls Engineer at Senso, contacted Xicato for help.

Four of the five Adeo DALI masters that are no longer needed

Diagnoses and Cures

The first day on the site, Dylan and Xicato fired up the Control Panel application and noticed a number of issues. Some of the XIM had not finished updating, and were still running old firmware. So the first thing they did was to perform an over-the-air (OTA) update on several of the modules. This was not affecting the DALI system, but it did enable full Bluetooth functionality, including operational data gathering and diagnostics.

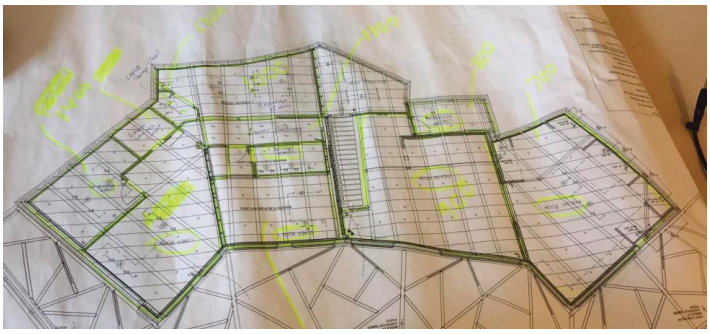


Control Panel Dashboard, showing unassigned Device IDs and Names (yellow), incompletely updated modules (green), and modules in Thermal Overload (red).

Still on Day One, the team began a new plan, using the Xicato Bluetooth control system.

First, they assigned Device IDs and Device Names according to room. With a capacity of 32,767 nodes per network, there were plenty of address space to assign a group of 100 Device IDs to each room… 700-799 for the theater, 200-299 for the kitchen, etc.

Then, they arranged the XIM into nested Groups. Each XIM can be a member of up to 16 groups, and these groups can entirely independent of each other, or they can be nested, or they can overlap. For Casa Smed, the team created one group containing all lights, a group for each floor, a groups for each room on each floor, and groups for areas within each room. In all, each XIM was a member of 3 or 4 groups.



The team managed to diagnose, update, provision, and program most of the lights on Day One.

Day Two

After naming and grouping the last few lights, the next thing they noticed was that the fixtures were overheating. XIM has a built-in fold-back mechanism that causes the lights to dim when they get too hot, and to shut down if they continue to be too hot after dimming. The downlights were installed in a very confined plenum space with very little airflow. With no airflow, the fixtures couldn't perform at full output.

Fortunately, XIM periodically transmits its temperature and intensity levels over Bluetooth. This data can be monitored using the Xicato Control Panel and the modules reprogrammed to lower maximum intensity levels. The installers watched the temperature rise to fold-back temperature, and estimated what maximum intensity would provide margin for hot days. In the end, they reprogrammed the various 220 lights to limit intensity to between 60% and 85%. Thermal problem solved.

At this point, it became clear that the DALI system was misbehaving. Not only was it still unable to control about 30% of the lighting, but it was competing with Bluetooth for control… it wouldn't shut up!

Rather than spend a lot of time diagnosing DALI – and much to the chagrin (but eventual satisfaction) of Greg, who had spent many thousands of dollars on DALI control equipment for the job – the team ultimately decided to shut it down.

In lieu of DALI, the team decided that the best way to interface with the Control4 system was through Xicato Intelligent Gateways (XIG). XIG is an inexpensive, standalone, programmable computing device with Ethernet and WiFi interfaces on the LAN side, and a Bluetooth interface to XIM and other control devices such as sensors, switches, and LED controllers/drivers. Xicato publishes two types of application programming interface (API) to the XIG, including a set of Python code libraries, as well as a simple HTTP interface that is used by the web server embedded in the device. After a quick review of the HTTP interface, Greg and James were confident they could develop a driver for the Control4 system that could control the XIM modules through the XIG, including on/off/dim and scene commands by individual light or lighting group.

Initially, the team installed two XIG in the house, one on each floor. But some of the lights in the very back bedroom could not reliably receive transmissions from the upstairs gateway, so it was

decided to add an additional XIG to that wing of the house. Between the 3 gateways, all 220 lights in the house could be controlled.

It's important to note much of the house was built with pre-fabricated walls/interiors from DIRTT, some of which have a metal frame along with a thin wood panel that is either textured with paint or fabric. It wasn't clear how much the metal walls changed the RF dynamics in the space, but in the end 3 gateways covered 220 fixtures on 2 floors and about 3000 square feet (300 square meters).

Metal in interior walls interferes with radio transmissions.

All's Well…

Both Greg and James were very impressed by how quickly Xicato was able to set up the lighting control, as well as by how feature rich and responsive the system proved to be. Greg noticed right away that the Bluetooth system response was much faster than DALI. He was skeptical on the first day, but by day 2 he was a believer. In fact, he was considering the idea of selling Control4 drivers for future such installations throughout North America, and will definitely recommend Xicato Bluetooth for future projects.

"Thank you for all the great work and support with programming the lights at the Smed residence. In 2 days you programmed the lights via Bluetooth, after we had spent two months trying unsuccessfully to get the fixtures working using Dali and Control4. Plus, you programmed all the fixtures to a safe temperature! (this was my biggest concern)."

James Robinson with Wave Technical ltd

Above: Smed kitchen.

Left: Great room, with Latona 5 downlights.

Below: Some of the Control4 and DALI equipment

Smed Residence Lighting Equipment

Senso Lighting Luminaires

- Latona 5 custom fixtures

Xicato LED Lighting Modules

- XIM Gen4 Artist Series (XIM19953013A5A): LES 19mm, 3000K, 1300LM, BLE+DALI

Xicato Intelligent Gateways (XIG)

- XIG-0101 Xicato Intelligent Gateway
- HTTP open interface

Software

- Xicato Control Panel (commissioning)

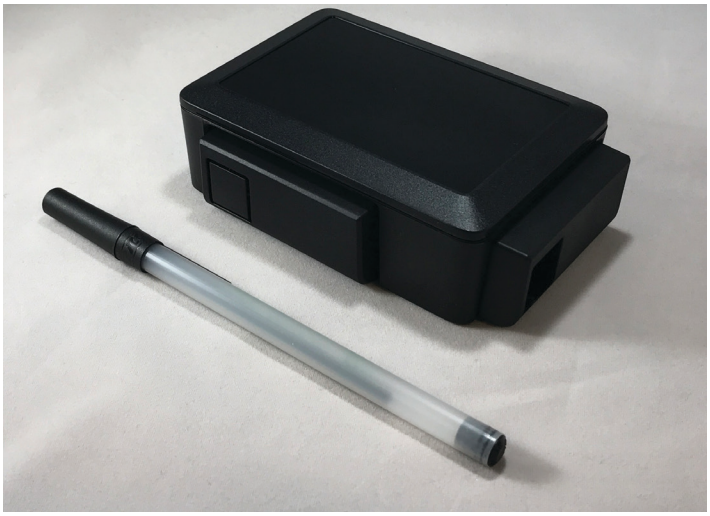
Lighting Design

Debbie Carruthers, DIRTT

Controls Design

Greg Fukushima, GiCor Home Technologies

XIM is available in 19mm and 9mm LES, in multiple spectral/CRI formulas and CCTs, and lumen output from 700LM to 3000LM



Xicato Intelligent Gateway (XIG-0101) provides range extension, remote monitoring, configuration and control access, and protocol conversion between Bluetooth and IP based protocols.

Senso Lighting Latona 5 fixture

Luminaire Manufacture

Senso Lighting

www.sensolighting.com
info@sensolighting.com
+1.403.216.7043

Photography

Rolf Hurbin (Senso) and John Yriberri (Xicato)

About Xicato

Xicato designs and develops light sources and electronics that enable architects, designers and building managers to create beautiful, smart spaces in which people love to live and work. With thousands of installations around the globe, Xicato continues to be a leading supplier of high quality lighting solutions. Xicato is defining the future of intelligent light sources by integrating electronics, software and connectivity.

Founded in 2007 and headquartered in Silicon Valley, Xicato has offices in China, Japan, Europe and the US.

For More Information

General information: www.xicato.com

Inquiries: info@xicato.com

Xicato Sales:

www.xicato.com/about-us/contact-us

Xicato Distributors:

www.xicato.com/about-us/distributors