WELCOME TO THE WEBINAR!

Let’s All Go To The Lobby
To Get Ourselves A Treat!

Networked Lighting Controls for Utilities

June 2, 2020
11:00 to Noon
Before we begin...

**During the Webinar**
- Attendees will be muted
- Please use the chat feature in the control panel to submit questions to LDL staff
- The presenter will pause to address questions every ~10 minutes
- Please participate in the online polls.

**Following the Webinar**
- Please take the short survey
- A recording and the slide deck will be posted on LDL’s webpage
- Reach out to LightingDesignLab@seattle.gov with comments or questions.
Click the logo to check them out!

We’d like to thank today’s event sponsor.
It takes a village...
LDL’s Four Core Service Areas

- **EDUCATION & TRAINING**
- **TOOLS & RESOURCES**
- **TECHNOLOGY EVALUATION**
- **INFORMATION AGGREGATION**
Meet Today’s Speaker

Stakeholder Solutions Manager

13 years working for utilities
Tribune of the Stakeholders
Friend of Industry
Regionalist

Mr. Wilson, posing outside the entrance of LDL on his way to the 2019 open house gala

-Puget Bugler
Enough about me...

Let’s talk about you...
WHAT ARE WE TALKING ABOUT...

<table>
<thead>
<tr>
<th>Understanding Key Concepts</th>
<th>Technology Basics</th>
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<td>Control Strategies Basics</td>
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<tr>
<td>Market Trends &amp; Dynamics</td>
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<table>
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<th>Program Implementation</th>
<th>Technology / Performance Requirements</th>
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</thead>
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<td>Savings &amp; Incentives</td>
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<td>Project Oversight</td>
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<td></td>
<td>Market Engagement &amp; Tools n’ Resources</td>
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[Lighting Design Lab]
UNDERSTANDING KEY CONCEPTS
~ crash course ~
So it’s on my network?!?
Many NLC systems operate on their own network

Many communicate via router – or from device to device

Most enterprise systems can integrate with existing networks
A communication protocol allows two or more devices to transmit information.

Wireless examples include: WiFi, Bluetooth, Zigbee, or cellular networks.

A load control protocol is the content in the message being communicated.

Examples include: DALI, DMX512, proprietary digital protocols or 0-10 volts (analog).
Luminaire Level Lighting Controls are Networked Lighting Controls

LLLC means every fixture includes:

- Motion & Daylight Sensor
- Load Controller
- Individually Addressable (connected)

NLC Tech Terms & Basic Concepts: LLLC vs. NLC?

1 : Many

1 : 1
NLC Tech Terms & Basic Concepts: **Wall Stations**

Now introducing... the artist formally known as... *THE WALL SWITCH*

- How users interact with the luminaires
- Often programmable
- May *or* may not include scenes

**Simple**  
**Interface**  
**Complex**

**Limited**  
**Capabilities**  
**Flexible**
NLC Tech Terms & Basic Concepts: **Scenes**

In lighting, a *scene* refers to a collection of control zones – with programmable preset’s

<table>
<thead>
<tr>
<th>Office Scenes:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half Lights</td>
<td>50%</td>
</tr>
<tr>
<td>Full Lights</td>
<td>100%</td>
</tr>
<tr>
<td>Read</td>
<td>30%</td>
</tr>
<tr>
<td>Relax</td>
<td>3%</td>
</tr>
<tr>
<td>Off / On</td>
<td>0% - 50%</td>
</tr>
</tbody>
</table>
The Sequence of Operations is how the system designer communicates intent.

### Sequence of Operations Learning Guide

**Area**
- **Typical open office**

**Lights**
- Zones (a) - (d)
- Fully dimmable lights controlled in this area

**Daylight Zones**
- Zones (a) - (b)
- Daylight rows 1 and 2 will dim independently. Lights will automatically adjust to daylight maintaining recommended 30FC on task surfaces

**Manual Wall Control**
- Zones (a), (b), (c), (d)
- For each independent zone, the user can select scenes on/off, 50%, and can raise/lower the zone

**CONTROL METHOD**

<table>
<thead>
<tr>
<th>SPACE TYPE</th>
<th>HIGH END TRIM</th>
<th>DAYLIGHT SENSOR</th>
<th>MANUAL SWITCH</th>
<th>OCCUPANCY SENSOR</th>
<th>TIME CLOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conference</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Equipment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Office - open</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X x</td>
</tr>
<tr>
<td>Office - private</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X x</td>
</tr>
<tr>
<td>Restrooms</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>x x</td>
</tr>
</tbody>
</table>

Click to access LDL Sequence of Operations learning guide
How *MOST* modern NLC lighting systems are

- Setup,
- Programmed, and
- Commissioned

- Increasingly App based

- Some companies offer as a service 📞
Configuration Tools & Wall Stations

These are the two ways *most* modern lighting systems are programmed, commissioned, and used.

*example of CREE SmartCast remote*
Do you have direct experience working with NLC configuration tools?
PAUSE FOR QUESTIONS
The Four Primary Control Strategies – *crash course*

- High End Trim or Task Tuning
- Occupancy & Vacancy
- Daylight Harvesting
- Scheduling
Control Method #1  High End Trim or Task Tuning

Starting with the *RIGHT* amount of light

High End Trim will

- Deliver the target illuminance level
- Reduce glare
- Extend the life of the fixture
- Provides reliable energy savings
High-end trim sets the new 100% light output level
Control Method #2  Occupancy & Vacancy

Occupancy / Vacancy?
• We got a class for that

Wired vs. Wireless?
• We got a class for that

How to Configure?
• We got a class for that
Control Method #3  Daylight Harvesting

Leverage Available Daylight

Dim Artificial Light

- Comfort in maintaining appropriate light level
- Reduces glare
- Saves energy
Control Method #3  Daylight Harvesting

For Networked Lighting Controls

- Primary Daylight Zone
- Secondary Daylight Zone

Two separate light sensors, controlling each zone
Control Method #3  Daylight Harvesting

For Luminaire Level Lighting Controls

- Individual daylighting zones **OR**
- Same zones as NLC configuration

Both are acceptable!
Control Method #4  Scheduling

High End Trim

Scheduling

Occupancy & Vacancy

Daylight Harvesting
Poll Question 2

High-End Trim with neutralizing 5G quantum nano-layer technology plus thumb-drive
PAUSE FOR QUESTIONS
Understanding Current NLC Market Trends – *crash course*

Configuration Tools - *The shift from bumpy to smooth...*

The Proliferation of *FEATURES*...

- Controls
- Persistence
- Energy monitoring
- Color tuning
- Cyber security
- Demand Response

... and so many more
Understanding Current NLC Market Trends: **Configuration Tools**

*From manually coding to smart devices*
Understanding Current NLC Market Trends: **Configuration Tools**

Press n’ Hold for **Pairing Mode**

Press, Press, Release, Press to **change mode**

Release, Press, Hold, Keep holding, to **reset**

**It was a confusing time...**
Configuration tools are great when they provide

- An ordinal process
- Visual confirmation of settings
- Integral help features

Some are still pretty confusing!

Not every system uses an app
Current Market Trends & Dynamics

**Market Proliferation***

- 48 systems currently on DLC NLC QPL
- 23 systems are LLLC

**Just a Few System Features**

- Controls Persistence (66%)
- Energy Monitoring (87%)
- Cyber Security (10%)
- Color Tuning (37%)
- Demand Response (64%)

*Total system count and features pulled from DLC’s Networked Lighting Controls QPL 5/27/20
PROJECT IMPLEMENTATION
The Program Design Control Panel

- Technical Requirement Settings
- Incentive Scheme Levers
- Market Outreach Throttle
- Savings Tolerance Dials
- Project Oversight Restrictors (documentation requirements)
- Tools & Resources Accelerator
The Program Design Control Panel

- **Technical Requirement Settings**
- **Incentive Scheme Levers**
- **Market Outreach Throttle**
- **Savings Tolerance Dials**
- **Project Oversight Restrictors** (documentation requirements)
- **Tools & Resources Accelerator**
Program Design Considerations: Technical Requirements

Networked Lighting Control System Technical Requirements V4.0

Rhetorical Question: When is the sum less than its parts?

...when the system stops working or can’t be maintained
Program Design Considerations: Savings & Incentives

### Example of prescriptive savings in City Light’s lighting program

<table>
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<tr>
<th>Space Use Type</th>
<th>Networked Lighting Controls</th>
<th>Luminaire Level Lighting Controls</th>
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<tr>
<td>Break Room</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>Classroom</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Hallway</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>Lobby</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>The Loo</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>Warehouse</td>
<td>40%</td>
<td>50%</td>
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And so on and so forth...

Regional Technical Forums: Non-Residential Lighting Retrofits protocol

1. Arranged or existing for the present, possible to be changed later

Simplify Approach:
- prescriptive savings
- prescriptive incentives

Right-Sized Incentive
- $50-75 incentive bonus – In addition to performance savings!
PAUSE FOR QUESTIONS
The Program Design Control Panel

- Technical Requirement Settings
- Incentive Scheme Levers
- Market Outreach Throttle
- Savings Tolerance Dials
- Project Oversight Restractors (*documentation requirements*)
- Tools & Resources Accelerator
Which type of project oversight is more meaningful?
Program Design Considerations: **Oversight & Documentation**

Reviewing sequence of operation
Program Design *Considerations*: Developing a Sequence of Operations

The Sequence of Operations is how the system designer communicates intent

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**Consider pre and post submission to ensure**

a) *There is a plan* and

b) You have something to verify against

**Click to access LDL Sequence of Operations learning guide**
Program Design Considerations: Oversight & Documentation

What do we need to document?

How does a utility conduct a post inspection?
Program Design Considerations: Oversight & Documentation

In a perfect world...

• Detailed Sequence of Operations Summary
• Walk site with programing agent
• Access to programing interface

NOT REALISTIC

(Remember - Not all NLC system uses apps / smart devices)
Project Requirement Considerations

**Reasonable Today**

- Pre and post Sequence of Operations Summary

- Post-inspection *sampling* of
  - Light levels
  - Movement settings
  - Daylighting operational?

- In the form of
  - Screen shots / pictures / measuring light levels

**Tomorrow**

- Systems that *Measure* become program / industry standard

- Exportable *As Built* Sequence of Operation Reports
The Program Design Control Panel

Technical Requirement Settings

Incentive Scheme Levers

Market Engagement Throttle

Savings Tolerance Dials

Project Oversight Restrictors (documentation requirements)

Tools & Resources Accelerator
Education & Market Development

1 & 2 Day NLC Workshops for EVERYBODY…

Hands-On Learning & Practical Application

• Specifics of control methods
• Developing sequence of operations
• Specification writing & interpreting
• System design & set up
• And so much more!!!

LDL’s Flagship Workshop

Lighting Design Lab
Education & Market Development

LDL’s Suite of NLC Education Offerings

- Tunable Light
- NLC For School Districts
- NLC For Warehouses
- Communicating the Value of NLC
- NLC For Healthcare
- Light & Health
- Power Over Ethernet
- Exterior Lighting
Education & Market Development

Market size and dynamics warrant a compressive approach

Targeted approach:

NLC for School District Staff

Full spectrum approach:

NLC for Lighting & Building Professionals

Trade Allies, Design Allies, Facility Staff, ESCO’s, Utility staff
Education & Market Development

It’s about the **STAKEHOLDERS** – not just the decision maker

- **Tenants**
  - Living with the system
- **Facility Professionals**
  - Leveraging the system
- ** Contractors / Installers**
  - Installing the system
- **Owners**
  - Investing in the system
Click to access the LDL networked lighting control learning guides
Networked Lighting Controls Learning Guides & Video

- **LLLC Video**
  - X3 short vids
  - *Demonstrates* primary control strategies
  - Simulates tenant improvement to highlight system flexibility

- For utility staff, TA’s / DA’s / Customers

[Click here to watch now!](#)
NLC Program & Project Considerations in Summary

- Leverage the DLC’s Networked Lighting Controls Qualified Products List
- Require pre and post submission of the project sequence of operations
- Leverage a SAMPLING of configuration tool screen shots
  - But don’t require it
- Invest in tools and resources that support the market
Do you plan to leverage these LDL Tools & Resources?
Last call for questions...
And now – a few words from LDL
# Upcoming LDL Online Events

Today’s slide deck and previous online courses can be found on our [website](#).

<table>
<thead>
<tr>
<th>LDL Course</th>
<th>Delivery Date</th>
<th>Time</th>
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<tr>
<td>Light Sources &amp; Luminaires</td>
<td>June 16</td>
<td>10:00 - Noon</td>
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<tr>
<td>Communicating the NLC Value Proposition</td>
<td>June 30</td>
<td>10:00 - Noon</td>
</tr>
<tr>
<td>Fundamentals of NLC (Side A – Theory &amp; Technology)</td>
<td>July 14</td>
<td>10:00 - Noon</td>
</tr>
<tr>
<td>Fundamentals of NLC (Side B – Practical Application)</td>
<td>July 15</td>
<td>10:00 - Noon</td>
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<tr>
<td>The Lighting Design Process</td>
<td>July 28</td>
<td>10:00 - Noon</td>
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Please take the online survey once you exit the webinar

We’ll SEE you on the next call... 😊