



Networked Lighting Control Systems

Technical Requirements

Version 2.00, Draft 2

Draft issued Apr 12, 2017. Comments due Wednesday, May 17, 2017.

Schedule of Revisions

Revision Number	Date	Description
1.0	April 21, 2016	<ul style="list-style-type: none">Initial Technical Requirements Published
1.01	May 7, 2016	<ul style="list-style-type: none">Clarified that the specification is for Interior Control Systems. Systems designed and marketed exclusively for exterior applications are not eligible to be qualified.
1.02	Feb 24, 2017	<ul style="list-style-type: none">Clarified that the specification does not cover DC or PoE systems.
2.00 Draft 1	Feb 3, 2017	<ul style="list-style-type: none">Draft 1 of Version 2.00 Technical Requirements released
2.00 Draft 2	Apr 12, 2017	<ul style="list-style-type: none">Draft 2 of Version 2.00 Technical Requirements released after stakeholder input to Draft 1

This document defines requirements to be met or reported for lighting control systems listed on the DesignLights Consortium® (DLC) Networked Lighting Controls Qualified Products List (QPL).

Scope of Technical Requirements

This is a specification for Interior and Exterior Networked Lighting Control (NLC) systems associated with commercial and industrial buildings, roadways, and exterior environments. NLC systems are defined for the purposes of this specification as the combination of sensors, network interfaces, and controllers that effect lighting changes to luminaires, but does not include the luminaires themselves. Any luminaire-specific control requirements are addressed separately by the DLC's Solid-State Lighting Technical Requirements and Qualified Products List, <https://www.designlights.org/solid-state-lighting/qualification-requirements/>. Please note that DC (Direct Current) and PoE (Power over Ethernet) lighting control systems are excluded while a corresponding Policy to qualify DC and PoE luminaires for DLC's SSL QPL is developed. A future revision of this Technical Requirements document will be modified to accept DC and PoE systems in conjunction with the SSL Luminaire DC and PoE Policy.

Definition of "Required" vs. "Reported" Capabilities

The technical requirements are built upon "Required" and "Reported" system capabilities.



25 **“Required” Capabilities:** Required Capabilities shall be available in all systems to be listed on the QPL.
26 Systems that do not offer these capabilities are not eligible to be listed. A successful application will provide
27 information on the availability of these capabilities and characteristics. Key information provided by the
28 manufacturer will be published on the QPL.

29 Note: While the DLC requires systems to offer a particular capability, the DLC does not specify whether a
30 capability must be installed on a project. For instance, while DLC requires systems to have daylight harvesting
31 / photocell capability, the DLC does not specify which rooms or luminaires on a project must be installed with
32 daylight harvesting / photocell capability. Project-specific requirements for rebates and incentives are
33 determined by individual efficiency programs. DLC intends to develop best-practice guidelines that individual
34 utilities may adopt, in whole or in part, to guide installation of capabilities on a project. These guidelines will
35 be developed separately from this Technical Requirements document with input from DLC stakeholders.

36 **“Reported” Capabilities:** DLC will report on the presence or absence of, type, and/or characteristics of each
37 Reported capability for qualified systems. While systems are not required to include these capabilities, a
38 successful application will provide information on the presence or absence of these capabilities and their
39 characteristics. Key information provided by the manufacturer will be published on the QPL.

40 41 Additional Requirements

42 **Warranty** – DLC requires a minimum warranty of at least 5 years for all components of the system addressed
43 by the specification, with the exception of software, server, and cloud service. An optional warranty extension
44 to 5 years is acceptable in meeting this requirement, however the QPL will identify that an extended warranty
45 must be purchased to meet the requirements.

46 **Commercial Availability and Verification** – All systems must be fully commercially available, able to be
47 purchased, with complete, final documentation and literature readily available on the manufacturer’s website
48 before they can be listed. DLC requires that a qualified system has been installed and operated successfully in
49 at least one actual field installation. DLC will verify this through a case study and/or a customer reference. See
50 the Application Form for more information.

51 **System Overview Presentation** - As part of the Application Review Process, the DLC requires a system
52 overview to be presented via webinar or in-person to the DLC. See the Application Form for more information.

53 **All Specification documents including the Application Form, Instructions, and supporting documentation can**
54 **be found on the DLC website at <https://www.designlights.org/lighting-controls/qualify-a-system/>**

55 Annual Revisions and Grace Period

56 The DLC revises the Networked Lighting Controls Technical Requirements annually, with final revisions
57 completed on June 1 of each year. Each manufacturer must requalify and relist a system each year with the
58 annual Technical Requirements revision schedule.

59 **Grace Period Policy:** A twelve month listing grace period will be provided for systems that have been qualified
60 under a previous version of the Technical Requirements, but do not meet revised requirements. These
61 systems can be requalified and listed under the previous version of the Technical Requirements. This will allow



a period of one year to develop an updated or new system that can be submitted for evaluation according to the most current Technical Requirements.

Table 1 provides a Summary of “Required” and “Reported” System Capabilities for Interior Lighting Systems.

Table 1 – Interior Lighting Systems

'Required' Interior System Capabilities	'Reported' Interior System Capabilities
<ul style="list-style-type: none">• <i>Networking of Luminaires and Devices</i>• <i>Occupancy / Traffic Sensing</i>• <i>Daylight Harvesting / Photocell Control</i>• <i>High-End Trim (Task Tuning)</i>• <i>Programmable Zoning</i>• <i>Luminaire and Device Addressability</i>• <i>Continuous Dimming</i>	<ul style="list-style-type: none">• <i>Control Persistence</i>• <i>Scheduling</i>• <i>Energy Monitoring</i>• <i>Device Monitoring / Remote Diagnostics</i>• <i>Type of User Interface</i>• <i>Luminaire Level Control (LLC, integrated)</i>• <i>Personal Control</i>• <i>Load Shedding (DR)</i>• <i>Plug Load Control</i>• <i>External Systems Integration (e.g. BMS, EMS, HVAC, Lighting, API)</i>• <i>Emergency Lighting</i>• <i>Security</i>• <i>Color Changing / Tuning</i>• <i>Start-Up and Configuration Party</i>



71 Table 2 provides a Summary of proposed “Required” and “Reported” System Capabilities for Exterior Lighting
72 Systems.

73 *Table 2 – Exterior Lighting Systems*

'Required' Exterior System Capabilities
<ul style="list-style-type: none">• <i>Networking of Luminaires and Devices</i>• <i>Occupancy / Traffic Sensing</i>• <i>Daylight Harvesting / Photocell Control</i>• <i>High-End Trim (Task Tuning)</i>• <i>Programmable Zoning</i>• <i>Luminaire and Device Addressability</i>• <i>Continuous Dimming</i>• <i>Scheduling</i>

'Reported' Exterior System Capabilities
<ul style="list-style-type: none">• <i>Control Persistence</i>• <i>Energy Monitoring</i>• <i>Device Monitoring / Remote Diagnostics</i>• <i>Type of User Interface</i>• <i>Load Shedding (DR)</i>• <i>External Systems Integration (EMS/BMS/HVAC/Lighting/API)</i>• <i>Security</i>• <i>Color Changing / Tuning</i>• <i>Start-Up and Configuration Party</i>

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Table 3 provides the detailed definitions for each Capability or Technical Requirement. This Table applies to both Interior and Exterior, except where noted. Please note that the Application Form specifies in more detail what information the DLC requires from manufacturers for each capability and what information will be published on the QPL.

Table 3: Capability and Requirement Definitions

Row	Capability	Definition
1	Networking of Luminaires and Devices	The capability of individual luminaires and control devices to exchange digital data with other luminaires and controls devices on the system. This capability is required at the room, space, or area level, but not at the whole building level or beyond (e.g. non-lighting systems, or the internet).
2	Occupancy / Traffic Sensing	The capability to affect the operation of lighting equipment based upon detecting the presence or absence of [Interior] people in a space; [Exterior] people and/or moving vehicles in an area or exterior environment. Exterior systems may satisfy this requirement through <i>External Systems Integration</i> as described below in lieu of in-network occupancy sensors if another source of data is used for traffic or pedestrian sensing.
3	Daylight Harvesting / Photocell Control	The capability to automatically affect the operation of lighting based on the amount of daylight and/or ambient light that is present in a space, area, or exterior environment.
4	High-End Trim (Task Tuning)	The capability to set the maximum light output to a less-than-maximum state of an individual or group of luminaires at the time of installation or commissioning. This capability is sometimes referred to as "Task Tuning". High-End Trim must be field reconfigurable. This capability is distinct from automatic compensation for lumen depreciation, which automatically increases output as a system operates over time.
5	Programmable Zoning	The capability to group luminaires and form unique lighting control zones for a control strategy via software-defined means, and not via physical configuration of mechanical or electrical installation details (e.g. wiring). Programmable Zoning is required for Occupancy Sensing, Task Tuning, and Daylight Harvesting control strategies except for systems that feature Luminaire Level Control (LLC) capabilities as defined in this specification under "Reported Capabilities", in which case zoning is only required for Occupancy Sensing and Task Tuning / High-End Trim control strategies.
6	Luminaire and Device Addressability	The ability to uniquely identify and/or address each individual luminaire, sensor, controller, and user interface device in the lighting system, allowing for configuration and re-configuration of devices and control zones independent of electrical circuiting. Please note that while DLC requires systems to have this addressability capability, systems that also offer traditional electrically circuited control zones as an option (e.g. zones defined by 0-10V wiring) will not be disqualified.
7	Continuous Dimming	The capability of a control system to provide control with sufficient resolution in output (100+ steps) to support light level changes perceived as smooth (as



		opposed to step dimming with a small number of discrete light levels).
8	Control Persistence	The capability of a networked lighting control system’s lowest-level (“edge device”) luminaire controllers to execute three pre-programmed energy saving strategies (occupancy sensing, daylight harvesting, and high-end trim) in the absence of communications with the next higher networked element in the system’s topology.
9	Scheduling	The capability to automatically affect the operation of lighting equipment based on time of day. Scheduling capability is Reported for Interior systems and Required for Exterior systems. Exterior systems are required to have built-in "astronomical" scheduling functionality for sunrise and sunset programming.
10	Energy Monitoring	The capability of a system, luminaire, or device to report its own energy consumption, or the energy consumption of any controlled device via direct measurement or other methodology. The method by which the system implements this capability must be clearly described. The sampling frequency and accuracy of reported data must be specified.
11	Device Monitoring / Remote Diagnostics	The capability to monitor, diagnose, and report operational performance including system and/or component failures.
12	Type of User Interface	The type of interface used by the control system for reading and adjusting control system settings during system start-up, commissioning, and/or ongoing operation.
13	Luminaire Level Control (LLC, integrated)	The capability to have a networked occupancy sensor, ambient light sensor, and addressable controller installed for each luminaire, with the sensor(s) directly integrated or embedded into the luminaire form factor during the luminaire manufacturing process. In addition to these required integrated components, LLC systems must have <i>Control Persistence</i> capability as described in this document. To demonstrate commercial availability of the integrated component options, at least one family, luminaire or kit with integrated sensing and control must be provided with the application and will be publicly listed on the QPL.
14	Personal Control	The capability for individual users to adjust to their personal preferences, via networked means, the illuminated environment of a light fixture or group of light fixtures in their specific task area. The product literature must indicate that the personal control features are specifically for this purpose with a control interface designed for an individual user that does not provide access to system-wide settings. A wireless dimmer switch may only be considered a personal control interface if product documentation (a) shows that the physical configuration is suitable for desktop use, and (b) describes configuration for personal control within a subsection of an open area. A software-based interface may only be considered personal control if product documentation (a) shows it provides a specific interface intended for personal control by an individual user within a subsection of an open space and (b) that the interface only allows access to control functions for the light fixtures in the specific area being controlled.
15	Load Shedding (Demand Response)	The capability to reduce the energy consumption of a lighting system, in a pre-defined way, on a temporary basis, in response to a demand response signal.



		The method by which the system implements this capability must be clearly described in the application.
16	Plug Load Control	The capability to control the power delivered to receptacles through scheduling or occupancy sensing. The method by which the system implements this capability must be clearly described in the application.
17	External Systems Integration (e.g. BMS, EMS, HVAC, Lighting, API)	The capability to exchange data with other networked systems such as Building or Energy Management Systems (BMS/EMS), Heating Ventilation and Air Conditioning (HVAC) Systems, or other Lighting and Building Systems via Application Program Interface (API) or other methods. The method, including formats and languages, by which the system implements this capability must be clearly described in the application.
18	Emergency Lighting	The capability of a system’s luminaires to interact with one or more of the following emergency power sources: 1) on-luminaire battery backup, 2) remote source (generator or central battery), switched at luminaire, 3) remote source (generator or central battery), switched at central location. The QPL will identify which, if any, of the 3 emergency power sources the system can interact with. To demonstrate compliance with this capability for each emergency power system type, the method by which the system interacts with the emergency lighting must be clearly documented in manufacturer literature. For each type of emergency power source respectively, the product literature must identify how the systems are connected including all components that are required and all associated wiring diagrams.
19	Security	DLC is providing an optional field on the QPL for system manufacturers to list an informational link to security information about their system.
20	Color Changing / Tuning	The capability to alter the output and color of tunable white and/or variable color output luminaires via a dedicated control interface(s). To demonstrate compliance with this capability, the interface(s) must be clearly described in the product literature as being for the purpose of variable CCT or color control and include graphical indicators for users that indicate the color or CCT of the system’s settings. The product literature must also specify installation and configuration requirements to implement this functionality.
21	Start-up and Configuration Party	<p>The QPL will identify the responsible party and their required level of training to start-up and configure the system to the extent that all Required Capabilities are functioning. If more than one selection is made, the most common type will also be identified.</p> <ul style="list-style-type: none"> (1) local installation contractor with less than 1 day of training (2) local installation contractor with less than 1 day of training, working with remote personnel at factory (3) factory-trained local installation contractor with 1 day or more factory training (4) factory representative on-site (5) other (describe)