Div 26 Specifications

CSI Specification-Division 26 Spec (Wireless)

Section 26 09 43 Network Lighting Controls

PART 1 - GENERAL

1.1 Summary

1. Section includes networked lighting control system comprised of the following components:

    1. System Software Interfaces
        1. Smartphone (iOS & Android) Programming Interface for Wireless Devices

    2. System Backbone and Integration Equipment
        1. System Bridge
        2. Energy Monitoring
        3. Real Time Clock
        4. UL924 Emergency Lighting Control

    3. Wireless Networked Devices
        1. Wireless Networked Wall Switches, Dimmers
        2. Wireless Networked Fixture Control Devices
        3. Wireless Networked Indoor Occupancy/Vacancy with Photosensors
        4. Wireless Networked Outdoor Occupancy and Photosensors
        5. Wireless Networked Indoor Luminaire Embedded Sensors
        6. Wireless Networked Power Packs
        7. Non-Wireless Power Packs
        8. Wireless Networked Luminaires

    2. The networked lighting control system shall meet all the characteristics and performance requirements specified herein.

    3. The contractor shall provide, install and verify proper operation of all equipment necessary for proper operation of the system as specified herein and as shown on applicable drawings.

1.2 Related Documents

1. Section 26 27 26 Wiring Devices
2. Section 26 09 23 Lighting Control Devices
3. Section 26 09 43.13 Digital-Network Lighting Controls
4. Section 26 09 43.16 Addressable Fixture Lighting Control
5. Section 26 09 43.19 Wireless Network Lighting Controls
6. Section 26 51 13 Interior Lighting Fixtures

1.3 Submittals

1. Submittal shall be provided including the following items.
    1. Bill of Materials necessary to install the networked lighting control system.
    2. Product Specification Sheets indicating general device descriptions, dimensions, electrical specifications, wiring details, and nomenclature.
    3. Riser Diagrams showing device wiring connections of system backbone and typical per room/area type.

4. Information Technology (IT) connection information pertaining to interconnection with facility IT networking equipment and third-party systems.
5. Other Diagrams and Operational Descriptions – as needed to indicate system operation or interaction with other system(s).
6. Contractor Startup/Commissioning Worksheet (must be completed prior to factory start-up).
7. Service Specification Sheets indicating general service descriptions, including startup, training, post-startup support, and service contract terms (if applicable).
8. Hardware and Software Operation Manuals.

1.4 Approvals

1. Prior approval from owner's representative is required for products or systems manufactured by companies not specified in the Network Lighting Controls section of this specification.

2. Any alternate product or system that has not received prior approval from the owner's representative at least 10 days prior to submission of a proposal package shall be rejected.

3. Alternate products or systems require submission of catalog datasheets, system overview documents and installation manuals to owner's representative.

4. For any alternate system that does not support any form of wireless communication to networked luminaires, networked control devices, networked sensors, or networked input devices, bidders shall provide a total installed cost including itemized labor costs for installing network wiring to luminaires, control devices, sensors, input devices and other required system peripherals.

1.5 Quality Assurance

1. Product Qualifications
    1. System electrical components shall be listed or recognized by a nationally recognized testing laboratory (e.g., UL, ETL, or CSA) and shall be labeled with required markings as applicable.
    2. System shall be listed as qualified under DesignLights Consortium Networked Lighting Control System Specification V5.0.
    3. System luminaires and controls are certified by manufacturer to have been designed, manufactured and tested for interoperability.
    4. All components shall be subjected to 100% end of line testing prior to shipment to the project site to ensure proper device operation.
    5. All components and the manufacturing facility where product is manufactured must be RoHS compliant.
2. Installation and Startup Qualifications
    1. System startup shall be performed by qualified personnel approved or certified by the manufacturer.
3. Service and Support Requirements
    1. Phone Support: Toll-free technical support shall be available.
    2. Remote Support: The bidder shall offer a remote support capability.
    3. Onsite Support: The bidder shall offer onsite support that is billable at whole day rates.

1.6 Project Conditions

1. Only install Domino indoor equipment after the following site conditions are maintained:
    1. Ambient Temperature: 10 to 122 degrees F (-12 to 40 degrees C)
    2. Relative Humidity: less than 90% non-condensing
    2. Equipment shall not be subjected to dust, debris, moisture, or temperature and humidity conditions exceeding the requirements indicated above or as marked on the product, at any point prior to installation.
    3. Only properly rated equipment and enclosures, installed per the manufacturer's instructions, may be subjected to dust and moisture following installation.

1.7 Warranty

1. The manufacturer shall provide a minimum five-year warranty on all hardware devices supplied and installed. Warranty coverage shall begin on the date of shipment.
2. The hardware warranty shall cover repair or replacement any defective products within the warranty period.

1.8 Maintenance & Sustainability

1. The manufacturer shall make available to the owner new parts, upgrades, and/or replacements available for a minimum of 5 years following installation.

PART 2 - EQUIPMENT

2.1 Manufacturers

Acceptable Manufacturers

1. Domino NLC by Satco Products, Inc.
2. Basis of Design System: Domino Wireless Network Lighting Controls

2.2 System Compliance

1. System components shall comply with UL 916 and UL 924 standards where applicable.
2. System components shall be RoHS compliant.
3. System components shall be UL recognized (low voltage) and/or listed where applicable.
4. Housing materials shall be UL 94-V0 for use in plenum ceiling where applicable.
5. All equipment shall be installed and connected in compliance with NFPA 70.

2.3 System Performance Requirements

1. System Architecture
    1. System shall have an architecture that is based upon three main concepts:
        1. Bluetooth (BLE) wireless mesh network intelligent lighting control devices,
        2. Unlimited standalone (no gateway required) lighting control zones using distributed intelligence,
        3. Optional Bluetooth/Wi-Fi connectivity for time based and third-party system integration for global operation (REST API).

2. Intelligent lighting control devices shall have individually addressable BLE wireless mesh network communication capability and consist of one or more basic lighting control components: occupancy/vacancy and daylight harvesting sensor, luminaire/load controller, dimming output, contact closure input, analog 0-10V input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or more of these components into a single device enclosure shall be permissible so as to minimize overall device count of system.

3. System must be capable of interfacing directly with networked luminaires such that Bluetooth Low Energy (BLE) wireless RF communication is used to interconnect networked luminaires with control components such as sensors, switches and system backbone (see Control Zone Characteristics sections for each type of wireless network connection).

4. Networked luminaires and intelligent lighting control devices shall support individual (unique) configuration of device settings and properties, with such configuration residing within the networked luminaires and intelligent control devices.

5. Lighting control zones consisting of one or more networked luminaires and intelligent lighting control devices and shall be capable of providing automatic control from sensors (occupancy/vacancy and/or photocell) and manual control from local wall stations without requiring connection to a higher-level system backbone; this capability is referred to as “distributed intelligence.” Non-Gateway.
    1. Unlimited lighting control zones of a maximum of 100 devices per zone shall be supported.

6. Networked luminaires and intelligent lighting control devices shall have distributed intelligence programming stored in non-volatile memory, such that following any loss of power the lighting control zones shall operate according to their defined default settings and sequence of operations.

7. Lighting control zones shall be capable of being networked with a higher- level system backbone to provide time-based control, remote control from inputs and/or systems external to the control zone, and remote configuration and monitoring through a software interface.

8. The system may include one or more system controllers that provide time- based control. The system controller also provides a means of connecting the lighting control system to a system software interface and building management systems via TCP, REST APIs protocol.

9. All system devices shall support firmware update, either remotely or from within the applications space, for purposes of upgrading functionality at a later date.

2. Wireless Networked Control Zone Characteristics
    1. No wired connections between networked devices shall be required for the purposes of system communications.
    2. Multiple wireless networking protocols shall be supported:
        1. A standards based, distributed mesh topology type of protocol for 2.4 MHz communication, so as to support lighting control applications and IoT applications.
    2. A Bluetooth standard protocol for 2.4 GHz communication that supports direct connection to a smartphone and tablet device, so as to support device configuration, control applications, and IoT without requiring the use of a system backbone.
    3. Wireless network shall be self-healing, such that the loss of backbone or local communication between devices does not result in the loss of control of the lights in the space.
    4. Wireless network communication shall support uniform and instant response such that all luminaires in a lighting control zone respond immediately and synchronously in response to a sensor or wall station signal.
    5. To support the system architecture requirement for distributed intelligence, wireless network communication shall support communication of control signals from sensors and wall stations to networked luminaires and wireless load control devices, without requiring any communication, interpretation, or translation of information through a backbone device such as a wireless access point, communication bridge or gateway.
    6. All wireless communication between lighting control components shall support UL1376 and IOXT standards including the following five tiers of security measures:
        1. Data Encryption
        2. Firmware Protection
        3. Tamper-Proof Hardware
        4. Authenticated User Access
        5. Mutual Device Authentication
    7. Accounting for typical environmental conditions and building construction materials encountered within commercial indoor lighting environments, wireless networked devices shall be capable of communicating to at least 100’ spacing between devices with embedded wireless transceivers under typical site conditions.
    8. Wireless networked devices shall have a line-of-sight communication range of at least 300’ under ideal environmental conditions.

3. System Integration Capabilities
    1. The system shall interface with third party building management systems (BMS) to support two-way communication using the industry standard via TCP, REST APIs protocol:
        1. The system shall support control of individual devices, including, but not limited to, control of relay and dimming output.
        2. The system shall support reading of individual device status information. The available status will depend on the individual device type and capabilities, which may include but not be limited to, relay state, dimming output, power measurement, occupancy sensor status, and photocell sensor states or readings. All system devices shall be available for polling for devices status.
        3. The system shall support activation of pre-defined system Global Profiles (see Supported Sequence of Operations for further definition of Global Profile capabilities).
    2. The system shall support activation of demand response levels from Demand Response Automation Servers (DRAS) via the OpenADR 2.0a protocol.

4. Supported Sequence of Operations
    1. Control Zones
        1. Networked luminaires and intelligent lighting control devices installed in an area (zone) shall be capable of transmitting and tracking occupancy sensor, photocell sensor, and manual switch information within at least 100 unique luminaires to support different and reconfigurable sequences of operation within the zone. These shall also be referred to as control zones.
    1. Control Groups
        1. An unlimited number of groups can be part of a zone (with up to the maximum of 100 luminaires). A networked luminaire installed in an area (zone) can be a member of up to 20 groups. A group can have up to the maximum allowed per zone of 100 and shall be capable of transmitting and tracking occupancy sensor, photocell sensor, and manual switch information to support different and reconfigurable sequences of operation within the group. These shall also be referred to as control groups.

2. Wall station Capabilities
    1. Wall stations shall be provided to support the following capabilities:
        1. On/Off and Auto of a local control group.
        2. Continuous dimming control of light level of a local control group.
        3. Scene control with up to 32 scenes per light and up to 127 per zone.

2. 3-way / multi-way control: multiple wall stations shall be capable of controlling the same local control groups, to support “multi-way” switching and/or dimming control.
3. Occupancy Vacancy Sensing Capabilities
    1. Occupancy/vacancy sensors shall be configurable to control an individual luminaire or group.
    2. Multiple occupancy/vacancy sensors shall be capable of controlling the same local groups.
    3. System shall support the following types of occupancy sensing sequence of operations:
        1. Auto On/Off Occupancy Sensing
        2. Auto Partial-On Occupancy Sensing
        3. Auto Partial-Off Occupancy Sensing
        4. Vacancy Sensing (Manual-On/Automatic-Off)
    4. Auto On/Off, Partial-On, and Partial-Off Occupancy Sensing modes shall function according to the following sequence of operation:
        1. Occupancy sensors shall automatically turn lights on to a designated level when occupancy is detected. To support fine tuning of Partial-On sequences the designated occupied light level shall support at least 100 dimming levels.

PART 3 - EXECUTION

3.01 INSTALLATION
1. Provide complete installation of the Networked Lighting Control Devices in accordance with contract documents and as shown on the Construction Drawings.
2. Sensors
    1. Coordinate layout and installation of ceiling-mounted, wall-mounted devices with other construction that penetrates ceilings, walls or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
    2. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer’s written instructions.
    3. Ensure that daylight sensor placement minimizes sensors view of electric light sources; ceiling mounted, and fixture-mounted daylight sensors shall not have direct view of luminaries.
3. Systems integration to be coordinated with owner’s representative, Keilton + Autani lighting control system manufacturer and other related equipment manufacturers.
4. Provide equipment at locations and in quantities indicated on drawings.
5. Provide any additional equipment required to provide control intent.

3.02 FIELD QUALITY CONTROL
1. Perform field inspection, testing, and adjusting in accordance with Section [01 40 00]
2. Verify that all control devices, components, receptacles, lighting equipment, etc. are powered and energized prior to initiating factory start up and commissioning.
3. Verify LED driver type and functioning / powered luminaires.

3.03 STARTUP
1. Factory Startup – If Factory startup is required/quoted provide both the manufacturer and the electrical engineer minimum ten (10) working days written notice to schedule services.
2. Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in final testing.
3. Final programming to be completed by an authorized manufacturer’s representative to establish control of the network as required by the specified sequence of operations.
4. Project Record Documents: Provide five (5) copies of the final results including actual locations of components and accessories to the building owner and owner’s representatives.
5. If deficiencies are discovered during the Factory Start Up, the Electrical Contractor to provide reimbursement of all expenses necessary for scheduling additional time and subsequent site visitation for required attendees.
6. An unsatisfactory condition revealed by these test results, or unsatisfactory methods of tests and/or testing apparatus and instruments, shall be brought to the attention of the Engineer, Project Manager and Factory Representative. Corrections by the electrical contractor shall be validated by re-tests to the satisfaction of the Engineer, Project Manager, and Factory Representative.

3.04 ACCEPTANCE AND COMMISSIONING

A. Final acceptance, Per California building Efficiency Standards (Title 24, Parts 1 and 6), Per local code requirements shall depend upon the satisfactory test results as performed in accordance with the verification of the sequence of operations and manufacturer's instructions.

B. Test and Inspections:

1. Operate the system and its various components to ensure that it is performing properly and in accordance with the sequence of operations.

2. Run a preliminary test for the purpose of:

   a. Determining whether the equipment is in a suitable condition to conduct the acceptance test.
   b. Checking and adjusting equipment.
   c. Training facility personnel.
   d. Verify that sensors are mapped to appropriate devices.
   e. Verify that lighting scheduling has been applied.
   f. Verify drawings are uploaded and viewable within the energy management system software.
   g. Verify that all system alerts and trigger notifications are configured.

3. Final system acceptance test: Individually test each networked device and demonstrate that they are operating properly in accordance with ASHRAE Functional testing requirements.

4. Supply all equipment necessary for system adjustment and testing.

5. Verify that the electrical data and information displayed is correct and properly tracking in real time.

3.05 COMMISSIONING, TRAINING AND DEMOSTRATION

1. Commission the system such that all connected devices are operational, reporting accurately and correctly in accordance with the sequence of operations.

2. Demonstrate the operational use of the system to the Owner.

3. Upon completion of the system programming, provide four (4) hours training to the owner's personnel on the operation and maintenance of the system.

Attendance: Electrical Contractor, System Integrator, Owner, Owner's Representative, Designated Design Representative(s) for and Keilton+Autani Manufactured System Representative.

4. Provide five (5) copies of final acceptance testing and test results.

END OF SECTION