Section 260943: Wireless Network Lighting Control Specification

General

1.1 Summary
1. The contractor shall install the wireless lighting control system specified in this section which shall provide time-based, sensor-based, and user-initiated lighting control.
2. The system shall allow optional system control and monitoring from a remote off-site location via a Virtual Private Network (VPN) to the site controller.
3. The wireless lighting control system shall be able to be accessed using any device with the Google Chrome browser.
4. All lighting controllers shall be individually addressable and shall be networked together using wireless communication that forms a self-healing mesh network.
5. All lighting controllers shall be capable of forming their own wireless communication route to the site controller.
6. Any lighting controller shall be capable of defaulting to a full-on state if connectivity to the site controller is lost in order to ensure environmental safety.

1.2 Submittals
1. Product Cut Sheets (general device descriptions, dimensions, wiring details, nomenclature) Other Diagrams – as needed for special operation or interaction with other system(s)
2. Contractor Commissioning Information (instructions on documenting the location of each of the lighting controllers)
3. Product Installation Guides
4. Other operational descriptions as needed
5. Quickstart guide for initial startup.

1.3 Quality Assurance
1. The manufacturing facility where products are manufactured must be ROHS compliant.
2. All wireless transmitting devices must be FCC compliant.
3. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

1.4 Coordination
1. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.
2. The selling agent shall coordinate system start up using professional services to program and commission the system.
3. The selling agent shall perform or coordinate training for the end users.

1.5 Warranty and Support
1. All devices in lighting control system shall have at least a five (5) year warranty.
2. Customer shall be provided one (1) year of software updates for the system.

Equipment

2.1 Manufacturers
1. This specification is based on Control Systems designed around the SNAP protocol.

2.2 System Requirements
1. System shall have an architecture that includes:
    a. A SNAP-based wireless self-forming mesh network
    b. Wireless lighting control devices
    c. Stand-alone site controller that manages lighting control devices
    d. Off the shelf Motion Sensors as required by code.
    e. Wireless switches (Optional)
    f. Daylight Harvesting as required by code.
    g. Demand Response as required by code.
    h. The capability to create zones.
    i. Dynamic Behaviors (optional dimming feature for Sports lighting applications)
2. System shall have one or more primary "site controller" devices that are capable of communicating with connected system devices.
3. The site controllers must have the ability to be remotely controlled via Internet using an Ethernet LAN.
4. The site controller and wireless light controllers must be capable of communicating using a SNAP- based wireless mesh network protocol.
5. The mesh network shall be capable of self-healing by re-routing wireless messages in the event that any one light controller ceases to function.
6. Individual lighting controls shall continue to provide default level of lighting in the event of a system communication failure with a site controller device.
7. All wireless communications by any device in the system (from lighting controls to site controllers) must be capable of using encryption.
8. System shall have a browser-based software management program that enables remote system control, status monitoring, and creation of lighting control zones.
9. The site controller and wireless light controllers must be capable of working with specified LED Drivers to support five or more dynamic dimming behaviors that are used in sports lighting applications.

2.3 Equipment
1. Wireless Light Controller
    a. The wireless light controller shall be suitable for control of commercial and industrial luminaries.
    b. The wireless light controller shall be capable of responding to multiple inputs (switches, sensors, etc.) as well as calendar-based events and schedules.
    c. The wireless light controller shall be capable of setting the correct dimming level through multiple control strategies based on inputs from sensors and switches and calendar events.
    d. An analog wireless light controller shall have a universal power supply that operates from 110 to 277VAC plus or minus 10%.

e. The wireless light controller shall be capable of being remotely monitored and controlled via the site controller using a standard web browser across either a LAN or Wi-Fi connection.
f. The wireless light controller shall be capable of responding to wireless communication messages from the site controller to set lights to specific dimming levels. The wireless light controller shall automatically recover from any power failure. Should power be interrupted and subsequently returned, the lights shall default to a user configured light level.
g. An analog wireless lighting controller shall include an internal relay to switch power to the fixture.
h. An analog wireless lighting controller shall be capable of 0-10V dimming.
i. A digital wireless lighting controller shall include options to support DALI-2 dimming and 0-10V dimming.
j. Wireless lighting controllers will have 1-2 sensor inputs to allow for the addition of motion sensors or photocells.
k. Wireless lighting controllers used in sports lighting applications shall be capable of performance to receive and complete rapid dimming commands required for dynamic dimming behaviors.

2. Site Controller
    a. Each site controller shall include wired ethernet, wi-fi, and cellular network connections to allow for multiple connection options.
    b. The wireless connection from the site controller to the light controller devices shall be through a SNAP mesh network.
    c. Each site controller shall be capable of supporting a network of up to 1000 wireless devices.
    d. All configuration information including light zones and relationships between lighting controllers and sensors shall be stored in the site controller.
    e. All configuration information in the site controller shall be able to be backed up to an external device.
    f. Each site controller shall be capable of supporting fast dimming commands in order to deliver dynamic dimming behaviors used in some sports lighting applications.

3. Browser-based Control and Monitoring Application
    a. Control and Monitoring of the lighting solution shall be possible by any device that supports a Google Chrome web browser. The application shall allow control and monitoring of the lighting system.
    b. The application shall be capable of displaying wireless light controllers and the site controller on a map.
    c. The application shall be capable of backing up and restoring the system configuration including all lights that have been added to the system.
    d. The application shall be able to create and edit zones of lights.
    e. Any light shall be capable of belonging to at least 8 custom zones.
    f. The application shall provide alarm notifications of anomalies in the system. The alerts shall be available via software dashboard. The alerts can create notification via emails or text messages.
    g. The application shall be capable of monitoring multiple locations.

h. The application shall be secured by a username and password.
i. The application will have layers of password protection to allow for limited access for job functions.
j. The application shall provide scheduling capabilities, including recurring and one-time event scheduling.
k. The application shall be capable of displaying networked devices and the key device characteristics.
l. The system shall have the capability to encrypt all wireless communication.
m. The system shall have a cloud-based option with the capability to combine the data from multiple gateways into a single interface with a single site map.

4. BMS Gateway
   a. The BMS Gateway must be compatible with the SimplySNAP system.
   b. The BMS Gateway will serve as a bridge from the SimplySNAP lighting control system to a Building Management System (BMS).
   c. The BMS Gateway will support BACnet, BACnet MS/TP, Modbus TCP/IP, and Modbus RTU (RS-232, RS-485).
   d. The BMS gateway needs to be on the same IP subnet as the SimplySNAP gateway.
   e. The BMS gateway will poll each SimplySNAP gateway to determine each of its configured devices, zones, scenes, etc.
   f. The BMS gateway map the SimplySNAP devices to BACNET Instance IDs. The customer BMS can control and poll the SimplySNAP devices. Lighting Scenes can be triggered by the BMS Gateway.
   g. The BMS Gateway will seamlessly interface with the top industry BMS systems.

5. Power Monitoring shall be available from compatible SNAP light controllers.
   a. Short term Power monitoring option of individual lights in the system – 2 weeks of historical data stored on the site controller.
   b. Long term Power monitoring option of entire system and individual zones/groups of lights in the system – 2 years or more of historical data stored on the SimplySNAP cloud system including the capability of custom timeframes and zone comparisons.
   c. SNAP compatible power monitoring controllers have a power monitoring circuit or a DALI2 interface to pull the power data from a DALI2 LED driver.

6. Daylight Harvesting
   a. Daylight Harvesting is a way to save energy by utilizing natural light to offset the amount of electric light needed to meet the designed illuminance for a particular area. SimplySNAP uses an open-loop daylight harvesting design. In this design, an approved daylight sensor is oriented towards the natural light and away from the electric lights. A hand-held light meter will be used at commissioning time to correlate the amount of daylight seen by the installed daylight sensor to the amount of daylight at the desired worksurface so that SimplySNAP can adjust the lights properly.
   b. Daylight harvesting requires the use of a SimplySNAP approved photocell.

7. Demand Response
   a. Demand Response allows a facility to reduce power usage by lowering the maximum light level during a time of high electrical demand or limited electrical capacity. SimplySNAP supports three methods for enabling Demand Response.
      - Manual Configuration using a switch input.
      - Using an Automatic Demand Response (ADR) Gateway as a sensor connected to a SimplySNAP controller.
      - Using a Building Management System (BMS) along with the SimplySNAP BMS Gateway.
8. Dynamic Behaviors
   a. Dynamic Behaviors allow sports lighting companies a wireless method to produce stunning lighting effects using rapid dimming commands to zones or groups of lights.

Execution

3.1 Installation
1. The successful bidder may schedule a pre-installation coordination meeting on site with the manufacturer's representative and owner's representative. The pre-installation coordination meeting shall review the project plans and specifications, the project submittals, installation methods, jobsite conditions, and the installation schedule. The manufacturer's representative shall provide the name and telephone number for a technical support person available to answer questions and provide additional information throughout the project.
2. The successful bidder shall coordinate the system installation and start-up to occur in a timely manner.
3. The successful bidder shall coordinate with the owner to secure internet access if required.
4. Installation of the specified equipment and system components shall be in accordance with the manufacturer's instructions.

3.2 Owner Requirements
1. Owner is to provide after-hours access to the controlled areas as needed for a timely completion of the installation.
2. Owner's IT manager is to discuss network access options. IT manager to provide optional secured access through the network firewall to allow communication with the site controllers as needed.
3. Owner is to provide an electronic file of a reflected ceiling plan showing the lighting fixtures in the controlled areas. As an alternate, when the owner does not have lighting drawings, owner is to provide files of the building's floor plan.
4. Owner is to provide name of light fixture manufacturer(s) and model numbers of all fixtures.

3.3 System Start-up and Programming
1. Upon completion of the installation by the installer, the system shall be started up and programmed by an authorized representative of the manufacturer.
2. System start-up and programming shall include:
   a. Identifying the physical location for each wireless lighting controller.
   b. Identifying the light controlled by each wireless lighting controller

      c.   Ensuring that each device is functioning properly.

      d.   Organizing the controlled lighting into functional groups for control and calendar scheduling. Creating and verifying automatic schedules.

3. Initial start-up and programming is to occur on-site. Additional programming may occur on-site or remotely over the Internet if direct connection to the internet is provided by the owner.

4. The manufacturer shall provide the owner or owner's representative documentation which includes:

      a.   Network configuration information, including location of site controllers.

      b.   Contact information for system support.

      c.   Web addresses for remote access (if provided).

      d.   Username and password for the application.