SmartCast Wireless Deployment Guide

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WELCOME TO CREE SMARTCAST® TECHNOLOGY

For years, bringing smart control to the lighting environment meant two sets of wires: one for power, one for control. That's two trips up the ladder, two wiring diagrams and two times the complexity. Even with newer wireless control technologies, installers still have to contend with extra equipment and complicated commissioning procedures.

Cree SmartCast® Technology delivers essential lighting control without the extra design, installation and setup time typical of traditional lighting control systems. With SmartCast® Technology, installers simply wire the fixtures for power and commission the entire system with the touch of one button.

This guide will take you through the deployment of SmartCast® Technology. You'll see how easy it is to design, install, and commission a code-compliant lighting system with OneButton™ Setup and SmartCast® Technology.

WHAT IS CREE SMARTCAST® TECHNOLOGY?

Instead of wires, SmartCast® Technology uses a network of wireless radio signals (IEEE 802.15.4) to link fixtures, sensors and controls into a connected and responsive lighting system,. Sensors are built directly into the fixtures, and whole system comes to life and connects itself together with one touch of the SmartCast® Technology commissioning tool.

SmartCast® Technology features:	
Integrated Sensors	*SmartCast® Technology products incorporate integrated ambient light and motion sensors to achieve energy savings. Embedded sensors in each luminaire eliminate the need for up-front sensor layout design and allow for reliable detection of occupants and ambient light.*
OneButton™ Setup	*SmartCast® Technology luminaire and dimmers automatically create intelligent groupings with OneButton Setup. The result is smart lighting that meets existing and emerging building codes and installs and sets up easier than comparable lighting controls systems*
	SmartCast® Technology luminaires

	and controls required minimal additional labor to install compared to non-dimming solutions. In new construction and upgrade applications, installers can rely on a secure wireless communication between luminaires and dimmers eliminating the need for control wiring.
Wireless Communication	

ONEBUTTON™ SETUP

Once the SmartCast® Technology luminaires and switches are installed and wired for power, the OneButton™ Setup process is started using the Configuration Tool. OneButton™ Setup establishes a network for all devices within range. A network can comprise up to 250 individual devices (luminaires, switches, plug load controllers, and 0-10V controllers). Because the network is wireless, in can include devices in different rooms, floors and building within range.

After forming the network, OneButton™ Setup automatically organizes individual devices into groups based on the layout of the space. For instance, the devices in a conference room are controlled as a group separately from the devices in the corridor outside, which form their own group. Yet, both groups are part of the same SmartCast® Technology network.

Like any wired lighting control environment, some lighting groups are controlled manually by dimmers and switches, and others are controlled automatically by motion sensors. In a SmartCast® Technology Installation, these are called "switch groups" and "occupancy groups," which OneButton™ Setup creates automatically.

PLANNING ONEBUTTON™ SETUP

Before you begin OneButton™ Setup, it's important to plan how the networks will be deployed. When planning SmartCast® Technology networks, be sure to consider the use of the spaces and what devices will be grouped together. Devices in different networks cannot be grouped together.

Make sure all SmartCast® Technology devices are installed and powered according to the installation instructions. All devices should be receiving constant, unswitched AC power. All prior occupancy sensors and traditional dimmers/switches should be bypassed and/or removed.

Note: SmartCast® Technology may be used with relay panels or contactors, but it is strongly recommended that these systems be bypassed. SmartCast® Technology setup, operation and maintenance operate more reliably when all devices are on unswitched power. In-wall motion sensors switches must be removed or bypassed.

When a device is ready for OneButton™ Setup, it will show a 2-blink sequence on the status LED. During OneButton™ Setup, the status LEDs will transition through various modes until devices are placed into their normal operating mode (1-blink). On luminaires, the status LED will automatically blink. On switches, the LED will blink when a button is pressed. For details on the location of the status LED, refer to the installation instructions for the device.

Figure A: Device Blink Patterns

Status LED Indicator	Operating Mode
1 Blink	*Set up and in normal operation*
2 Blinks	*Ready for OneButton Setup*
3 Blinks	*OneButton Setup in process*
4 Blinks	*Select mode*
5 Blinks, Solid or Off	*Error - contact Cree Customer Service*

MULTIPLE NETWORKS

When you form a network with OneButton™ Setup, all devices that are powered on, in range and not in an existing network are added to the new network. After joining a network, they will not be added to networks formed by subsequent OneButton™ Setups.

If you are setting up more than one SmartCast® Technology network, each network must be set up one at a time. This network-by-network deployment can be performed in two ways: Install the first network, commission the first network, then install the second network, commission the second network, etc. Or, you can install all fixtures for all networks, and use circuit breakers to power and set up one network at a time.

PERFORMANCE CONSIDERATIONS

Network size and group size: While SmartCast® Technology is designed for networks with up to 250 devices and groups with up to 100 devices, you can achieve the optimal balance of speed, responsiveness and network size when networks comprise 100 to 125 devices. To help you decide how many networks to set up for your project, consider the guidelines in ***Figure B***.

Physical network constraints: SmartCast® Technology networks are similar to other wireless networks such as WiFi networks; distance and obstructions between devices can decrease speed and responsiveness. SmartCast Technology does a great job automatically determining lighting groups and light levels, but you can make sure you're getting the most out of the system when you plan ahead and take physical constraints, like walls and open space into consideration. For guidance on planning for physical obstructions, consider the guidelines in *Figure C.*

Figure B: Network Size Guidelines

Large (Over 150)

Pros:

- *Fewer networks to commission*
- *Faster network selection from Configuration Tool*

Cons:

- *Configuration Tool takes longer to reconnect to existing network(s)*
- *Longer response times to settings or group*

Figure C: Physical Constraint Guidelines

Distance

When several devices are located within 30 ft. of each other, they can be considered tightly grouped. Large distances between devices or groups of devices affect available communication paths and signal strength and should be broken into multiple networks with each cluster as a network.

Internal Walls

Depending on their material, internal walls can attenuate or weaken wireless signals. Where possible, limit

changes

Figure B: Network Size Guidelines

- *More devices (and occupants) affected during any change*

Medium (50-150)

- ***Best balance between responsiveness, performance and Configuration Tool rediscovery***

Small (Under 50)

Pros:

- *Fast network selection*
- *Faster response times to settings or groups changes*
- *Fewer devices (and occupants) affected during any change*

Cons:

- *More steps required to set up a large space*
- *May cause network selection from the Configuration Tool to be slow*
- *May not be feasible for large open areas with many devices*

Figure C: Physical Constraint Guidelines

networks to no more than three internal walls between the Configuration Tool and any one device. Avoid crossing any solid, all-metal walls within a network, and keep the Configuration Tool centrally located in the space during OneButton Setup.

External Walls

External walls are typically more densely constructed than internal walls and can attenuate wireless signals more than internal walls. Limit network setup to within external walls. If network boundaries could cross external walls, it is advised to create multiple networks. Keep the Configuration Tool centrally located in the space during OneButton Setup.

Internal Floor/Ceiling

External walls, floors and ceilings are often densely constructed and can attenuate wireless signals. Further, it may not be intuitive to those performing maintenance that a network spans multiple floors. If network boundaries could cross floors, it is advised to create multiple networks and limit each network to a single floor.

PERFORMING ONEBUTTON™ SETUP

Start by counting the devices (fixtures and switches) to be included in the network. Ensure they are powered on; fixtures should be at full brightness and switches should flash their LED twice when a button is pressed. Stand in the center of the planned network, power on the SmartCast® Technology Configuration Tool and allow it to search for existing networks. Only one Configuration Tool should be operated at a time.

If no existing networks are found, press **"OK"** to start OneButton™ Setup. If any existing networks are discovered, the Configuration Tool will present the option to **Edit Existing** or **Set Up New**. To add new devices to an existing network, select **Edit Existing**. To set up a new network and with new devices, select **Set Up New**. Press **"OK"** on the Configuration Tool to begin OneButton Setup™.

As fixtures are identified and added to the new SmartCast® Technology network, they will dim down. The status LED on all devices in the system (fixtures and switches) will begin showing a 3-blink sequence.

As OneButton™ Setup adds fixtures and switches to the network, compare the number of devices found and reported on the Configuration Tool with the number of devices you previously continued.

During daylight harvesting calibration, all fixtures that are part of the network will turn off. The Configuration Tool will indicate when the lights are supposed to be off. Any fixtures that stay at full brightness for the whole OneButton™ Setup process are not part of the newly created network. OneButton™ Setup will continue with all available devices. After the Configuration Tool indicates that OneButton™ Setup is complete, the troubleshooting actions that follow in ***Figure D*** can be attempted.

Figure D: If devices are missing from the new network, or if too many joined, you can correct the issue as follows:

Problem: All devices were not found

Symptom	*Potential Cause*	*Solution*
Status LED is blinking two times.	*Device(s) missed the join process.*	*Connect Configuration Tool to the existing network, if not already connected. Perform Add New Devices from the Advanced menu.*
Status LED is blinking three or four times.	*Device(s) needs to be reset.* *Device did not complete OneButton Setup.*	*Connect Configuration Tool to the existing network, if not already connected. Use Reset Device from the Advanced menu to reset the device. If the devices cannot be reset using the Configuration Tool, follow the manual reset procedure on the installation sheet. If possible, cycle power after manual reset. After reset, confirm Status LED is blinking twice. Connect Configuration Tool to the existing network, if not already connected. Perform Add New Devices from the Advanced menu. If problem continues, cycle power and try again.*

Problem: Too many devices were found

Unintended device was found during OneButton Setup	*More devices than expected were powered and ins range with their Status LED blinking twice.*	*Connect Configuration Tool to the existing network, if not already connected. Use Reset Device from the Advanced menu to reset the extra device(s) on the network.*

Problem: SmartCast® Technology Configuration Tool cannot discover all network devices; "found x of y

devices."

Rediscover Devices won't find missing device(s).	*Configuration Tool needs to be centrally located.* *Device is non-responsive.*	*Relocate to center of network and choose "Rediscover Devices."* *Look for non-powered devices.*

Note: *Choosing "Go to Main Menu" should only be selected as a last resort. If a device is in-network, was simply not discovered and this option was selected, Add Device can assign duplicate addresses. This can lead to unpredictable system behavior.*

Problem: SmartCast® Technology Configuration Tool displays a warning that it cannot discover all network devices.

Discover Network Devices reports missing devices.	*Configuration Tool is not located such that it can communicate with all devices.* *Missing device is not responding.*	*Move Configuration Tool so it is centrally located within devices on the network.* *Select "Rediscover Devices."* *Verify missing device has power. If the missing device is a luminaire, verify that the SmartCast Technology Control Module is powered and its Status LED illuminates.*

Note: *If the Configuration Tool reports missing devices, "Go to Main Menu" should only be selected after attempting to correct the issue using the above methods. If the device is communicating in the network but not discovered by the Configuration Tool, continuing to the Main Menu may allow for duplicate device addresses which may cause unpredictable system behavior.*

VERIFYING ONEBUTTON™ SETUP

At the conclusion of OneButton™ Setup, spaces should be tested for proper grouping and operation. To perform verification of the new SmartCast Technology installation, follow these steps:

Confirm proper grouping:

Group Type	Definition	Check	Tips
Switch	*A group of fixtures that are controlled by one or more switches.*	*With the system in normal mode (Configuration Tool off or on main menu), use the on/off/raise/lower paddles on wall switch to determine if all desired fixtures are controlled.*	*If the fixtures are being dimmed due to daylight harvesting, they may not be able to be raised, but will be able to be turned off and on.*

Occupancy	*A group of fixtures that act together in response to motion events within the group.*	*Connect the Configuration Tool to the network, if not already connected. Navigate to Device Settings Occupancy and select Set Occupied Level. The Configuration Tool will prompt you to select a group after which fixtures in the group will turn off. Select the Back button once group is confirmed.*	*Don't advance past the screen indicating a group was selected until the group has been verified. Depending on the setting selected, fixtures may change levels.*

Adjust grouping if necessary. Making changes to the switch group will not affect the occupancy group, and vice-versa.

Group Operation	Behavior	Settings
Create	*Select each device to assign to a group. Previous grouping will be overridden.*	*Assign defaults.*
Add Device	*Select an existing group and add selected devices to that group. Device to add must be part of the network the Configuration Tool is connected to.*	*New device inherits settings from group.*
Merge	*Select one or more groups to combine into a single group.*	*Assign defaults.*
Ungroup	*Select an occupancy group to dissolve; each fixture becomes its own group. This operation only applies to occupancy groups.*	*Maintain existing settings.*

Adjusting default settings, if necessary:

SmartCast® Technology groups share a collection of settings that define their behavior. Each of these settings has a default value but can be changed.

Setting	Default	Modification
Control Mode	*Dimmer in group - Manual On, Auto Off*	*Device Settings → Occupancy → Set Mode*

	No Dimmer in group - Auto On, Auto Off	
Occupied Level	*100%*	*Device Settings → Occupancy → Set Occupied Level*
Unoccupied Level	*0%*	*Device Settings → Occupancy → Set Unoccupied Level*
Occupancy Sensitivity	*HIGH*	*Device Settings → Occupancy → Set Sensitivity*
Occupancy Timeout	*20 minutes*	*Device Settings → Occupancy → Set Timeout*
Minimum Daylighting Level	*5%*	*Device Settings → Daylighting → Set Min Level*

Verify occupancy sensors.

To test that each sensor is functioning properly, select "Test Occupancy" mode from the Configuration Tool.

You will be prompted to select the occupancy group you want to test, at which point the group will enter a test mode where each fixture within the group acts only on its own motion sensor and is assigned a 30-second timeout. While the fixtures remain in this mode, you will verify that each fixture times out after approximately 30 seconds on no motion, remains off for a brief period of time (e.g., 30 seconds to 1 minute of no motion), and then turns on again due to motion events detected by the fixture.

Once all occupancy sensors in the group have been verified, select ***"OK"*** *on the Configuration Tool. If you identify a problematic fixture (e.g., it won't time out or triggers falsely), you can adjust sensitivity for the group using the Configuration Tool, under Device Settings → Occupancy → Set Sensitivity.*