# Design Recommendations When Using Multiple Control Strategies

## Overview

There are multiple ways to automatically control lights in an area. Using multiple control strategies can sometimes cause conflicts resulting in unexpected behavior for the occupant. This document will discuss recommended operations for common control strategies.

## Using Timeswitches and Occupancy Sensors in the Same Area

### Code Compliance

In most cases, in order to comply with building energy codes that have automatic light shutoff requirements, either a timeswitch (e.g., timeclock) OR an occupancy sensor needs to be used. Using both timeswitches and occupancy sensors in the same area is NOT recommended.

### How Timeswitches Work

There are two common types of timeswitch events: fixed time and astronomic.

#### Fixed Time Events

Fixed time events always occur at the same time. For example, an event to turn OFF the lights at 8:00 PM will always turn OFF the lights at 8:00 PM.

#### Astronomic Events

Astronomic events are based on sunrise and sunset times. These times can change throughout the year based on location. As a result, the system needs to know the location so it can properly calculate when sunrise and sunset will occur. For example, an event programmed to turn ON the lights 30 minutes before sunset could occur at 6:00 PM or 8:00 PM depending on the time of year and location.

### How Occupancy Sensors Work

Occupancy sensors detect occupants in an area and pass that information along to the lighting control system. While there are many different types of sensors for different applications, they all serve the same basic function of informing the control system whether or not an area is occupied. The lighting control system typically uses this information to change between “occupied” and “unoccupied” lighting levels. Depending on the system, those levels are often programmable.

### Potential Conflicts

Using timeswitches and occupancy sensors in the same area at the same time is NOT recommended. The behavior of a timeswitch and an occupancy sensor could conflict and result in undesired performance for the occupant. Consider these scenarios:

#### Scenario 1:

An occupant walks into an area that contains an occupancy sensor and the lights turn ON at 6:42 PM. A daily timeswitch event to turn OFF the lights at 6:45 PM occurs while the occupant is still in the area.

#### Scenario 2:

A timeswitch event to turn ON the lights at 6:00 AM occurs but no one is in the area. Energy is wasted and the sensor is in the “unoccupied” state. An occupant walks into the area at 6:45 AM and finds the lights already ON. The area stays occupied until 5:45 PM when the area becomes unoccupied and the sensor turns OFF the lights.

### Suggested Operation for Optimal Performance

A. Use either timeswitches or occupancy sensors, but not both. This will avoid any conflicting scenarios that could waste energy or cause the lights to turn OFF on an occupant unexpectedly.

B. Use a system that can enable/disable sensors with a timeswitch event; such as a Quantum system or a standalone QS system with a QS timeclock or GRAFIK Eye QS unit. Disable the sensors when it is desirable to keep the lights ON (e.g., during normal operating hours) and enable the sensors outside of normal operating hours.

# Using Timeswitches and Outdoor Photocells in the Same Area

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## How Outdoor Photocells Work

An outdoor photocell measures light and turns ON exterior lighting when the ambient light falls below a programmable threshold. Conversely, a photocell turns OFF exterior lighting when the ambient light exceeds a programmable threshold. The photocell captures local conditions (e.g., cloudy day) that may cause the exterior lights to stay ON longer or turn ON sooner than having a fixed schedule.

## Potential Conflicts

Lutron does NOT recommend the use of both a timeswitch and a photocell to control the same lights. If the lights controlled by the photocell are also controlled by a timeswitch, certain situations could cause the lights to not turn ON/OFF automatically as required. Consider this scenario:

### Scenario 1

A timeswitch event turns OFF the lights at 6:05 AM. The current conditions are dark and overcast. The photocell sends a command to turn OFF the lights at 8:09 AM because there is considerably more ambient light available at that time. The perception is that the photocell was not working between 6:05 AM and 8:09 AM because it did not keep the lights ON. However, the timeswitch caused the lights to turn OFF prematurely.

## Suggested Operation

Lutron recommends that if a photocell is being used with exterior lighting, it should be the only control used with the exterior lighting. If a photocell is not being used, an astronomic timeswitch can be used.

# Using Upstream Relay Panels to Switch Power to RF Products Normally Connected to Constant Power

## Potential Issues

Wireless occupancy and daylight sensors send commands to load controllers (e.g., Maestro Wireless dimmer) when there is a change in the area. If the load controller is powered OFF, it will not receive any of these commands. Consider these scenarios:

Scenario 1

A person enters the room and a wireless occupancy sensor sends a command to a wireless dimmer to turn ON the lights. The dimmer does not have power so it will not receive this command and the lights will not turn ON.

Scenario 2

This scenario is a continuation of the scenario above except that there is also a wireless daylight sensor present. When the lights fail to turn ON when the person entered the room, the person presses the ON button on the dimmer to turn ON the lights. However, since the dimmer is powered OFF, the lights will not turn ON. When the upstream panel provides power to the dimmer, the dimmer will be in the same state as when it lost power – which could be OFF. Also, since the dimmer does not have power, it will miss any daylight sensor messages and the lights may turn ON at the incorrect level.

## Suggested Operation

A. Lutron recommends using a system with a timeswitch if the purpose is to have timeswitch control of wireless dimmers. See **Using Timeswitches and Occupancy Sensors in the Same Area** for more information. Some Lutron systems with a timeswitch include: Vive system, Quantum system, and GRAFIK Eye QS system.

B. Do not switch power upstream to a wireless dimmer that is working with a wireless occupancy sensor. It is not necessary to remove power to a dimmer in order to ensure the lights turn OFF in an area. The occupancy sensor will automatically turn OFF the lights when the area is unoccupied. The lights can always be turned ON/OFF manually by pressing the appropriate button on the dimmer.

# Using Upstream Relay Panels to Switch Power to EcoSystem Devices

## Issues

EcoSystem ballasts, drivers, and interfaces were designed to be connected to constant power. EcoSystem devices are capable of turning their loads ON/OFF through digital communication with an EcoSystem control. Switching OFF an EcoSystem ballast or driver will cause the turn ON time to be much longer than from an electronic OFF state. In addition, the EcoSystem device is unable to communicate with the EcoSystem control when power is switched OFF to the device. EcoSystem devices are capable of sending alerts to a Quantum system to indicate when a ballast or lamp has failed or when a certain number of operating hours has been reached. This alert functionality requires the EcoSystem device to be connected to constant power.

## Suggested Operation

Lutron recommends wiring EcoSystem devices to constant power per the instructions provided with the device.

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