

# Automatic Receptacle Control

California Title 24, IECC, ASHRAE, NEC



# Automatic Receptacle Control

## Questions ??

- How will the receptacles be controlled?
- What is the 50% rule?
- What equipment is available for controlled receptacle installations?
- Is product marking standard finalized?
- NEMA generated whitepaper



# Automatic Receptacle Control Summary

- Applies only to commercial building energy codes
- 2022 CA Title 24, Part 6 Energy Code, Section 130.5
- 2022 ASHRAE 90.1, Section 8.4.2
- 2021 International Energy Conservation Code, Section 405.11
- NEC 2023, Article 406.3(F)
- ANSI/NEMA WD6 2021
- NEMA BI 50002-2022



# What types of receptacles are required to be controlled?

Title 24	IECC	ASHRAE 90.1
120 volt 15 and 20 Ampere receptacles	125 volt 15 and 20 Ampere receptacles	125 volt 15 and 20 Ampere receptacles



# What locations require controlled receptacles? How many?

Title 24	IECC	ASHRAE 90.1
<p>In all buildings, both controlled and uncontrolled 120-volt receptacles in each private office, open office area, reception lobby, conference room, kitchenette in office spaces, copy rooms, hotel/motel guest rooms. At least one controlled receptacle installed within 6 feet from each uncontrolled receptacle.</p>	<p>At least 50% of 125-volt, 15 and 20-Amp receptacles in enclosed offices, conference rooms, copy rooms, breakrooms, classrooms, workstations. At least one controlled receptacle installed within 12 inches from each uncontrolled receptacle.</p> <p>At least 25% of branch circuits supplying modular furniture not shown on the construction documents (for future control of receptacles in modular furniture).</p>	<p>At least 50% of all 125-volt 15 and 20-amp receptacles in all private offices, conference rooms, copy rooms, break rooms, classrooms, and individual workstations</p> <p>At least 25% of branch circuits installed for modular furniture not shown on the construction documents</p>



# What controlled methods do not comply?

Title 24	IECC	ASHRAE 90.1
Plug-in power strips do not comply for this requirement.	Plug-in power strips do not comply for this requirement.	Plug-in power strips do not comply for this requirement.



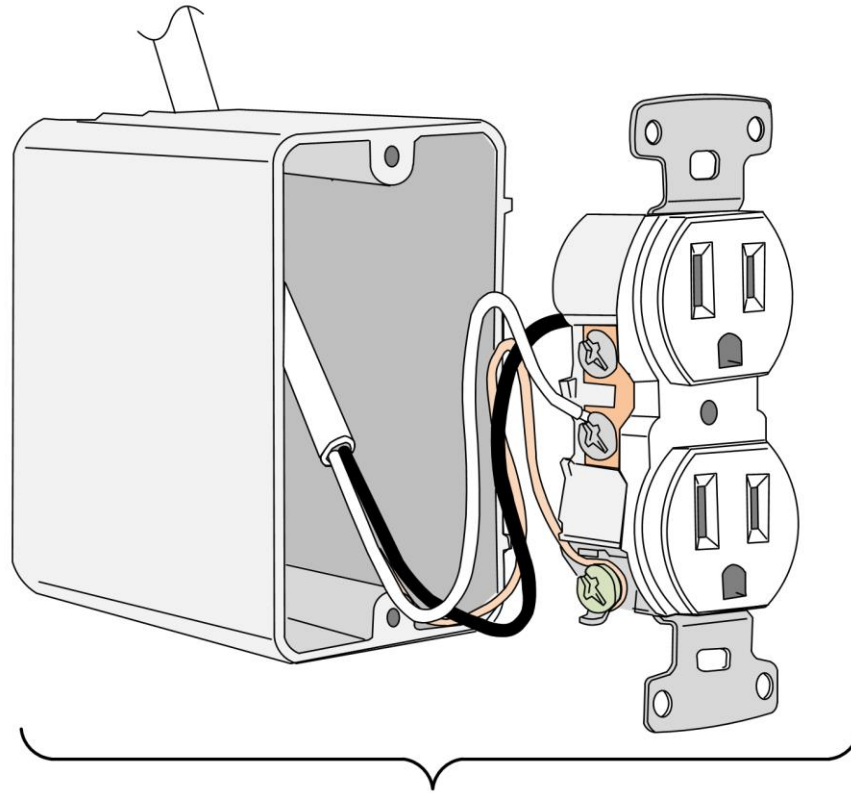
# What locations do not require controlled receptacles?

Title 24	IECC	ASHRAE 90.1
<p>Clock receptacles (mounted 6' or more above the floor)</p> <p>Receptacles for copiers, printers and other IT equipment in copy rooms (not including personal computers).</p> <p>Receptacles for refrigerators and water dispensary devices in kitchenettes.</p> <p>Receptacles on circuits rated more than 20 amperes.</p>	<p>Same as ASHRAE 90.1, plus within a single modular office workstation, non-controlled receptacles are permitted to be located more than 12 inches but not more than 72 inches from the controlled receptacles serving that workstation.</p>	<p>Spaces where receptacles are specifically designated for equipment requiring 24-hour operation.</p> <p>Also, where automatic shutoff would endanger the safety or security of the room or occupants.</p>



# Definitions

**Outlet:** A point on the wiring system at which current is taken to supply utilization equipment.



**Receptacle:** A contact device installed at the outlet for the connection of an attachment plug, or for the direct connection of electrical utilization equipment designed to mate with the corresponding contact device.



**Receptacle Outlet:** An outlet where one or more receptacles are mounted.





# Receptacle Examples



Single



Duplex



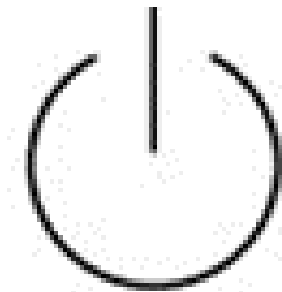
# Marking Requirements

- Title 24, the IECC and ASHRAE 90.1 all have various requirements for the marking of controlled receptacles. However, the 2023 NEC in Section 406.3(F) has specific requirements for controlled receptacle marking. The NEC requirements satisfy the energy code requirements. They include:
  - Be permanently marked with the controlled receptacle symbol and with the word “controlled”.
  - The receptacle(s) shall be marked on the receptacle (not cover plate) and be visible after installation.
  - Where split-wired receptacles are used, the required symbol and word “controlled” shall designate which receptacles are controlled.



# Controlled receptacle symbol described in 2023 NEC

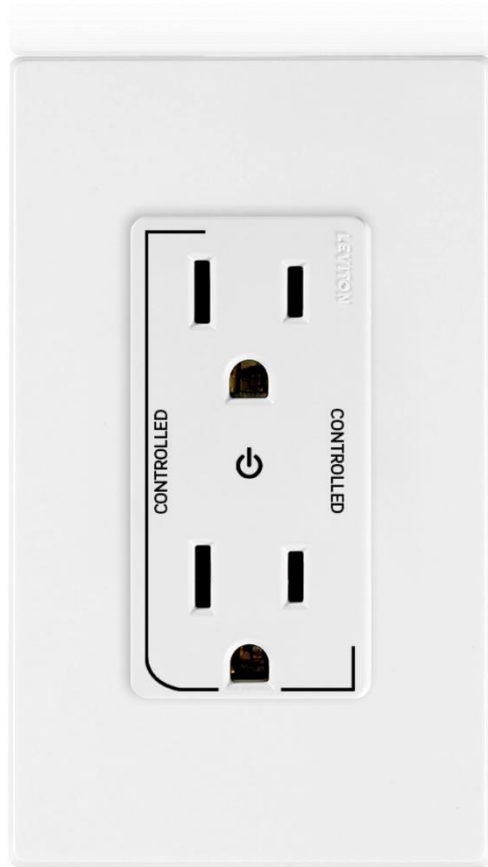
- 2023 NEC Article 406.3(F)



Controlled



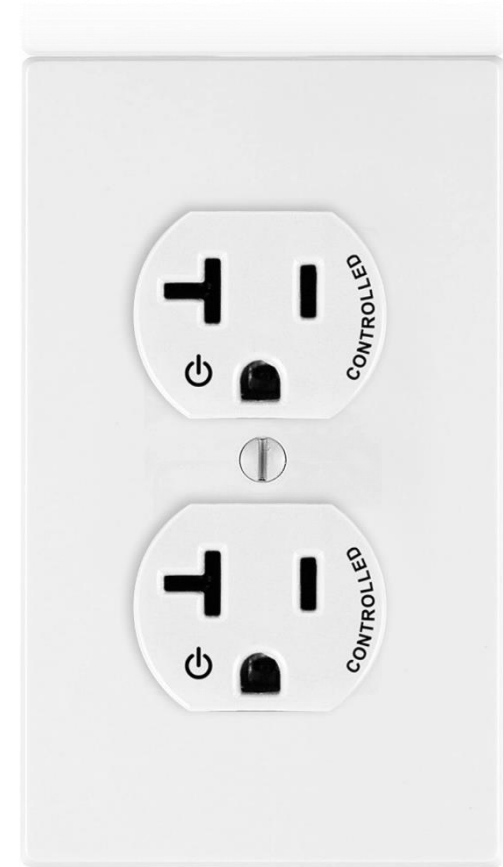
# Marking Examples



Two Controlled



Two non-Controlled



Two Controlled



# Marking Examples



# What available products provide automatic control to comply with controlled receptacle requirements?

- Motion sensors
- Occupancy sensors
- Networked control systems or building automation systems
- Relay panels
- Receptacle with integral switching means



# How to Control the Receptacles?

- Motion / Occupancy sensors
- On-off schedule either built into the switching relay or fed externally from a networked control systems or building automation systems



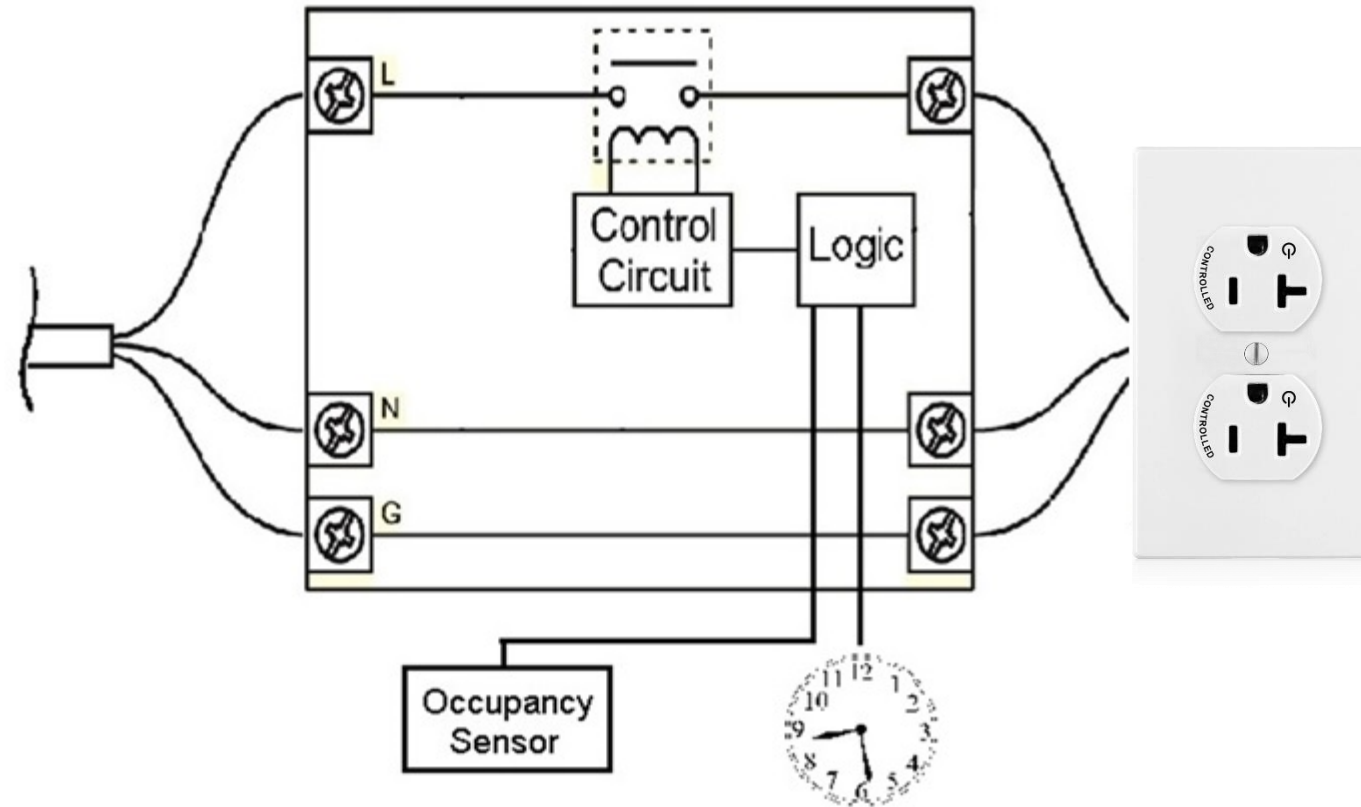
# Wired Remote Controlled Receptacles

- Must decide which receptacles will be controlled as a group – can be more difficult to change wiring later.
- Requires two feed wires, one for controlled and one for non-controlled receptacles
- Poor granularity of control (e.g. all receptacles wired together always turn on and off together)
- OK for new construction, but difficult for retrofitting existing buildings.





# Controlled Receptacle with External Control and Sensors (UL ATNZ or PAZX)



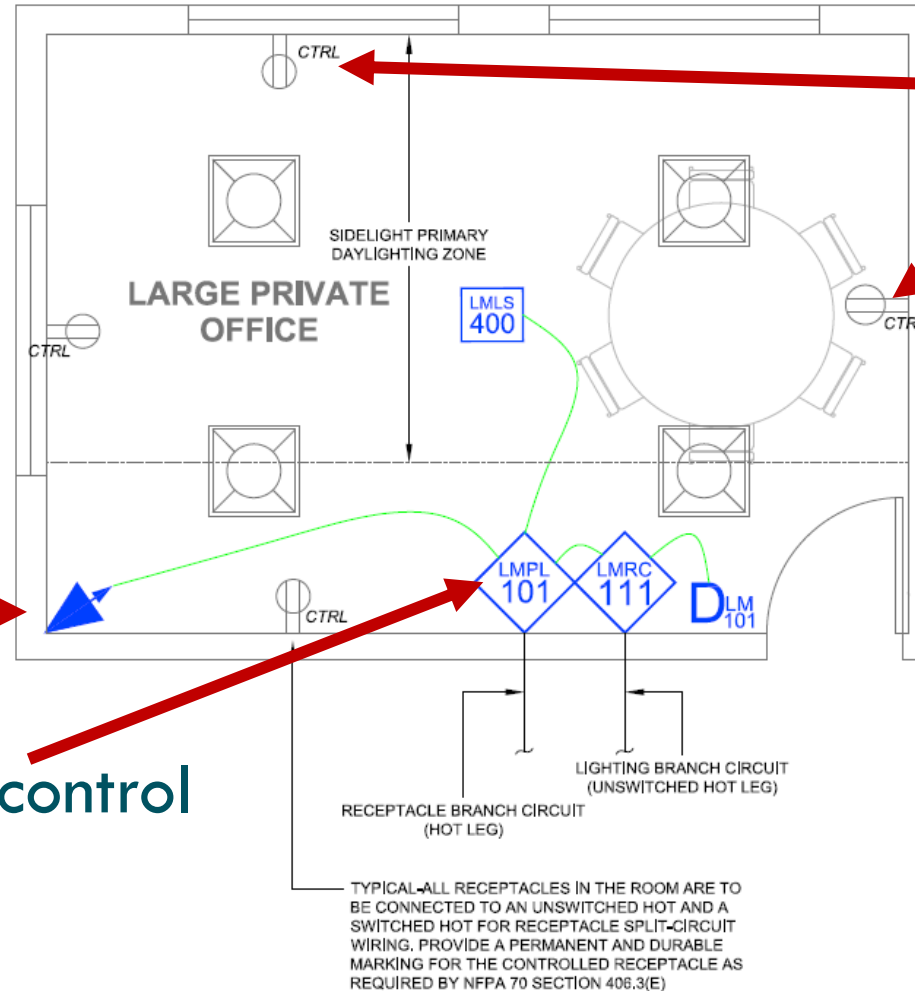
# Example Construction Document Layout

This example demonstrates how controlled receptacles may be shown on construction documents with branch circuit external control and sensor.

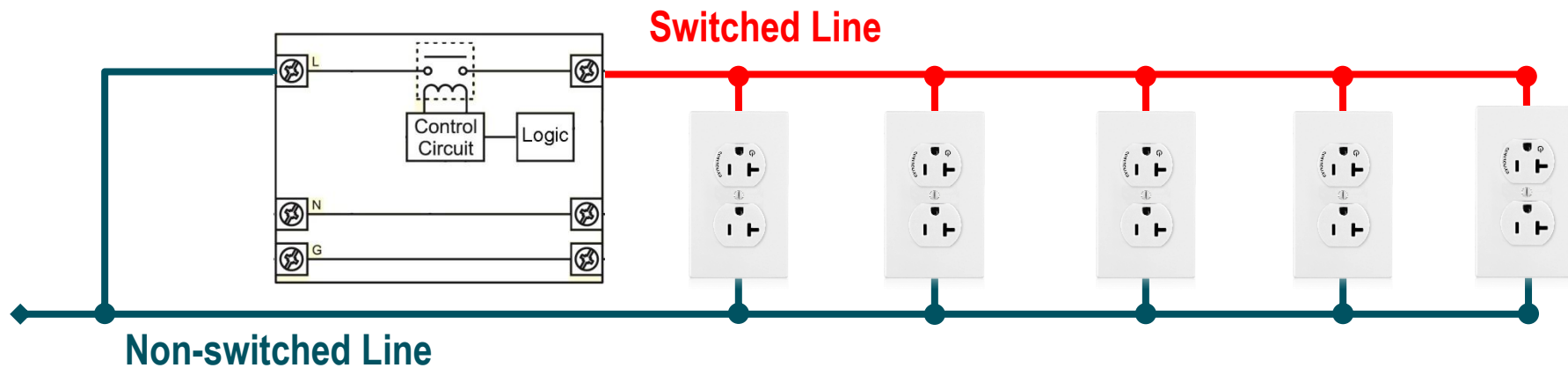
Occupancy detecting sensor

External control device

Typical one controlled, one non-controlled receptacle in each outlet location



# Example Using Single Automatic Switch per Branch Circuit with Split Receptacles

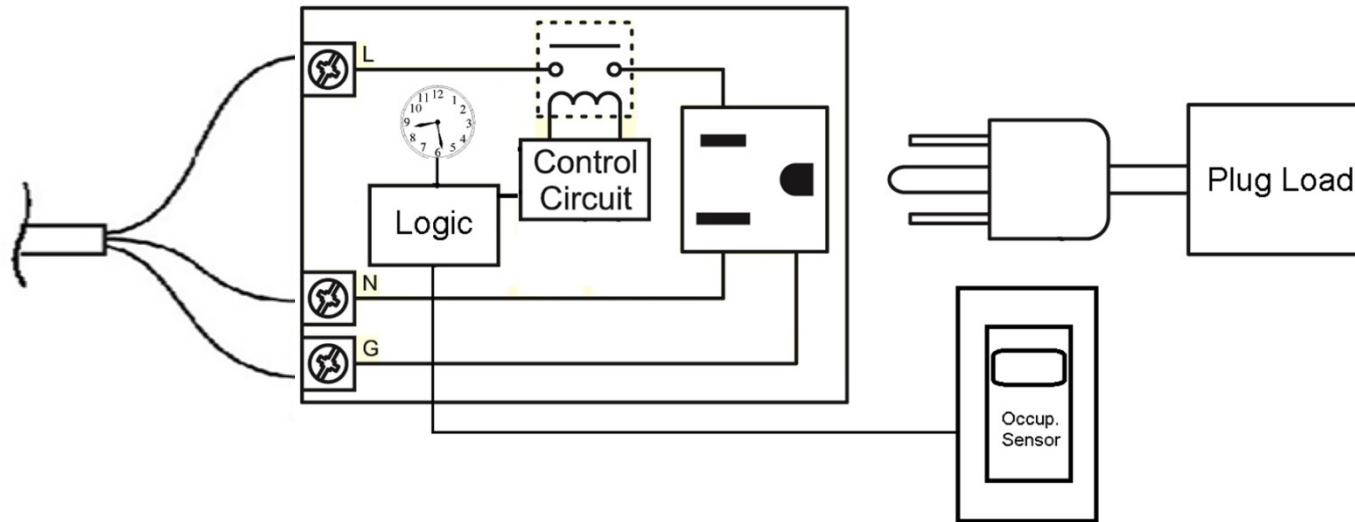


Neutral and Ground wires (not shown here) are common to all receptacles

Distance between either controlled or non-controlled receptacles must meet energy code limits



# Controlled Receptacle With Integral Switching Means and External Sensor (UL 498B)

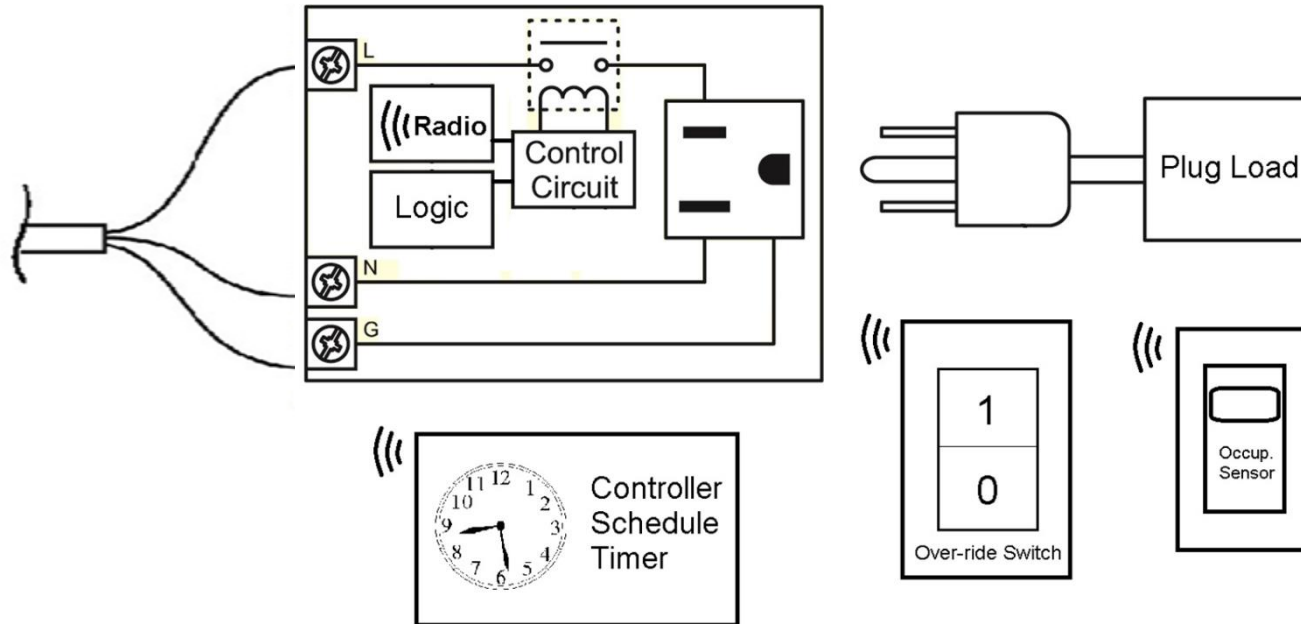


# Wireless Remote Control of Receptacles With Integral Switching Means

- Each receptacle can be separately controlled via wireless commands
- No special branch circuit rewiring needed – useful for retrofitting existing buildings
- Enables more granularity of control (e.g. receptacles for just one desk can be turned off instead of turning off the entire floor or area)



# Controlled Receptacle with Integral Switching Means and External RF Sensors (UL 498B)

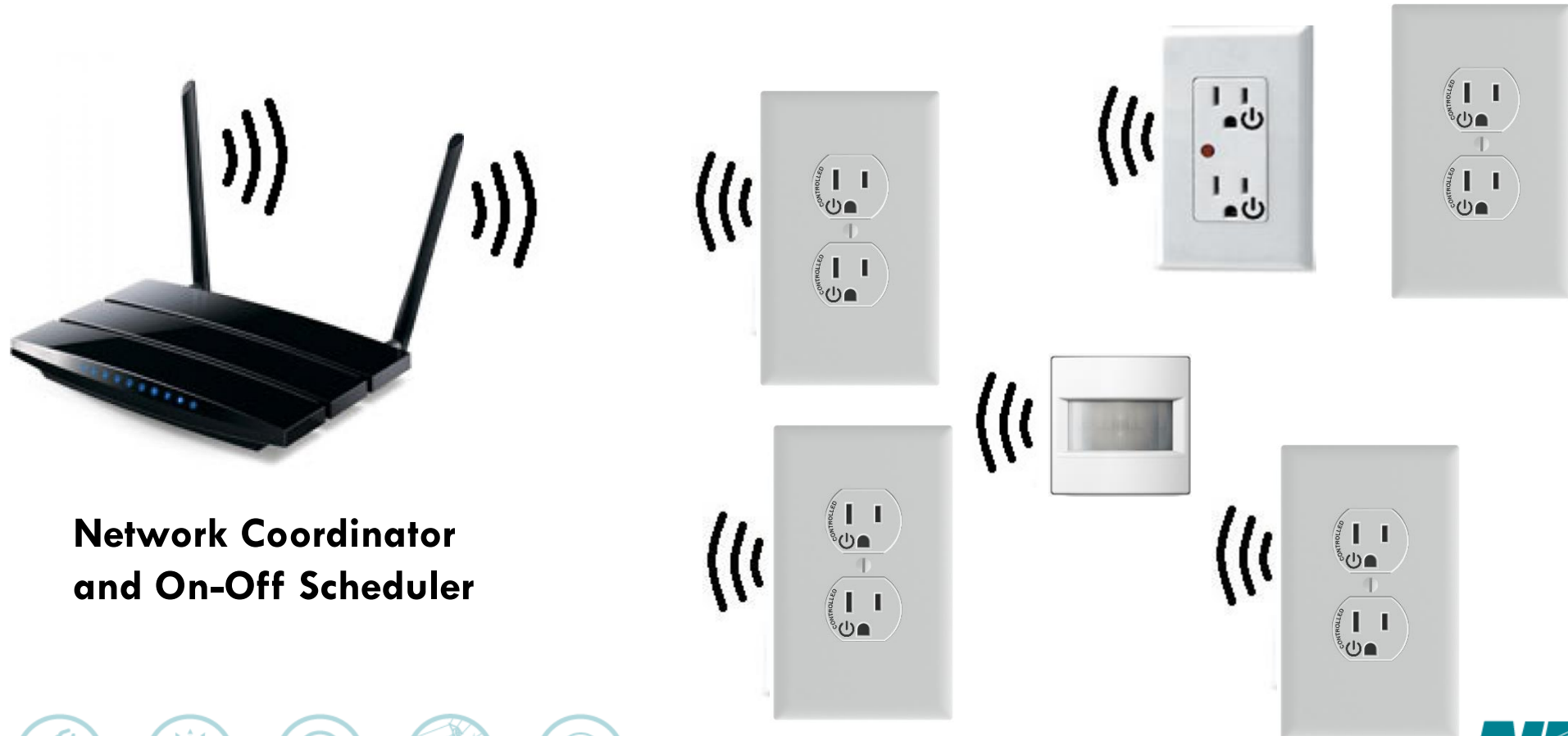


Wireless Communication:

- ZigBee
- Zwave
- WiFi
- Bluetooth
- Proprietary



# Example Using Controlled Receptacles with Internal Switching Means (UL 498B)



**Network Coordinator  
and On-Off Scheduler**



# COMcheck Compliance

COMcheck “Inspection Checklist” report shows compliance or what exceptions might be applied to the project for ASHRAE 90.1 and IECC



COMcheck Software Version COMcheckWeb

## Inspection Checklist

Energy Code: 90.1 (2019) Standard

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
8.4.2 [EL10]²	At least 50% of all 125 volt 15- and 20-Amp receptacles are controlled by an automatic control device.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.





# Automatic Receptacle Control

California Title 24, IECC, ASHRAE, NEC

