signify interact

System guide

# Signify Interact for Intelligent Buildings

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Signify Interact for Intelligent Buildings is a wireless smart lighting system that is easy to install, setup, and manage. Commissioning and operating the system is made simple and efficient using the Signify Interact Builder mobile app and web portal.

A portfolio of Interact ready luminaires and devices is available to suit a wide range of applications. These luminaires and devices connect to form wireless networks that enable system operation.

The smart lighting system can be operated in a standalone configuration, or gateways can be added to wireless networks to enable additional cloud connected features.

# 1. Application overview

Signify Interact for Intelligent Buildings is designed to install, setup, and manage a lighting system in projects of the following application types:

- Office
- Industry
- Educational Institutions
- Municipal Buildings
- Care Facilities
- Retail
- Building perimeters
- Outdoor parking lots
- Covered parking garages

# 2. Project structure

A project is created for a site where Interact ready luminaires and devices are being installed. Within each project, one or more wireless networks are created based on the physical layout of the site and the number of Interact ready luminaires and devices installed. Additional networks may be required to overcome wireless obstructions on site.

## 2.1. Wireless Networks

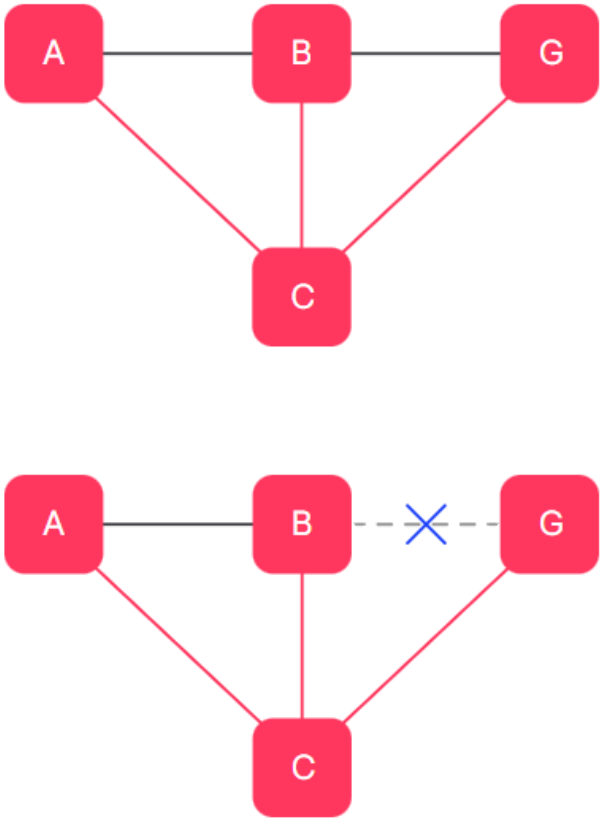
Wireless networks are required to enable secure and scalable wireless communication within the lighting system and are created using the Signify Interact Builder mobile app or web portal.

Interact ready luminaires and devices use the Bluetooth Low Energy (BLE) wireless communication protocol to communicate with mobile phones. This enables mobile phones using the Signify Interact Builder app to discover and add Interact ready luminaires and devices to wireless networks. In networks without gateways, BLE also enables mobile phones to deploy behavior configurations and control the lighting system locally.

Interact ready luminaires and devices within a wireless network communicate with each other using the Zigbee wireless communication protocol. Zigbee forms a wireless mesh between devices added to the network and enables the configured operation of the lighting system. The advantage of a mesh network is the capability for self-healing by using automatic route discovery.

## 2.2. Routing between wireless devices

The lights of a wireless system are guaranteed to work if the distance between the light and at least one of the other lights in the network is less than or equal to 10 m (depending on the sensor type). It is preferred to have at least two lights within the range of each light, as the wireless Zigbee network uses mesh routing, as shown below:




This makes the network much more robust as multiple routing paths can be used for communication.

The connection from light A to the gateway G can go via light B. If for some reason the connection between A and B is blocked, the network will automatically route the traffic through light point C.

These require the light to be installed within the reach of at least two other lights within 10 m (33 ft).

As the Zigbee Green Power devices (sensors and switches) only send messages in the Zigbee network, they exist in the network but play no role in the routing between the wireless devices.

Wireless networks operate in the 2.4GHz frequency band, which is used by 2.4 GHz Wi-Fi, Bluetooth and Zigbee. Although these technologies have been designed to co-exist in the 2.4 GHz band, it is still important to choose wireless network Zigbee channels carefully to avoid any potential interference. The Zigbee channel is user-selectable when creating a wireless network.

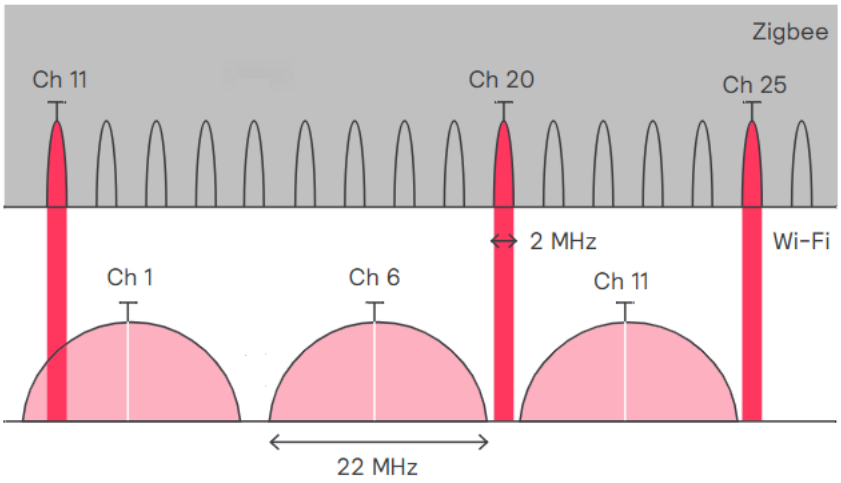
## 2.3. Channel selection

As Wi-Fi channels overlap each other, it is required to select non-overlapping channels to ensure best possible communication.

Interference between overlapping channels results in lower transmission speeds or at worst no communication at all.

In a well-managed Wi-Fi system, channels 1, 6 and 11 are used to create a network with full coverage without access points interfering with each other. Using these channels also leaves gaps in the frequency band.

The wireless Zigbee network uses channels 11, 20 and 25 that are positioned in the gaps of the Wi-Fi band, as shown below:




## 2.4. Interference

Devices using Ultra High Frequency (UHF) radio signals are sensitive to interference. However, systems using frequencies in the 2.4 GHz band are designed to coexist.

Also, for the wireless Zigbee network, the transmitting powers are significantly lower when compared to Wi-Fi, mobile telephony etc. The table shows the relation between the maximum permitted powers for several types of radio signals.

*Overview of maximum permitted powers for several appliances operating in UHF frequency bands*

| **Device / Type** | **Max. permitted power** | |
|---|---|---|
| | **Transmitting power** | **Power ratio** |
| **Microwave** | 1000 W | 60 dBm |
| **Mobile telephone (GSM)** | 2 W | 33 dBm |
| **Wi-Fi (at 2.4 GHz)** | 100 mW | 20 dBm |
| **Bluetooth** | 100 mW | 20 dBm |
| **Zigbee** | 2.5 mW | 4 dBm |

To ensure reliable Zigbee communication within wireless networks, the following application-specific distance limitations between luminaires and devices should be observed:

- Office/Educational Institution applications - 10 m (33 ft)
- Industry/Warehouse/Retail applications - 15 m (49 ft)
- Outdoor Parking applications (only for LCN4120, LCN4150) - 49 m (160 ft)

Distances vary depending on the sensor type, refer to each sensor data sheet for maximum distances allowed by each device.

Wireless gateways should be within the specified application range of at least two mains powered wireless luminaires or devices in their respective wireless networks. Ideally, they should be mounted in a central location within the network for maximum reliability. Zigbee Green Power (ZGP) devices do not count as devices in range in this instance since they do not repeat Zigbee messages.

## 2.5. Groups

Groups are created within wireless networks using the Signify Interact Builder mobile app or web portal. Groups are where the behavior of the smart lighting system is defined. Groups enable Interact ready luminaires and devices to be linked together wirelessly to respond to occupancy, vacancy and light level using various configurable light behavior parameters and light behavior states. They also enable user interface control, scene setting and schedule control.

## 2.6. Zones

Zones are optionally created within groups using the Signify Interact Builder mobile app or web portal. Zones allow for Interact ready luminaires and devices to be linked together to respond in unison to scenes. Zones are also required to enable the daylight sensing settings within groups.

# 3. System security

Signify Interact for Intelligent Buildings functions in a secured environment, ensuring privacy and security to the user's data. The key features include:

- Wireless Zigbee protocol based on 128-bit AES key encryption
- Bluetooth protocol based on 256-bit AES key encryption

Refer to the Security Statement for further details.

# 4. Key features

The system can be installed with or without wireless gateways. When installed without a gateway, the devices within a wireless network operate in a standalone architecture with lighting control capability and energy saving functionality. Adding a gateway to a wireless network enables additional functionality by connecting the network to the cloud. The following table provides a list of features available with/without a gateway.

| Feature | Without gateway | With Gateway |
|---|---|---|
| Occupancy sensing | ✓ | ✓ |
| Daylight sensing | ✓ | ✓ |
| Outdoor parking daylight override | ✓ | ✓ |
| Wireless switches for manual control | ✓ | ✓ |
| Light behavior states Light behavior V2 | ✓ | ✓ |
| Scenes | ✓ | ✓ |
| Tunable White | ✓ | ✓ |
| High end trim | ✓ | ✓ |
| Schedules | ✕ | ✓ |
| Remote control | ✕ | ✓ |
| System monitoring | ✕ | ✓ |
| Energy reporting | ✕ | ✓ |
| Project updates | ✕ | ✓ |
| Demand response | ✕ | ✓ |
| BACnet | ✕ | ✓ |
| Light Control REST API | ✕ | ✓ |
| MQTT API | ✕ | ✓ |

## 4.1. Occupancy sensing

Occupancy sensing allows the system to automatically switch on the lights when a group becomes occupied (auto on) and switch them off when the group becomes vacant (auto off).

## 4.2. Daylight sensing

Daylight sensing allows the system to take advantage of the ambient light coming through windows or translucent ceilings to dim the lights. This is achieved by using the sensors to continuously measure the light level and adjust the brightness of the luminaires to keep the light level at a target setpoint.

In Daylight sensing, the minimum light level can be set to 20%, 5%, or dim to off (0%) when the ambient light level is sufficient.

## 4.3. Outdoor parking daylight override

Outdoor parking daylight override allows for the outdoor parking sensors (LCN4120, LCN4150) to switch off when ambient light is sufficient. This enables luminaires in outdoor parking applications to remain off during the day and only operate at night, or when low light level conditions occur.

## 4.4. Switches for manual control

Wireless switches provide users with the ability to manually control their lighting environment. These switches offer various functionalities such as on/off control, dimming, color temperature adjustment and scene selection.

## 4.5. Light behavior states

Light behavior states are discrete, predefined configurations stored in devices that determine how groups of lights respond to occupancy and daylight sensing. Each state contains a set of configurable parameters allowing for occupancy sensing, daylight sensing, light level and time delay adjustments that can be customized according to specific needs and scenarios.

Light behavior V2 groups allow up to six different states to be stored by devices in the group, while non-Light behavior V2 groups only store a single state. In Light behavior V2 groups, each created state can be independently named and configured. These states can then be recalled by the mobile app, enabling users to switch between lighting behavior states for different operational needs without requiring manual group re-configuration.

## 4.6. Scenes

Scenes are used to set the intensity level of individual lights or zones in a group for manual recall. If Tunable White lights are in the group, the color temperature can also be adjusted. They can be recalled using switches, the app, and if gateways are used, the web portal. Two scenes can be assigned to 4-button switches.

## 4.7. Tunable White

Interact ready luminaires that support Tunable White allow for control of the output color temperature in addition to light intensity.

## 4.8. High end trim

High end trim limits the maximum output level of a group of lights. Selecting a high-end trim other than default (no trim) lowers the maximum possible light output of the group.

## 4.9. Schedules

Schedules provide the ability to define control behaviors for groups at selected day(s) of the week and at a fixed time of day. A single schedule can be defined with actions for multiple groups, with on, off and scene selection actions available for each group.

## 4.10. Remote control

In projects with gateways, remote control enables users to perform on/off control, dimming, color temperature adjustment and scene selection of their lighting system from anywhere, using the app or portal. For experts, behavior configuration changes and remote deployment using the app are also possible.

## 4.11. System monitoring

The Signify Interact Builder web portal provides system monitoring capabilities. Energy consumption can be viewed and Interact ready luminaires and devices that have failed or are degraded (> 80% of lifespan burning hours) are reported.

## 4.12. Energy reporting

Energy reporting allows users to generate .csv reports for specified date ranges up to one year prior. In the report, incremental energy consumption (in Wh) is reported every 15 minutes for every group in the project.

## 4.13. Project updates

The Signify Interact Builder app, web portal and cloud are regularly updated to enable new features and fix issues. New device firmware may also be released to support these updates. Over-the-air (OTA) project updates are essential for keeping the system devices up to date with the latest firmware, ensuring optimal functionality and security and enabling new system features as they become available.

## 4.14. Demand response

Demand response allows the lighting system to temporarily reduce its energy consumption. It operates as a temporary high-end trim across the entire project. In projects with gateways, manual and automatic demand response (ADR) options are available. ADR requires the addition of a dedicated ADR gateway and supporting infrastructure to achieve demand response through OpenADR. ADR enables automatic system response to requests sent by the local utility company to reduce energy consumption during times of peak energy usage.

## 4.15. BACnet

BACnet integration is an on-premise, IP-based communication between the interact gateways and a third-party BACnet system. It supports manual control and occupancy data reporting of lighting groups.

## 4.16. Light Control REST API

Light Control REST API provides temporary, real-time manual control of luminaires and lighting groups through the Interact gateway, allowing third-party systems to override automatic lighting behavior by setting dim levels, recalling scenes, or sending on/off commands. When occupancy sensing is enabled, the system automatically returns to its configured lighting behavior after the group's hold time expires; otherwise, the manual override remains in effect until a new override is applied.

For more information, see Interact Developer - API Docs (will be available soon).

## 4.17. MQTT (Message Queuing Telemetry Transport) API

The gateway operates as an MQTT client publisher towards an external MQTT broker. The MQTT broker is hosted by a third-party building integrator. It enables you to receive actual updates from the gateway, via an MQTT broker, for devices and groups managed by the gateway, including occupancy status (per group, per device for built-in and mains powered sensors), total energy consumption per device, burning hours per device, and health status per device.

For more information, see Interact Developer - API Docs (will be available soon).

# 5. System limitations

Account level

| Feature | Maximum limit |
|---|---|
| Max projects per Expert account | 1000 |

Project level

| Feature | Maximum limit |
|---|---|
| Light networks/ gateways | 100 |
| Schedules | 16 |
| Groups/schedule | 16 |
| Expert accounts per project | 10 |
| User accounts per project | multiple |

Wireless light network level

| Feature | Maximum limit |
|---|---|
| Nodes | 200 |
| Zigbee Green Power (ZGP) devices (switches + battery powered sensors) | 50 |
| Switches | 50 |
| Sensors (battery powered) | 30 |
| Groups + zones | 64 |
| Scenes | 128 |

Group level

| Feature | Maximum limit |
| --- | --- |
| Nodes (Interact ready luminaires, mains powered sensors, switch relays, Smart T-LEDs) | 200 |
| Zigbee Green Power (ZGP) devices (switches + battery powered sensors) | 5 |
| Scenes | 16 |
| Light behavior state Light behavior V2 group | 6 |
| Light behavior state non-Light behavior V2 group | 1 |

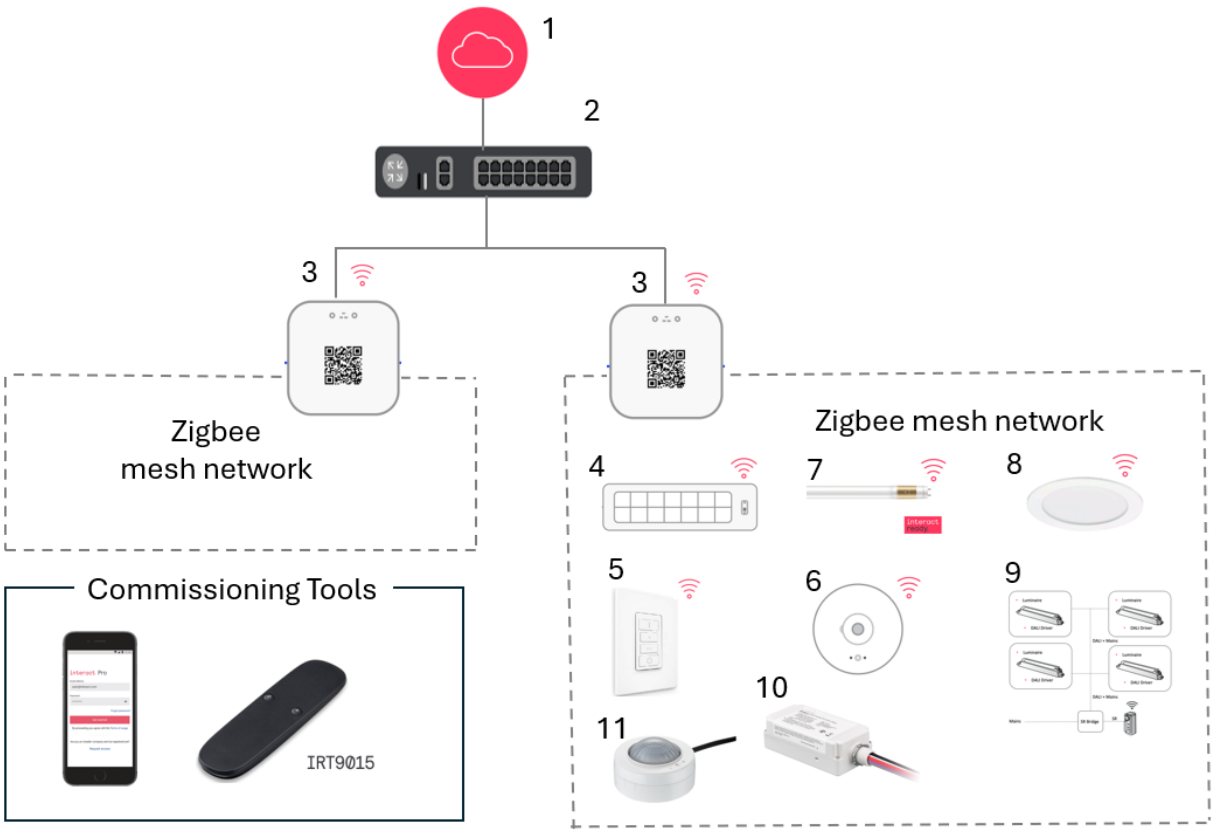
**Important**

All luminaires, sensors, gateways, and devices must remain energized 24/7. Turning off luminaires should not be done by disconnecting the mains power; instead, it should be managed through the system's automatic or manual controls. Frequently switching off the mains power can lead to system malfunctions and undesirable lighting behavior due to variations in device power-up timing. Switching off gateways will disable all key features enabled by gateways while they are powered off.

## 5.1. Operational distance of Zigbee devices

Wireless Zigbee devices (Wireless Gateway, sensors and switches) function optimally with a distance range of 10 meters to 50 meters (32.8 feet to 164 feet) between nodes. For more details, refer to the specification sheet for each device.

# 6. System components




1. Interact Cloud
2. IT infrastructure
3. Wireless gateway
4. Luminaires with built-in sensors/transceivers
5. Wireless switches,
6. Battery powered sensors (ZGP)
7. 7-Smart T-LEDs.
8. Luminaires with wireless drivers
9. 9-DALI and 0-10V bridges with sensors/transceivers
10. Switch relay
11. Mains powered sensor.

## 6.1. Wireless gateway

The wireless gateway communicates with Interact ready luminaires and devices within a wireless network using Zigbee. Adding a gateway to a wireless network enables additional functionality (described in the Key Features overview) by connecting the network to the cloud.

## 6.2. Luminaires with built-in sensors

Luminaires with built-in sensors integrate sensing capabilities and wireless communication directly into the luminaire assembly. The mains powered SR (Sensor Ready) driver(s) in the luminaire power and communicate with the built-in sensor, which contains the Bluetooth and Zigbee antennas. Other than mains power to the luminaire, no additional wiring or external sensors are required.

## 6.3. Mains powered sensors

Mains powered sensors (MPS) integrate sensing capabilities and wireless communication directly into a standalone sensor. The mains powered sensor contains the Bluetooth and Zigbee antennas. Other than mains power to the sensor, no additional wiring or external sensors are required. These sensors can be used in combination with wireless drivers or luminaires with built-in transceivers, or as an extension sensor used in combination with built-in sensors.

## 6.4. Mains powered sensors DALI

Mains powered sensors (MPS) DALI allow up to 10 DALI-2 (DIA) luminaires to be connected directly to a mains powered sensor, it has a zigbee range of 50 meters, and provides different coverage patterns and trunking or independent luminiare mounting options.

## 6.5. Luminaires with built-in transceivers

Luminaires with built-in transceivers integrate wireless communication directly into the luminaire assembly. The mains powered SR (Sensor Ready) driver(s) in the luminaire power and communicate with the built-in transceiver, which contains the Bluetooth and Zigbee antennas. Other than mains power to the luminaire, no additional wiring is required. Transceivers do not have sensing capabilities, so they must be grouped with external sensors or with luminaires with built-in sensors for automatic behavior configurations.

## 6.6. Luminaires with wireless drivers

Luminaires with wireless drivers integrate wireless communication directly into the luminaire. The mains powered wireless driver(s) in the luminaire contains the Bluetooth and Zigbee antenna. Other than mains power to the luminaire, no additional wiring is required. Wireless drivers do not have sensing capabilities, so they must be grouped with external sensors or with luminaires with built-in sensors for automatic behavior configurations.

## 6.7. Smart T-LEDs

Smart T-LEDs integrate wireless communication directly into the lamp. Each mains powered Smart T-LED lamp has the Bluetooth and Zigbee antenna built-in. Other than mains power to the fixture, no additional wiring is required. Smart T-LEDs do not have sensing capabilities, so they must be grouped with external sensors or with luminaires with built-in sensors for automatic behavior configurations.

## 6.8. DALI and 0-10V

DALI and 0-10V bridges enable wireless control for non-Interact ready luminaires with DALI or 0-10V drivers. The mains powered SR (Sensor Ready) bridge powers and communicates with a sensor or transceiver, which contains the Bluetooth and Zigbee antennas. The bridge itself is equipped with a power switching relay and a signal output (DALI or 0-10V) to switch and dim the connected non-Interact ready luminaires. The same grouping concepts outlined for luminaires with built-in sensors vs transceivers apply.

## 6.9. DALI extender

The DALI Extender extends the SR bus to the DALI bus and enables multiple applications requiring connecting SR devices to DALI drivers or DALI emergency drivers. It provides supply to SR bus and DALI bus. This device enables longer cost-effective trunking lines with lower number of sensors, remote testing of emergency luminaires and connection to third-party tunable white drivers making the system inclusive. The DALI Extender can be installed independently or be built-in to luminaire.

## 6.10. Switch relays

Switch relays enable wireless control for non-Interact ready luminaires with 0-10V drivers as well as other on/off switching loads such as receptacles, signage, etc. The mains powered switch relay contains the Bluetooth and Zigbee antennas and is equipped with a power switching relay and a signal output (0-10V). Switch relays do not have sensing capabilities, so they must be grouped with external sensors or with luminaires with built-in sensors for automatic behavior configurations.

## 6.11. Zigbee Green Power (ZGP) devices

Zigbee Green Power devices (ZGP) are part of an open Zigbee standard designed for ultra-low-power RF devices, primarily used in battery-powered applications or with EnOcean modules. These types of devices are considered Zigbee endpoint nodes, meaning they cannot rebroadcast messages within the Zigbee mesh network. Instead, they rely on other mesh devices to communicate with the group or zone.

### 6.11.1. Wireless switches (ZGP)

Wireless switches provide a user interface for on/off control, dimming, color temperature adjustment and scene selection.

### 6.11.2. Battery powered sensors (ZGP)

External battery powered ZGP sensors are used to control luminaires with wireless transceivers and/or wireless drivers. Battery powered occupancy sensors can also be grouped with luminaires with built-in sensors to extend motion coverage within a group.

# 7. User roles

The Signify Interact for Intelligent Buildings system involves two key roles – expert and user — each with specific responsibilities and permissions. Here is an overview of the different roles and their responsibilities:

## 7.1. Expert

Expert role is used to commission and maintain a project. Expert role-holders are typically installers, commissioning engineers and facility managers. There can be multiple experts assigned to a project.

## 7.2. User

User role is used to perform light control operations only, with restricted group access assigned to users by experts. This role is intended for end user occupants who would like personal control over assigned groups using the Signify Interact Builder app or web portal. Users are only supported in projects with gateways.

# 8. Access per role

The following table provides the details of the access controls available with the Expert and the User roles:

Account level

| Action/Role | Expert | User |
|---|---|---|
| Request access (register) | ✓ | ✕ |
| Invite others | ✓ | ✕ |
| Delete others | ✓ | ✕ |
| Create projects (networks, groups, zones) | ✓ | ✕ |
| Commission projects (app only) | ✓ | ✕ |
| Update projects (with gateways) | ✓ | ✕ |
| Manage projects (behavior, scenes, replacement) | ✓ | ✕ |
| Energy & health (gateway projects, web portal only) | ✓ | ✕ |
| Energy reports (gateway projects, web portal only) | ✓ | ✕ |
| Manage schedules (gateway projects) | ✓ | ✕ |
| Control lights | ✓ | ✓ |
| Network force unlock | ✓ | ✕ |

# 9. Light behavior

Light behavior refers to all possible configurations that determine how groups of lights respond to motion (occupancy), no motion (vacancy), and light level (daylight sensing).

## 9.1. Occupancy sensing

Occupancy sensing determines if and how a group responds to motion (occupancy) and no motion (vacancy). Interact motion sensors use passive infrared (PIR) technology to detect motion. PIR works by detecting changes in infrared radiation (heat) emitted by objects in the sensor's field of view, which requires a direct line of sight between moving objects and the sensor. The sensitivity and field of view vary based on the sensor sensitivity (if adjustable) and the installation height.

## 9.2. Daylight sensing

Daylight sensing measures the light level detected by sensors in a zone and automatically adjusts the light level to maintain a calibrated light level set point (lux). When ambient light increases, the luminaires will dim down, and when it decreases, the luminaires will brighten to maintain the desired light level set point.

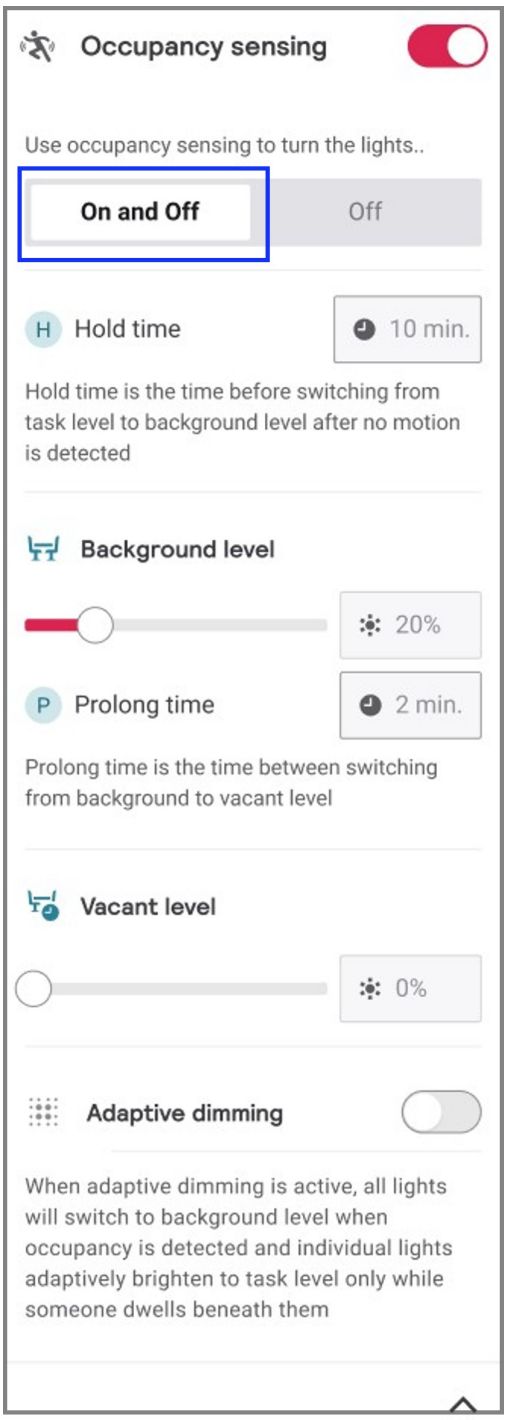
## 9.3. Light behavior states

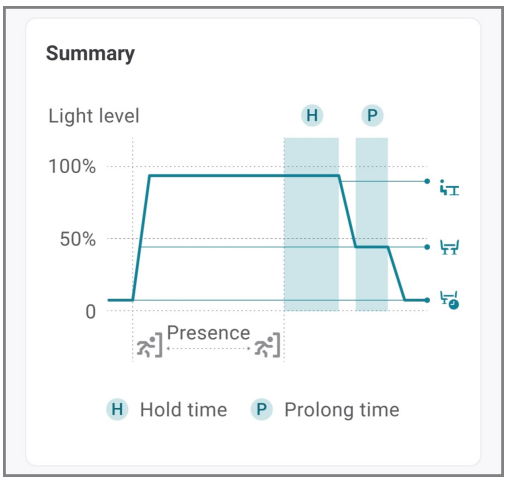
Light behavior states are discrete, predefined configurations stored in devices that determine how groups of lights respond to occupancy and daylight sensing. Each state contains a set of configurable parameters allowing for occupancy sensing, daylight sensing, light level, and time delay adjustments.

## 9.4. Light behavior state parameters

### 9.4.1. Occupancy sensing

- Occupancy sensing is enabled and **On and Off** option (occupancy mode) is selected.

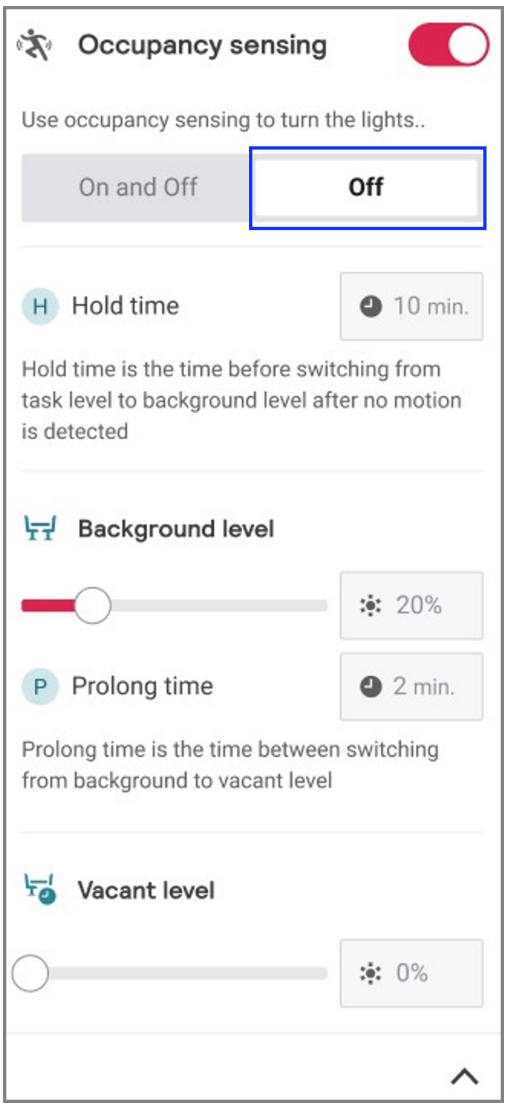

Occupancy sensing
Use occupancy sensing to turn the lights..
On and Off
Off
H
Hold time
10 min.
Hold time is the time before switching from task level to background level after no motion is detected
Background level
20%
P
Prolong time
2 min.
Prolong time is the time between switching from background to vacant level
Vacant level
0%
Adaptive dimming
When adaptive dimming is active, all lights will switch to background level when occupancy is detected and individual lights adaptively brighten to task level only while someone dwells beneath them

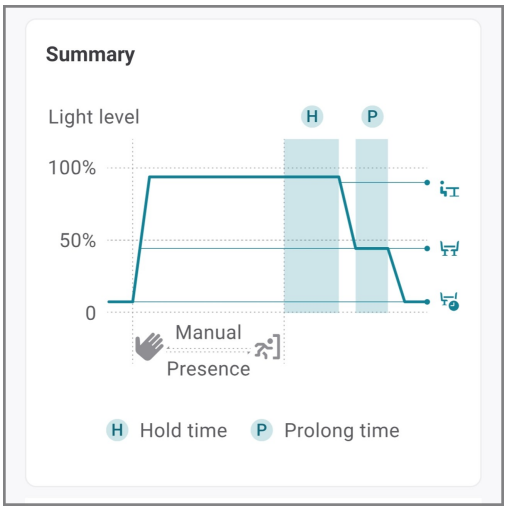



The group responds to both occupancy and vacancy. When occupancy is detected, the group transitions from Vacant level to Task level. A manual override (wall switch, app/portal light control or schedule) can turn the lights to on, off, a specific scene, dim level or color temperature.

Once the configured Hold time expires after vacancy, the group transitions from its current status to the Background level if a Prolong time has been set. Once the configured Prolong time expires, the group transitions from Background level to Vacant level. If motion is detected during the Prolong time, the group transitions from Background level to Task level. If the Prolong time is not set (0 minutes), the group transitions directly from its present status to Vacant level once the configured Hold time expires.

- Occupancy sensing is enabled and **Off** option (vacancy mode) is selected.

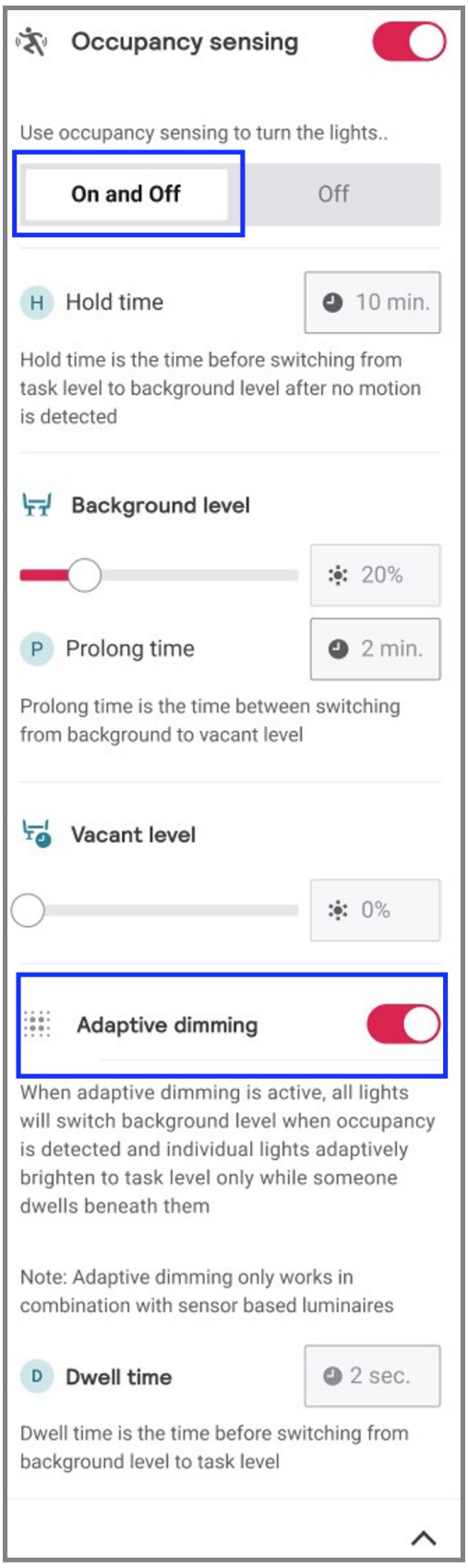


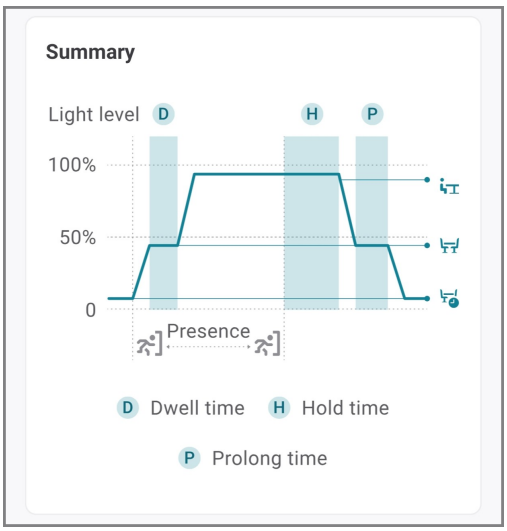




The group does not initially responds to occupancy. A manual override (wall switch, app/portal light control or schedule) is required to turn the lights on, off, a specific scene, dim level or color temperature.

Once the configured Hold time expires after vacancy, the group transitions from its current status to the Background level if a Prolong time has been set. Once the configured Prolong time expires, the group transitions from Background level to Vacant level. If motion is detected during the Prolong time, the group transitions from Background level to Task level. If the Prolong time is not set (0 minutes), the group transitions directly from its present status to Vacant level once the configured Hold time expires.

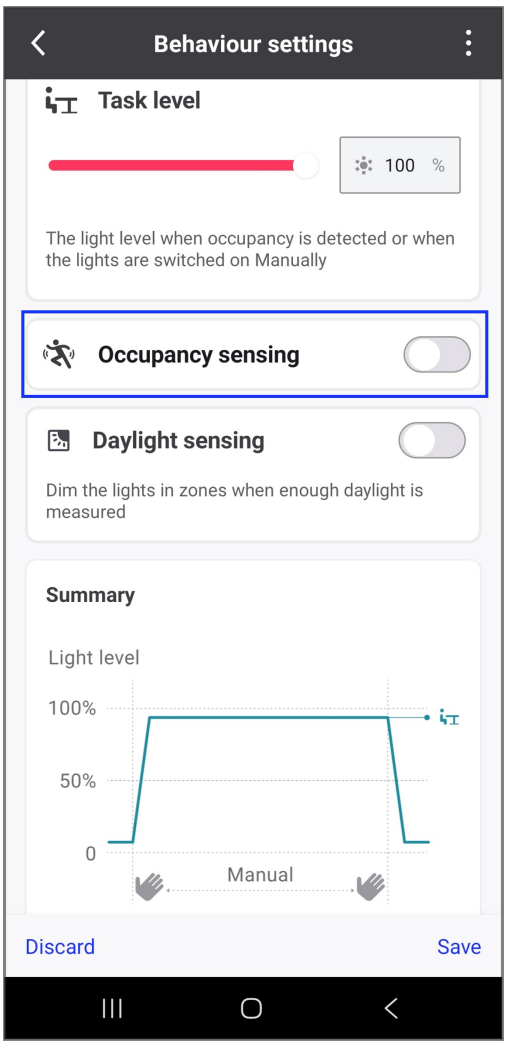
- Occupancy sensing is enabled, **On and Off** option is selected, and **Adaptive dimming** option is enabled.


Occupancy sensing
Use occupancy sensing to turn the lights..
On and Off
Off
H
Hold time
10 min.
Hold time is the time before switching from task level to background level after no motion is detected
Background level
20%
P
Prolong time
2 min.
Prolong time is the time between switching from background to vacant level
Vacant level
0%
Adaptive dimming
When adaptive dimming is active, all lights will switch background level when occupancy is detected and individual lights adaptively brighten to task level only while someone dwells beneath them
Note: Adaptive dimming only works in combination with sensor based luminaires
D
Dwell time
2 sec.
Dwell time is the time before switching from background level to task level




The group responds to both occupancy and vacancy. When occupancy is detected, the group transitions from Vacant level to Background level. When an individual built-in sensor detects motion and the configured dwell time is exceeded, sensor transitions the light from Background level to Task level. A manual override (wall switch, app/portal light control or schedule) can turn the lights to on, off, a specific scene, dim level or color temperature.

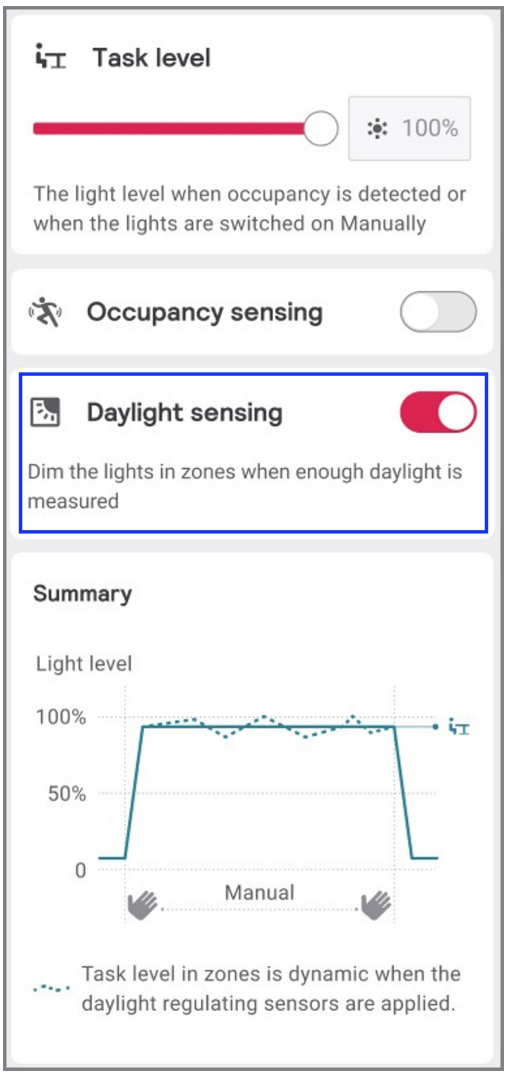
- Occupancy sensing is disabled.




The group does not respond to occupancy or vacancy. A manual override (wall switch, app/portal light control or schedule) is required to turn the lights on, off, a specific scene, dim level or color temperature.

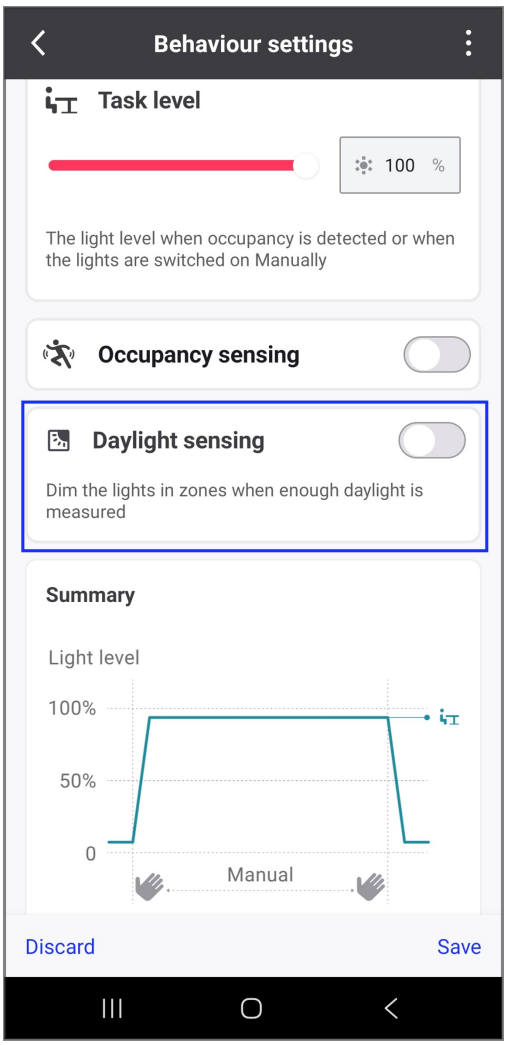
### 9.4.2. Daylight sensing

- Daylight sensing is enabled.




When a group is commanded to Task level, the lights assigned to zones within the group automatically regulate their output to maintain the calibrated light-level set point. By default, built-in sensors regulate the light level of their associated devices individually. Alternatively, they can be configured to follow a designated zone master built-in sensor. Devices in a zone without a built-in sensor follow the zone master built-in sensor configured for regulation within the same zone. If a zone contains only devices without built-in sensors, a battery-powered multi-sensor must be installed in that zone to enable light level regulation.

- Daylight sensing is disabled.




The zones in the group do not automatically adjusts their light level in response to the daylight level.

### 9.4.3. Light levels

- **Task level (1-100%)**
  The light level that a group switches to upon occupancy when Occupancy sensing is enabled to turn the lights On and Off, or in response to a manual On command. If Daylight sensing is enabled, the Task level behaves as a switch-on level, then daylight regulation begins.
- **Background level (0-100%)**
  - When Occupancy sensing is enabled, a light level that the group switches to during the configured Prolong time upon vacancy. Background level is useful as a warning level before the lights switch to Vacant level.
  - A light level that the group switches to upon occupancy, when both Occupancy sensing and Adaptive dimming are enabled.
- **Vacant level (0-100%)**
  When Occupancy sensing is enabled, a light level that the group switches to upon vacancy after the configured Hold time and Prolong time are expired. This level is maintained until occupancy is detected.

### 9.4.4. Time delays

- **Hold time (1-60 min)**
  When Occupancy sensing is enabled, Hold time defines the duration for which the group maintains its current status, whether operating at Task level or under a manual override, after occupancy is no longer detected. Once the Hold time expires, the group transitions to Background level (if Prolong Time > 0) or directly to Vacant level (if Prolong Time = 0).

  The minimum hold time for a group can be configured to less than 5 minutes with additional restrictions to the number of luminaires and areas per network. See the following table for requirements:

| Hold time | Maximum number of groups | Maximum number of nodes |
|---|---|---|
| 1 minute | 6 | 50 |
| 2 minutes | 12 | 75 |
| 3 minutes | 18 | 100 |
| 4 minutes | 24 | 125 |

> **Note**
>
> - Latest firmware (FW > 7.4.12) is required.
> - Battery powered sensors (ZGP) cannot use hold time lower than five minutes.
> - Node refers to any device that has an antenna and is part of the Zigbee mesh, for example: SC200, SC100, SNH210, Wireless drivers (WIA). Battery-powered sensors and switches (ZGP devices) are not counted as nodes.

- **Prolong time (0-30 min)**
  When Occupancy sensing is enabled, Prolong time defines the duration for which the group remains at Background level after the Hold time has expired before transitioning to Vacant level.

- **Dwell time (0-30 sec)**
  When Occupancy sensing option is selected as On and Off and Adaptive dimming option is enabled, Dwell time defines the minimum amount of time that luminaires with built-in sensors must detect motion before switching from Background level to Task level. Upon occupancy, the whole group switches to Background level then individual luminaires will switch to Task level if they detect dwelling motion that exceeds the configured Dwell time.

## 9.5. Zones and Scenes

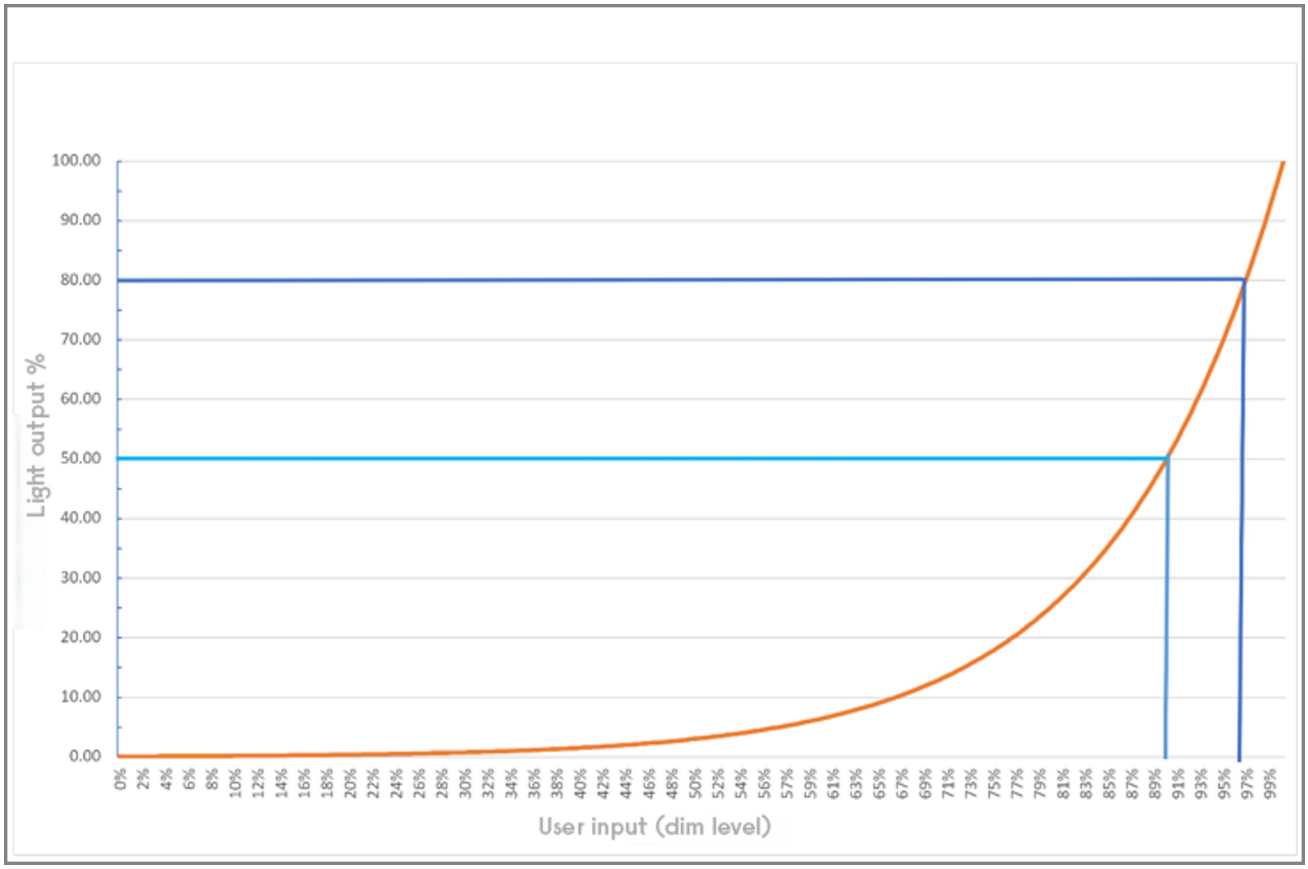
A zone is a sub-selection of luminaries inside a group. Zones allow multiple luminaires to be set in unison when Scenes are configured vs lights in the group that are not in zones, which must be individually set. In addition, luminaires must be in zones to enable Daylight sensing.

A scene can be triggered either by a single press of a button from a 4-button switch, the LightControl application, or via a schedule. A scene always behaves as a manual override, meaning lights resume normal or automatic behavior once the group Hold time expires.

## 9.6. Dim curve

The system applies a dimming curve that appears linear to the human eye. This means that when the light level is adjusted from 100% to 50%, the lights will visually dim to what a person would perceive as approximately 50% brightness. However, these perceived light levels do not correspond linearly to actual energy consumption. Human vision is more sensitive to changes at lower light levels and less sensitive at higher levels, so the human visual response is not proportional to the electrical power consumption.

The following graph illustrates how the perceived light output changes relative to the input values set through the UI.




An exception to the above behavior occurs when using BACnet light control commands. In this case, the system switches to a linear to energy curve. This means that if the lights are set to 50% brightness through BACnet, the energy consumption will also be approximately 50%. This approach ensures that the light output is directly proportional to the energy used, rather than how it appears to the human eye.

## 9.7. High end trim

The high end trim feature sets the new maximum value for dimming level and proportionally scales down the rest of the values, such as task, background, and vacant level. This includes any manual dimming or scene levels.

If the high end trim value is 90%, then 90% is the new 100% dim level, and all other values are also scaled down to 90% of their original value.

High-end trim values are linear to energy, which differs from the linear-to-eye behavior used for scenes or any other control mechanisms from the UI. As a result, setting the high-end trim value at 80% will yield an energy consumption close to 80%.



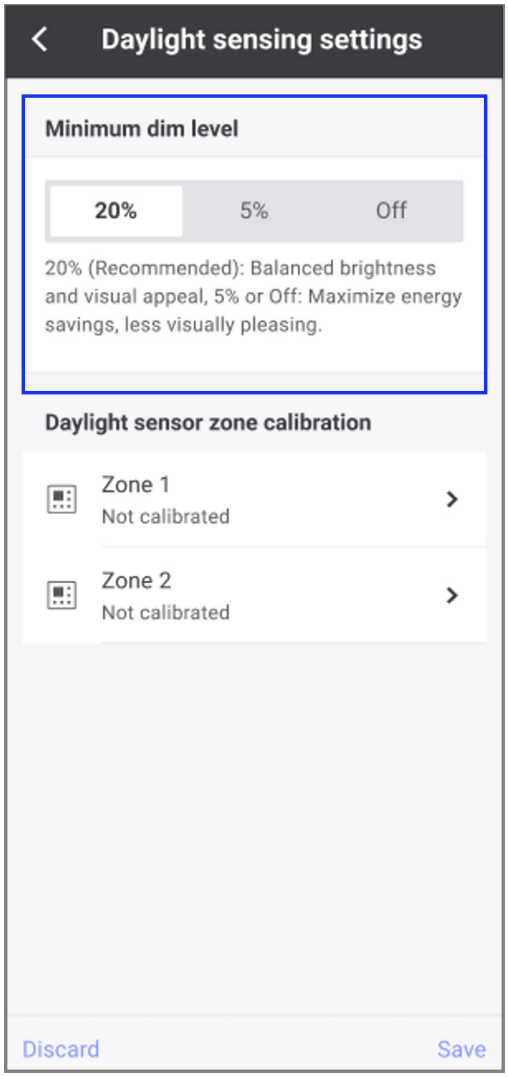
**Note**

When using low levels (<20%), the energy consumption tends to be higher than normal due to loss of efficiency and stand by power consumption.

## 9.8. Daylight sensing settings

Daylight sensing settings are defined globally for a group, ensuring that the same configuration is applied across all configured light behavior states in that group.

### 9.8.1. Minimum dim level of Daylight sensing




- **Minimum dim level to 20%**
  If Daylight sensing is enabled, this is the default (recommended) minimum dim level that lights in a group will dim to when trying to maintain the light level set point.
- **Minimum dim level to 5%**
  If Daylight sensing is enabled, this option allows the lights to dim to 5% when trying to maintain the light level set point, thereby increasing the energy savings.
- **Minimum dim level to Off**
  This option allows the lights to dim to 0%. When the detected light level is greater than the target light level, the lights will dim down to a minimum level (5% or the driver's minimum dim level, whichever is greater). If the light level remains above 150% of the target light level continuously for 10 minutes, then the lights will be switched off. Once the ambient light level falls and remains below the target light level continuously for 6 minutes, then the lights will be switched on, if the group is currently set to the Task level (occupied or manually turned on).

**Note**

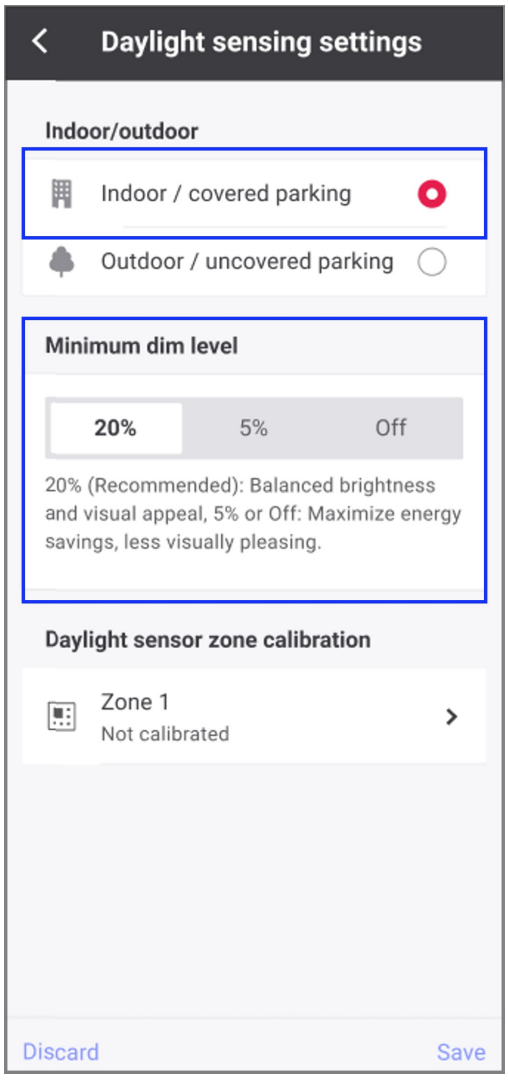
- Dim to **Off** operates independently of the Daylight sensing settings configured for the group's light behavior states. As a result, if dim to **Off** is enabled, the lights will still dim to off even when Daylight sensing is disabled in one or more light behavior states.
- Lights that have dimmed to off may remain off even when the group is re-occupied after transitioning to the Vacant level. When **Occupancy sensing** with **On and Off** option is enabled and the ambient light level remains sufficiently high, re-occupancy will not automatically turn on lights that have been dimmed to off.

### 9.8.2. Indoor/outdoor

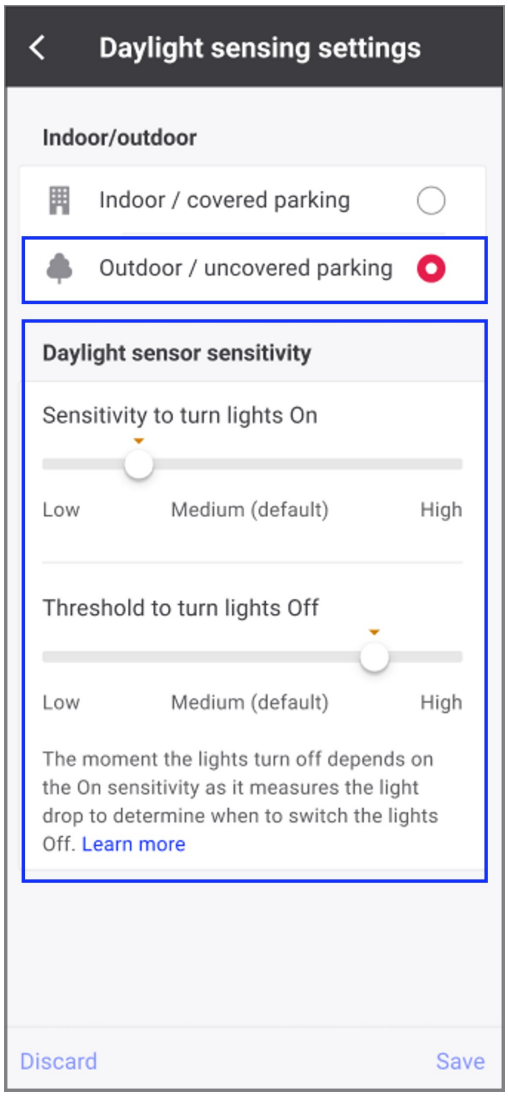
This option will be visible only if any outdoor parking sensor is added to a group.

**Indoor sensors**

For Indoor sensors, minimum dim level can be set to **20%**, **5%** or **Off**.



Outdoor sensors




- Turn on lights
  For Outdoor sensors, threshold to turn lights On can be adjusted between Low, Medium, and High through a slider. By default, sensitivity is set to **Medium**.

  Lights automatically turn on when the measured outdoor ambient light level falls below the configured threshold. The turn-on threshold can be adjusted using the sensitivity slider, with Low, Medium, and High settings that determine how responsive the system is to changes in outdoor light conditions. Higher sensitivity causes the lights to turn on at brighter ambient light levels, while lower sensitivity requires darker conditions to turn on the lights.

- Turn off lights
  For Outdoor sensors, threshold to turn lights Off can be adjusted between Low, Medium, and High through a slider. By default, threshold is set to **Medium**.

  Lights automatically turn Off when the measured outdoor light level reaches the configured threshold setting (Low, Medium, or High). This threshold to turn off lights is determined by the configured On

sensitivity value as it measures the light drop.

### 9.8.3. Daylight sensor zone calibration

Calibrates each zone in the group independently to activate daylight sensing. It is applicable only for indoor sensors.

# 10. BACnet support

Signify Interact for Intelligent Buildings BACnet integration relies on a CSV configuration file that contains a list of available BACnet objects based on the project configuration.

BACnet objects are automatically generated during BACnet configuration in a project.

**Note**

Occupancy objects are not created for groups that have no sensors.

***Example of configuration file***

| DeviceID | DataType | ObjectType | ObjectID | ObjectName |
|---|---|---|---|---|
| 905542 | 3 | 3 | 5 | Area_1_OCCUPANCY |
| 905542 | 4 | 1 | 3 | Area_1_MANUAL_OVERRIDE |
| 905542 | 3 | 3 | 2 | Area_2_OCCUPANCY |
| 905542 | 4 | 1 | 0 | Area_2_MANUAL_OVERRIDE |
| 905542 | 3 | 3 | 8 | Area_3_OCCUPANCY |
| 905542 | 4 | 1 | 6 | Area_3_MANUAL_OVERRIDE |

***DeviceID***

The ID of the Wireless Gateway connected to the BACnet system. The device ID is based on the MAC address of the Wireless Gateway. If there is an address conflict on a BACnet system, it can be updated manually by the BACnet client. The new BACnet ID is persisted in the subsequent BACnet configuration deployments.

***ObjectID***

The ObjectID property specifies a unique number assigned to an individual BACnet object.

***ObjectName***

The ObjectName property specifies the name of the object. This is composed out of the group name where the object is located and appended with the data type. For example: `OPEN_OFFICE_OCCUPANCY`.

*BACnet objects*

| DataType | ObjectType | Range | Remarks |
|---|---|---|---|
| Occupancy (3) | Binary Input (3) | 0 to 1 | 0 = Vacant (after a prolong time and hold time)<br>1 = Occupied<br>Change of value and polling |
| ManualOverride (4) | Analog Output (1) | 0 to 100 and 255 | ManualOverride sets a light level state until the area becomes vacant again (after a prolong time and hold time), and then resumes automatic behavior.<br>• 0 = Off<br>• 1 to 100 = brightness level (the light control commands use a linear to energy curve)<br>• 255 = automatic lighting behavior |

**Note**

The occupancy status can be reported over BACnet with a potential latency ranging from 1 to 60 seconds, as the gateway polls occupancy data at one minute intervals. In rare cases, when a message from an individual sensor is not received such as a situation involving congested Zigbee networks, the reporting delay may extend up to two minutes.

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www.interact-lighting.com

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