LightRules

Admin Guide Version 3.0

DIGITAL LUMENS

Copyright

table of contents

Chapter One:

Getting Started

LightRules Software Version 3.0

LightRules is the lighting management and building intelligence platform designed for use with intelligent LED light fixtures and light agents from Digital Lumens. LightRules transforms a building's lighting system into a network of sensors capable of dramatically improving energy efficiency, increasing productivity, and improving employee safety.

In addition to basic lighting control operations like dimming and occupancy sensing, LightRules also provides:

- A dashboard-style interface
- Automated emergency lighting testing and reporting
- Automated lighting management
- Manual light control, including control via a Mobile App
- Detailed energy usage, energy cost, and occupancy reporting
- Email reports
- Integration with daylight harvesting enabled lights

Recommended Browsers

LightRules is best experienced using a modern, secure web browser:

- Best: Chrome, Firefox
- Good: Safari, Microsoft Edge, IE11
- Acceptable: IE10, IE9

What's New in LightRules?

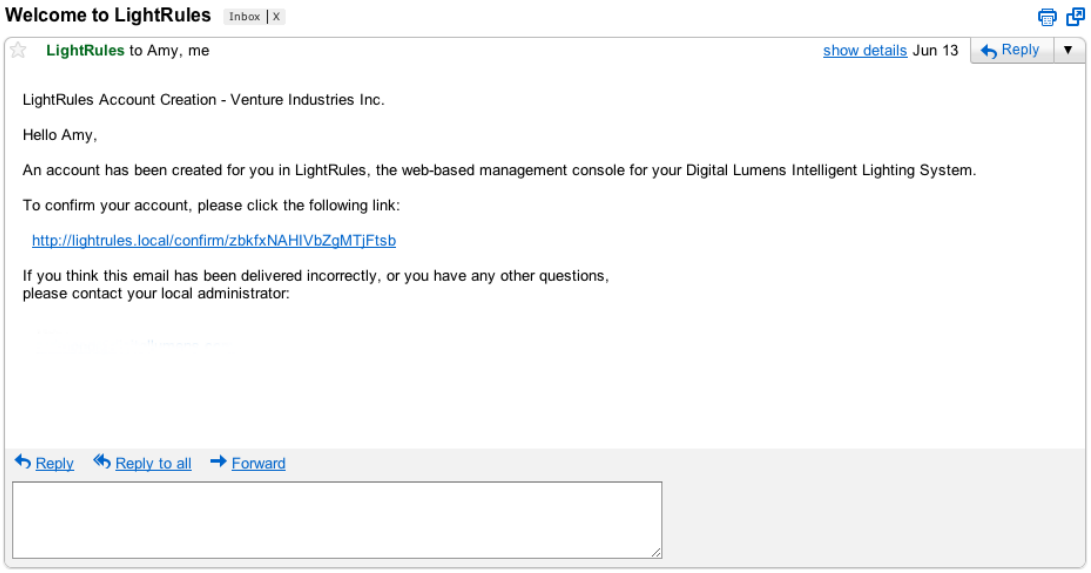
LightRules 3.0 provides increased control, automation, and visibility into the operations of your business.

New Features:

- "LightRules Menu" (see page 8): The LightRules menu has been simplified and reorganized for easier navigation.
- "LightRules Dashboard" (see page 9): The new Dashboard is designed to highlight the most important information for managers to understand, at a glance, how their facility is operating.
- "Heatmap Reports " (see page 32): Heatmap reports display data as an overlay on the facility floor plan, showing occupancy across the facility that can be displayed for any date and time range.
- "Chart Reports " (see page 35): LightRules Chart Reports track your facility's occupancy, energy usage, energy cost, and daylight harvesting-related data.
- "Week Grid Reports" (see page 37): Week Grid reports display facility occupancy data across the hours of the day and the days of the week.
- "Email Summary Reports " (see page 39): The information found on the Dashboard is easily accessed from a LightRules Email Report that can be sent to your inbox each month.

New Account Registration

When the system admin sets up your account, LightRules automatically generates and sends you an email with confirmation instructions:

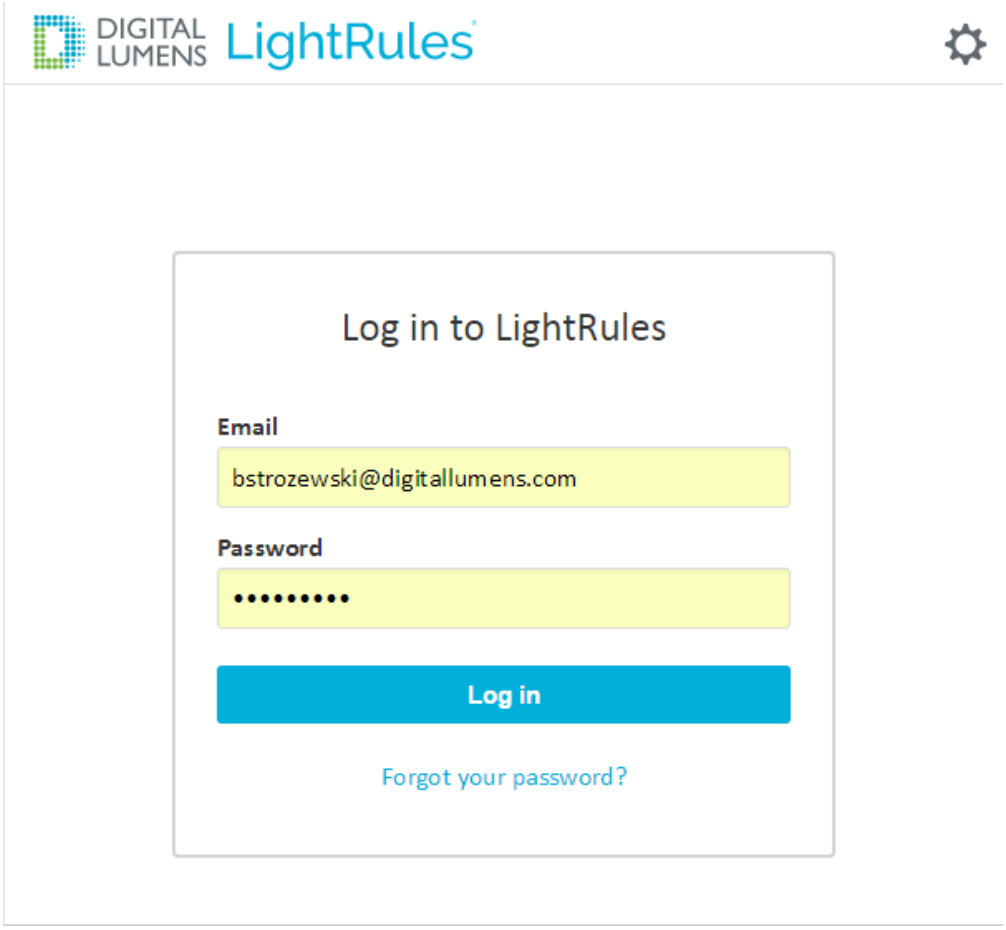


1. Click the link in the email.
2. Enter the desired password in the top field. Your password must contain at least four characters or digits.
3. Enter your password a second time in the bottom field.
4. Click **Change Password**.
5. Read the End-User License Agreement (EULA) and then click **I Agree**.

> **Note:** If your network configuration is stand-alone (the LightRules appliance is not connected to the facility's enterprise network), the system admin will create your password during account creation.

Logging In

1. Open the Login screen by clicking the link in the new account email you received from LightRules.
2. For future use, create a bookmark to the link in your web browser.
3. Enter your email address and password.



4. Click **Log In**.

> **Tip:** During installation, if a default email domain has been configured, then LightRules accepts the first part of a user's email address as a valid login.
> For example, if the email address is "amy.jones@ventureindustires.com" that user can log in using either of the following: **amy.jones@ventureindustries.com** or **amy.jones**

User Roles

There are four types of user roles— a user may have one or all four types. Each role grants access to a portion of the user interface, as follows:

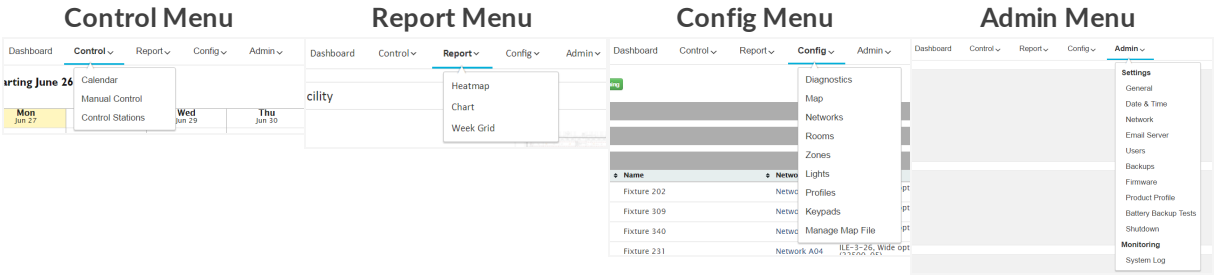
Reporting Role	Operations Role
• All report actions	• Push profiles via manual control • Cancel manual control • Ping a light or gateway • View and modify the calendar • View networks, rooms, zones, and lights • View and edit profiles • Start, extend, and cancel Control Station overrides • Mobile App
Administration Role	**Station Operator Role**
• All user setup functions • Network, room, zone, and light configuration • Data backup • Site configuration • Discover operation • Upload/Download map files • View and modify the calendar • View networks, rooms, zones, and lights • Add, edit, and delete Control Stations	• Start, extend, and cancel Control Station overrides

Chapter Two:

Navigation

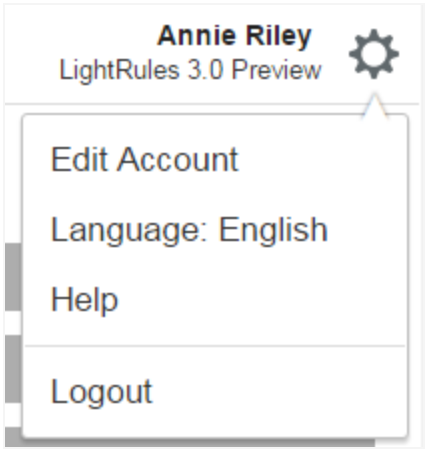
LightRules Menu

(✳NEW) New in LightRules 3.0, there are three key action areas — *Control*, *Report*, and *Config* — in addition to the *Admin* menu & *Dashboard*.



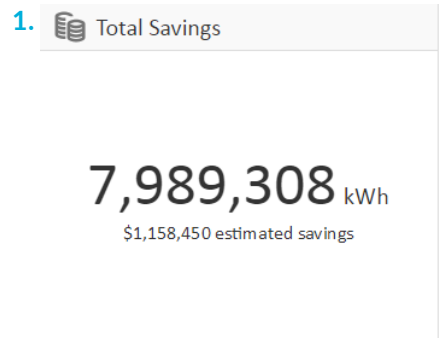
> **Note:** Access to each menu depends on your type of user. For more information, see "User Roles" (see page 6).

The *Site Name* and *Settings* menu appear in the top-right corner. From here you can edit your account, change your user language, access help, or logout:

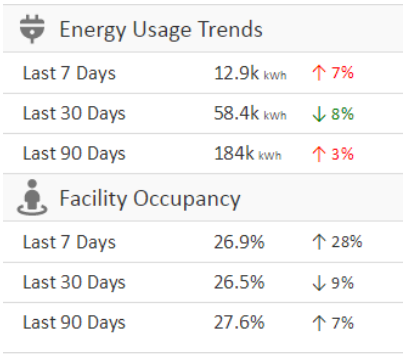


LightRules Dashboard

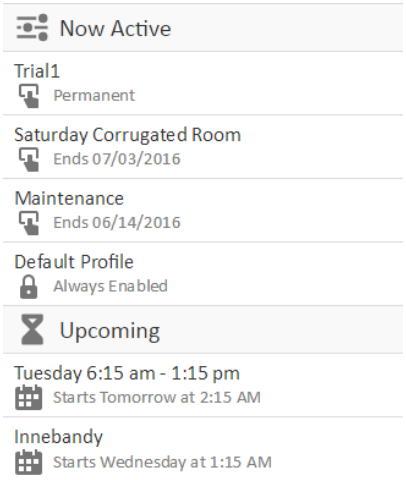
(*NEW) Following login, the LightRules dashboard appears, providing at-a-glance reporting, energy usage information, and instant access to manual light control. The new 3.0 dashboard is redesigned to provide a detailed, insightful view of the facility:

1. 

The *Total Savings* widget lets you see how much your lighting system has saved you since installation. Click the number to view the LightRules Savings line chart. For more information on total savings, see "Chart Reports " (see page 35).

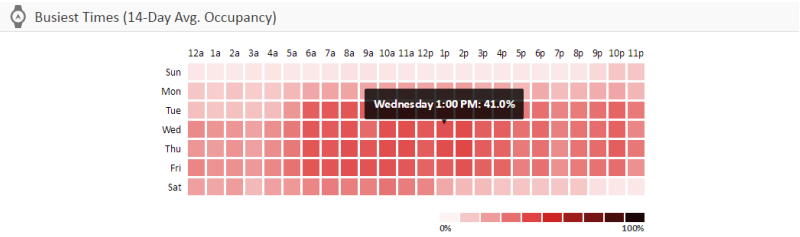
2. 

The *Trends* widget shows you energy usage trends and facility occupancy data. Hover over the up/down arrows to see the percent change over 7, 30 or 90 days. CLick the energy amount or percentage to view the line chart. For more information, see "Chart Reports " (see page 35).

3. 

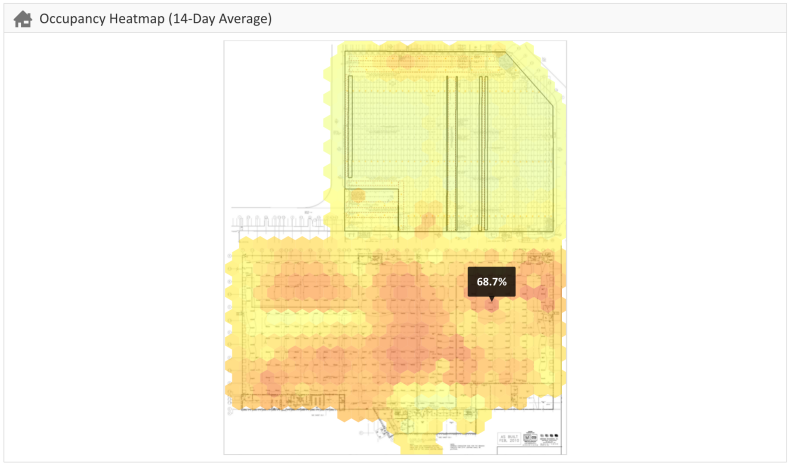
The *Active Profiles* widget displays active and upcoming profiles throughout your facility. You can cancel profiles from here by hovering over the profile and selecting the gray "X." For more information, see "Manual Control" (see page 17).

4.



The *Busiest Times* grid lets you see average occupancy over the past 14 days. For more information, see "Week Grid Reports" (see page 37).

5.



The *Occupancy Heatmap* lets you visualize where you facility is busiest over a 14-day average. For more information, see "Heatmap Reports " (see page 32).

Chapter Three:

Control

Calendar

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

The calendar offers a quick and easy way to set up an automated lighting schedule. Reserve a block of time on the calendar by scheduling a lighting profile for a single event, or schedule a profile that triggers on a recurring basis according to the selected parameters.

LightRules automatically controls the lighting levels in your facility based on a lighting schedule. The default lighting profile configured during system installation populates the calendar.

- When you click and drag a time range on the calendar, LightRules schedules a profile, which is represented by a solid-colored block.
- You can create a block for a single calendar date or specify repeat options so that the block recurs on a specific day of the week, a day of the month, and so on.
- If you stack one profile block on top of another, the most recently created block has priority.

> **Tip:** The white background on the calendar represents your default lighting profile. When you add a block to the calendar, you are effectively overriding the default profile by scheduling a profile for a period of time. The default profile resumes when the block expires.

Calendar Control Tasks

General Strategy for Creating a Lighting Schedule

Use the following guidelines when creating your facility's lighting schedule:

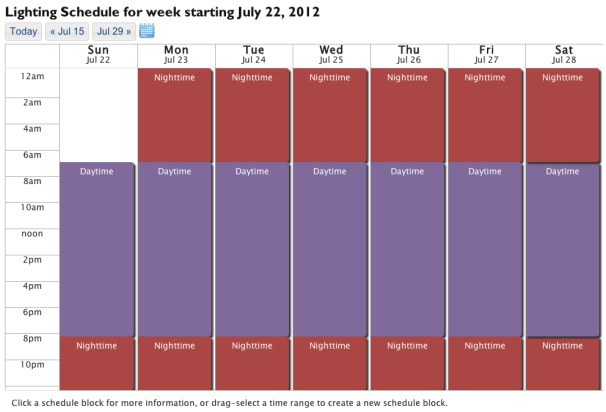
- Maximize lighting levels for safety and comfort while the facility is occupied during a typical workday.
- Identify time periods where the facility, or areas of the facility, are unoccupied and schedule accordingly.
- If any areas of the facility require elevated lighting levels on a regular basis, schedule accordingly.

A typical facility will block the following profiles on the calendar:

1. Day Schedule: M-F, 6am to 7pm, full occupancy profile.
2. Night Schedule: Nightly, 7pm to 6am, reduced occupancy profile.
3. Weekend Schedule: Sat + Sun, 6am to 7pm, reduced occupancy profile.

Reviewing the Calendar

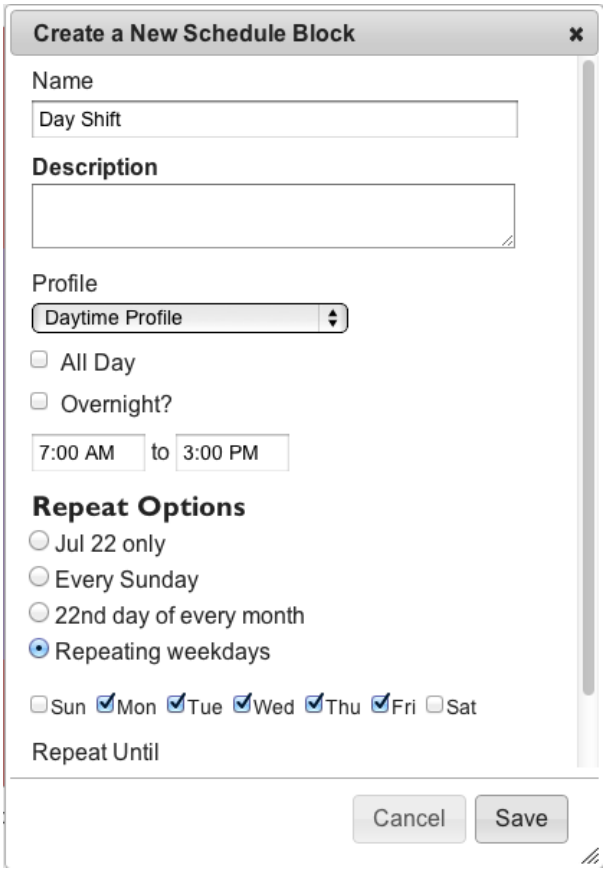
Select **Control** > **Calendar** from the menu to open and review the calendar. Each block represents a scheduled profile. Click a block to review its settings and then click **Cancel** to exit.



The calendar provides standard navigation controls for scrolling to the next/previous week. You can also click on the mini calendar icon and jump to a specific day, month, and year.

> **Tip:** By default, the calendar starts each week on Sunday. You can configure a different day as the start of the week, as needed. Go to for more information.

Using the Calendar to Schedule a Block



1. Select **Control** > **Calendar** from the menu.
2. As desired, scroll ahead to a different week in the calendar or jump to a specific day, month, and year.
3. Click and drag on the calendar to create a new block.
4. Type a name for the block and then select a profile from the dropdown list.
5. Specify start and end times.
6. Select from the Repeat Options:
    - **[date] Only** LightRules triggers the profile according to the start and end times.
    - **Every [day of the week]** Triggers the profile on a recurring basis. Specify an end date, as desired.
    - **Every [day of the month]** Triggers the profile on a recurring basis. Specify an end date, as desired.
    - **Repeating Weekdays** Triggers the profile on a recurring basis, on the checked days of the week.
      Specify an end date, as desired.

7. Click **Save**.

> **Tip:** Use the Repeating Weekdays option and check all of the days of the week to repeat a profile every day.

Additional Options

When you schedule a profile, you may also check one of the following:

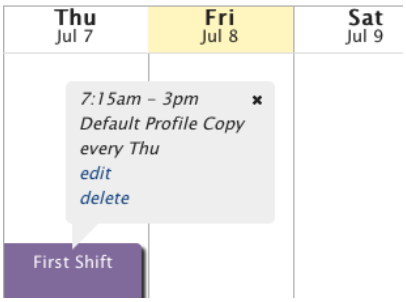
- **All Day** to create a block automatically starts at 12:00am and ends at 12:00pm, check the All Day box.
- **Overnight** to create a block that carries over into the next day, check the Overnight box.

If applicable, to specify an end date, enter a Repeat Until date.

> **Note:** It is preferable not to create blocks that span multiple days. Instead, use the repeat options described above to accomplish the desired result. For example, if you create a separate block for each weekday, you can then edit just that weekday rather than the span of days.

Using the Calendar to Edit a Block

1. Select **Control** > **Calendar** from the menu.
2. Navigate to and click on the block you wish to modify.
3. Click **edit:**

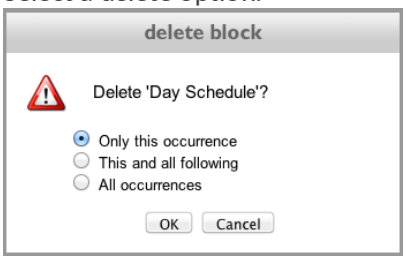


4. Enter new settings and then click **Save**.

Deleting a Block

1. Select **Control** > **Calendar** from the menu.
2. Navigate to and click on the block you wish to delete.

3. Click **delete**.
4. Select a delete option:



5. Click **OK**.

Manual Control

> **User Considerations:** Only Operations users can access this feature. See "User Roles" (see page 6) for more information.

Overview

With the manual control feature, LightRules enables you to override part or all of the currently running scheduled profile and implement one or more temporary profiles for a specified period of time, or indefinitely until canceled.

- Manual profiles can be set to change the light settings of a single zone, a set of zones, or the all zones in the facility.
- The dashboard displays the manual profile(s) in use and allows you to cancel each manual profile separately, at any time.

A manual profile does not automatically override all other running profiles. To completely override all profiles (and therefore all lights) the manual profile must contain all zones in the facility.

Manual Control Tasks

Perform the following tasks with LightRules manual control:

Push an Existing Manual Profile

When you push a manual profile over the lighting network to the lights, the profile requires several seconds or minutes to become fully active, depending on how many lights are affected. The progress bar displays the percentage of the operation that is complete.

1. Out in the facility, press button 1-8 on a keypad,
   - or -
   select **Control** > **Manual Control** from the menu.
2. Select an existing profile from the dropdown menu.
3. Select an **Expiration Setting**[1] from the dropdown menu and then click **Push** to activate the manual profile.

---

[1] Select an expiration setting before pushing a manual profile:

- **Fixed Duration** runs the manual profile for a set period of time, in minutes.
- **Permanent** runs the manual profile indefinitely, until you cancel that profile.

Create a new Manual Profile

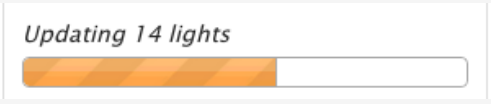
Manual profiles are helpful for testing new settings. For example, to test a new occupancy sensor setting, you can push a manual profile, walk out into the facility and check the new settings, and then cancel the manual profile. Manual profiles are also useful for handling one-time or non-scheduled events, including facility maintenance and demand-response events. Additionally, the optional LightRules Keypad activates a manual profile when a user presses button 1-8.

> **Tip:** Create and save manual profiles for future use so you can instantly access and push a profile on-demand, when it is needed.

1. Select **Control** > **Manual Control** from the menu.
2. Click **Create New**.
3. Using a logical naming convention, type a new name for the manual profile.
4. Enter a description for the manual profile.
5. Modify the rule set for the selected zone:
   - Use the right slider to adjust the active power level (20 -100).
   - Use the left slider to adjust the inactive power level (0 - 100).
   - Enter the desired sensor delay (minimum 30 seconds).
6. Click **Add Rule** to add more zones.

   > **Note:** When you create a manual profile, you do not have to include all zones. For example, a manual profile can contain a single zone that you wish to control manually while the rest of the facility continues running the scheduled profile.

7. Click **Save** to save the manual profile for future use, without activating it,
   - or -
   select an **Expiration Setting**[1] from the dropdown menu and then click **Save and Push** to save and instantly activate the manual profile.

> **Note:** The push operation takes from a few seconds to several minutes to complete. Most lights update instantly. When you push a manual profile, LightRules displays the progress bar on the dashboard: 
>

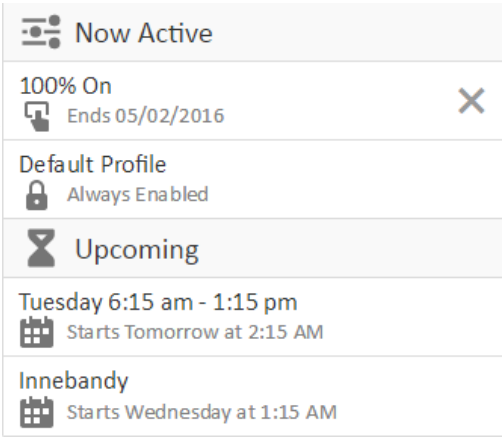
[1] Select an expiration setting before pushing a manual profile:

- **Fixed Duration** runs the manual profile for a set period of time, in minutes.
- **Permanent** runs the manual profile indefinitely, until you cancel that profile.

Active Profiles Display

The dashboard displays the current lighting schedule and any running manual profiles. If you activate a manual profile, that manual profile overrides all other profiles, manual and scheduled. On the dashboard, the new manual profile appears above all other profiles.

When you cancel the manual profile, LightRules reverts to the next profile shown in the list.



Clone a Manual Profile

1. Select **Control** > **Manual Control** from the menu.
2. Select any existing profile from the dropdown list and then click **Clone**.
3. Using a logical naming convention, type a new name for the manual profile.
4. Click **Add Rule** to add zones, as needed; or, click the **"X"** next to a zone to delete that zone.
5. Edit the zone rules, as needed.
6. Click **Save** to save the manual profile for future use without activating it,
   - or -
   select an **Expiration Setting**[1] from the dropdown menu and then click **Save and Push** to save and instantly activate the manual profile.

Edit a Manual Profile

1. Select **Control** > **Manual Control** from the menu.
2. Select any existing manual profile manual from the dropdown list and then click **Edit**.
3. Click **Add Rule** to add zones, as desired; or, click the **"X"** next to a zone to delete that zone.
4. Edit the zone rules, as desired.
5. Click **Save** to save the manual profile for future use without activating it,
   - or -

[1] Select an expiration setting before pushing a manual profile:

- **Fixed Duration** runs the manual profile for a set period of time, in minutes.
- **Permanent** runs the manual profile indefinitely, until you cancel that profile.

Expiration Setting[2] from the dropdown menu and then click **Save and Push** to save and instantly activate the manual profile.

Cancel a Manual Profile

The active manual profile de-activates when you click the "X" next to that manual profile in the Active Profiles widget on the dashboard. If you are running multiple manual profiles, you may cancel each manual profile individually.

[2]Select an expiration setting before pushing a manual profile:

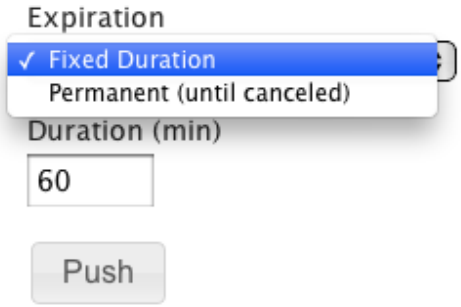
- **Fixed Duration** runs the manual profile for a set period of time, in minutes.
- **Permanent** runs the manual profile indefinitely, until you cancel that profile.

[2]Select an expiration setting before pushing a manual profile:

- **Fixed Duration** runs the manual profile for a set period of time, in minutes.
- **Permanent** runs the manual profile indefinitely, until you cancel that profile.

Expiration Settings

Select an expiration setting before pushing a manual profile.



- **Fixed Duration** runs the manual profile for a set period of time, in minutes.
- **Permanent** runs the manual profile indefinitely, until you cancel that profile.

Control Stations

Control Stations provide users with limited knowledge of LightRules software the ability to manually override configuration of the lighting system within a designated area of the facility. This is most commonly used when there is a temporary need for higher levels of light for safety and improved visibility when performing tasks such as cleaning, maintenance, and responding to safety incidents.

Control Station Permissions

The following user roles are available for Control Stations. Users may have one role or a combination of the three:

- **Station Operator permission** - start override, cancel override.
- **Operations permission** - start override, cancel override, access LightRules toolbar.
- **Administration permission** - user setup, add new stations, edit stations, delete stations, access LightRules toolbar.

Best Practices for Control Station

To get started working with control stations, an Administrator needs to first plan control areas and stations.

Identifying Areas

The first step in configuring Control Stations is to identify the areas being controlled from each station. Each area contains one or more zones, and is implemented by creating a profile with the zones and proper settings.

Areas should not have overlapping zones, because it is not possible to tell from the Control Station screen which of two active profiles is effective for a given zone. Keep the areas distinct for maximum clarity.

Naming Profiles

Name profiles to identify the area, for example “Underbody 1” or “Frame Weld 7.” Try to avoid redundant words like "operator," "station," or "override" in the profile names. Profile names must be less than forty characters.

For help creating profiles, go to "Profiles" (see page 57).

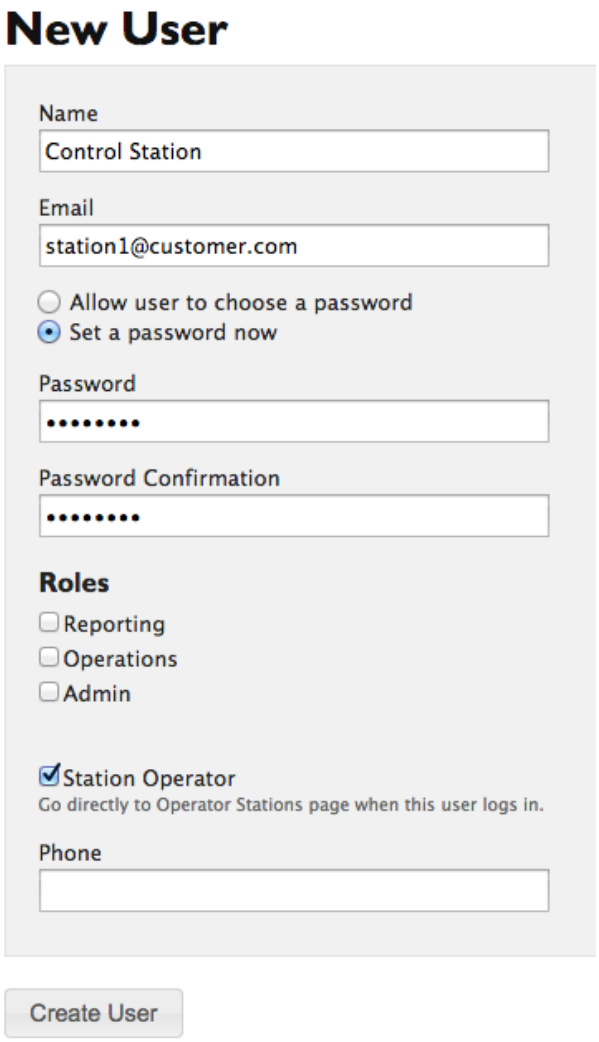
Identifying Stations

Stations correspond to the physical locations of computers in the facility where an operator can control the lighting in the areas visible from that location.

Create stations and add profiles ordering them in a way that makes the best sense from the perspective of an operator standing at that station.

Creating Dedicated Logins

To simplify login at Control Stations, configure dedicated Operator logins. For example, if the default login domain is *customer.com*, create a user with email *station1@customer.com*, assigning only the Station Operator user role, and create a password such as *station1*:



Using this method, anyone can then log in using the email *station1* and password *station1*, and will be shown the Control Station screen, with no other access to LightRules.

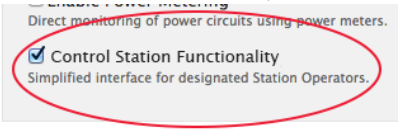
Note: LightRules toolbar navigation is removed for users with only Station Operator user permission. Users with Operations or Administration permissions can view the Control Station screen by selecting **Config** > **Control Stations** from the LightRules toolbar.

For more information about creating users, see "User Settings" (see page 76).

Enabling Control Stations

User Considerations: Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

1. Select **Admin** > **General** and then click **Edit General Settings**.
2. Under Feature Control, select **Control Station Functionality**.

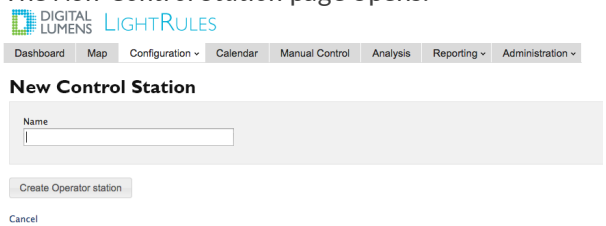


3. Click **Save Settings**.
4. Create profiles corresponding to the areas needed for each station (for help creating profiles, go to "Profiles" (see page 57)).

Creating Control Stations

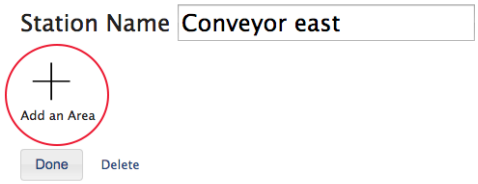
User Considerations: Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

1. Select **Control** > **Control Stations**.
2. If no stations have been created, click **Create Control Station**. If stations have already been created, they will appear as a list on this page. Click **New** to create a new station.
The *New Control Station* page opens.

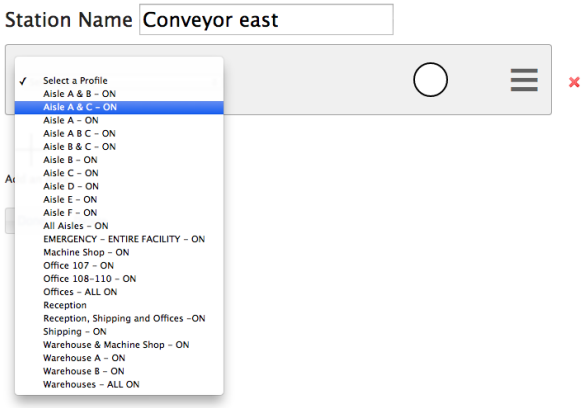


3. Enter a name for the station, and click **Create Control Station**. Once created, the *Control Station* page opens.

4. Click **Edit** .
5. Click the plus sign to add an area to the station.



6. Select a Profile from the dropdown list.



7. Click and drag the gray lines to rearrange areas.
8. Delete an area by clicking the red X.
9. When you are finished adding areas, click **Done**.

Editing Control Stations

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

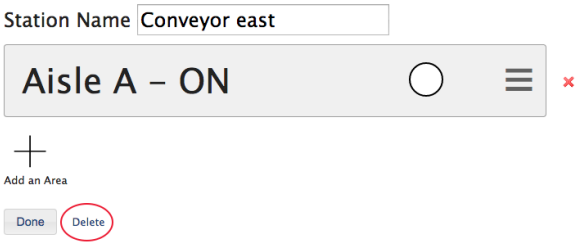
1. Select **Control** > **Control Stations**.
2. Select the station you wish to edit.
3. Click **Edit**.

4. Make any necessary changes.
5. Click **Done**.

Deleting Control Stations

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

1. Select **Control** > **Control Stations**.
2. Select the station you wish to delete.
3. Click **Edit**.
4. Click **Delete**.



> **Note:** Deleting a station does not cancel any override profiles that are currently active.

Starting an Override

> **User Considerations:** Only Operations or Station Operator users can access this feature. See "User Roles" (see page 6) for more information.

1. Select **Control** > **Control Stations**.
2. Select a Control Station from the drop down list.
3. Click the white circle next to the desired area.
   An override is started with a one hour duration.

4. (Optional) Click the green button to extend the override for an hour.

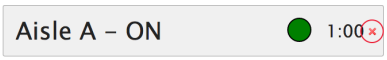
When the countdown reaches 0:00, the profile is reverted and the button returns to the white “not active” state.

> **Note:** If a profile is pushed using "Manual Control" (see page 17), the station is updated if it contains affected areas.

Canceling an Override

> **User Considerations:** Only Operations or Station Operator users can access this feature. See "User Roles" (see page 6) for more information.

1. Select **Control** > **Control Stations**.
2. Select a Control Station from the drop down list.
3. Click the red "X" to cancel the override.



When the override is canceled, the profile is reverted and the button returns to the white “not active” state.

Chapter Four:

Report

Reports Overview

LightRules Reports are powerful tools that help you gain insight into the operations of your business allowing you to increase productivity, maximize savings, reduce downtime, and improve business planning.

How does reporting work?

LightRules gathers data from lights and reports on that data using the following parameters:

- Lights record detail about when they are in active power level and inactive power level modes.
- Lights record detail about occupancy sensor events.
- LightRules polls all lights, retrieving detailed log information on a 15-minute cycle.
- Each time LightRules successfully communicates with a light, it remembers the “last seen” time.
- After each polling cycle, LightRules examines the detail from each light, counting the time the light was in the active and inactive modes. LightRules also uses the occupancy sensor events to count the time during which the area under each light was occupied.

  > **Note:** In some instances, a light may be configured with a dimming level above 0 for its inactive mode setting. For example, some lights — “night lights” — are configured this way for safety.

- From the recorded information, LightRules calculates the light’s total Energy Usage (kWh) for each 15-minute interval. All reporting is based on either Energy Usage or Occupancy (time occupied as a percentage of total time).
- If the Average Energy Cost (dollars per kWh) is configured, LightRules can also display reports in Energy Cost by multiplying the Energy Usage (kWh) by Average Energy Cost ($/kWh) to get an estimation of the Energy Cost for the given time.

  > **Note:** The Energy Cost calculation does not take into account variable energy cost or peak usage billing. It is meant as a convenience for LightRules users who are more comfortable viewing reports in monetary amounts than kilowatt-hour.

- Energy Usage and Occupancy values for each light per 15-minute interval are then aggregated into Zone/Interval, Room/Interval, and Total Facility/Interval values.
- Room/Interval and Facility/Interval values are aggregated into One Hour and One Day durations, resulting in Room/Hour, Room/Day, Facility/Hour, and Facility/Day values.

In LightRules software, the following aggregated values are exposed in the reporting system:

- Room/Interval
- Room/Hour
- Room/Day
- Zone/Interval

- Zone/Hour
- Zone/Day
- Facility/Interval
- Facility/Hour
- Facility/Day

Each light may be designated in one zone, and each zone may be designated in one room. Only the current light:zone zone:room mapping is used in aggregation, so aggregation includes only data captured since the last mapping change, whereas historical mappings are not aggregated.

Reporting Metrics

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

Administrators can set metrics that allow LightRules to tailor reports to your facility:

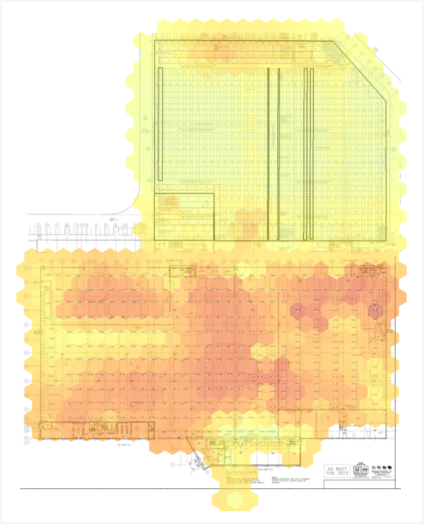
1. Select **Admin** > **General**.
2. Click **Edit General Settings**.
3. In the *Reporting Metrics* section, enter or select the following:
    - **Energy cost per kWh**: Average energy cost per kWh.
    - **Old power estimate (W)**: Estimate, in total Watts, of previous lighting system.
    - **Room/Zone Summary Metric**: Average daily kWh or average daily cost.
    - **Valid Reporting Dates**: Set first and last day for reporting, or select the Automatic checkbox.
    - **Valid Metered Power Reporting Dates** (for LightRules Power reports): Set first and last day for reporting, or select the Automatic checkbox.
4. Click **Save Settings**.

Types of Reports

- "Chart Reports " (see page 35)
- "Heatmap Reports " (see page 32)
- "Week Grid Reports" (see page 37)
- "Email Summary Reports " (see page 39)
- "LightRules Power Reports" (see page 40)

Heatmap Reports

> **User Considerations:** Only Reporting users can access this feature. See "User Roles" (see page 6) for more information.



(NEW) Heatmap reports display data as an overlay on the facility floor plan, showing occupancy across the facility. Similar to other reporting tools, the heatmap is designed to be customized. Occupancy across the facility can be displayed for any date and time range and the heatmap tiles can be manipulated to see information more clearly.

Running Heatmap Reports

Select **Report** > **Heatmap** from the menu.

The heatmap report loads with automatically selected parameters. Customize the report by altering the following:

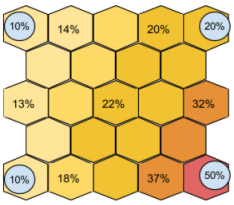
- **Date Range**: Enter a custom date range, select / deselect days of the week, and then click **Update**.
- **Hours**: Use the slider to select a particular time of day within a 24 hour period.
- **Display**: Select Occupancy, Active Percentage, or Energy Usage.
- **Tile Size**: Select Small, Medium, or Large.
- **Tile Type**: Select Color or Size.
- **Color**: If Color is selected as the Tile Type, use the slider to compresses the color scale, which increases the contrast of the heatmap.

Interpreting the Heatmap

The heatmap is a visual representation of data across a space. The space is divided into hexagonal tiles whose values are not linked to a specific fixture, but instead are the result of a calculation of the values of nearby fixtures, adjusted by distance.

The value for a given tile is most heavily influenced by fixtures near the tile's center, while less influenced by fixtures farther away. The number shown when hovering over a tile is the calculated value at the tile's center.

The following image shows how closer lights have more influence:



Note: Using smaller tiles produces a heatmap with finer detail, not increased accuracy.

The summary data shown in the top right corner represents the average value of all lights in the facility over the selected time range. It is not spatial in nature like the heat map visualization.

Example Cases

- Set the date range for an extended time period to understand average occupancy over the selected time. This is useful for understanding typical occupancy for a certain shift, certain weekday, or even a season.
- Use the heatmap to look at occupancy for a particular day or hour. Drag the *Hours* slider to see occupancy throughout the hours of the day for a 24 hour period.
- Running an occupancy heatmap report over time lets you see how employees or customers travel throughout the facility. You may be able to identify poor traffic patterns allowing you to improve productivity. You can also use the heatmap to layout your warehouse or production lines more effectively to reduce pick times or bottlenecks.
- Occupancy heatmap reports allow you to analyze the usage of space and see areas that are under-utilized.
- Use occupancy heatmaps for security information by identifying unwanted activity such as employees traveling in restricted areas or activity outside operating hours.
- The color slider is most useful when values aren't well distributed, for example a heatmap showing occupancy on the weekend might have all low values. In these cases, drag the color slider in from the edges to increase the contrast.

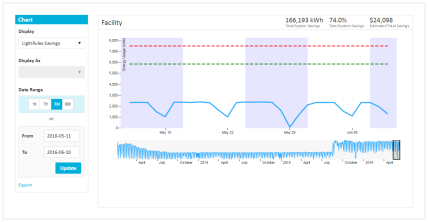
Best Practices

- LightRules reports have unique URLs that let you bookmark and share customized reports links. Copy and paste the URL to share with coworkers, or bookmark the link using your browser's guidelines.
- Use medium or large tiles for best performance (larger tiles reduce load time).
- Selecting **Size** as the *Tile Type* is useful for persons with color sensitivity.
- Use the Color control to 1) view a histogram distribution of the occupancy percentage and 2) enhance the visualization to highlight desired parameters.

To enable energy cost reporting, an Administrator first needs to enter a flat rate energy cost. See the *Reporting Metrics* section in "Reports Overview" (see page 30) for more information.

Chart Reports

> **User Considerations:** Only Reporting users can access this feature. See "User Roles" (see page 6) for more information.



(✲NEW) The LightRules reporting engine helps facility managers identify operational trends and use the data from LightRules to reduce downtime, increase productivity, maximize energy savings, understand production costs, and manage their valuable space effectively.

LightRules Chart Reports track your facility's occupancy, energy usage, energy cost, and daylight harvesting-related data. You can choose among several report types, chart types, and durations, and export data to an XLS file.

Running Chart Reports

1. Select **Report** > **Chart** from the LightRules menu.
2. Select a report type (Display).
3. Select a chart type (Display as), if applicable.
4. Select a Date Range or enter a custom date range.
5. Click **Update**.

Filter by Room, Zone, or Light

> **Note:** This option is not available for reports displaying as mixed chart types.

1. Run one of the following reports: Energy Usage, Energy Cost, Occupancy, Average Power, or Active Percentage.
2. To filter by room, check **Show Rooms**.
   LightRules auto-refreshes the results, and a list of rooms in the facility is displayed below the chart.
3. To filter by zone, select a room from the list.
   LightRules auto-refreshes the results, and a list of zones in the room is displayed below the chart.
4. To filter by light, select a zone from the list.
   LightRules auto-refreshes the results, and a list of lights in the zone is displayed below the chart.

Example Case

The LightRules Savings report shows collected energy usage data that lets you validate the energy savings from switching to an intelligent lighting system. Three key metrics are displayed:

- The blue line is actual facility lighting energy usage, after all LightRules control strategies have been implemented. This utility-grade data is pulled directly from power meters integrated into every lighting fixture and is collected on an ongoing basis.
- The green dotted line represents an estimate of the power usage if no LightRules controls strategies were implemented. This is an estimation of savings achieved by simply switching to LEDs, without taking advantage of LightRules scheduling, profiles, and tuning.
- The red dotted line represents an estimate of the power usage of the previous lighting system, based on wattage estimates.

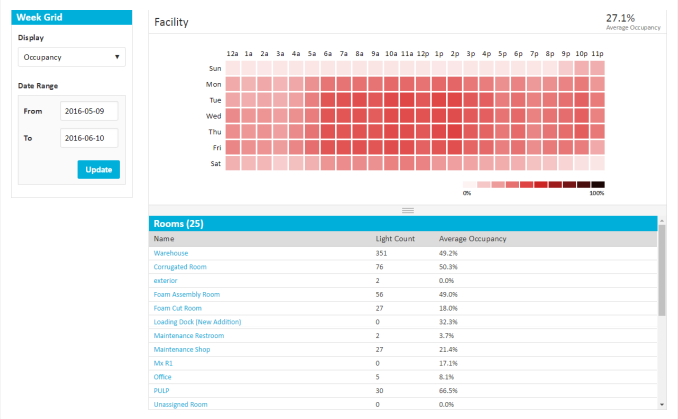
Best Practices

- LightRules reports have unique URLs that let you bookmark and share customized reports links. Copy and paste the URL to share with coworkers, or bookmark the link using your browser's guidelines.
- To enable energy cost reporting, an Administrator first needs to enter a flat rate energy cost. See the *Reporting Metrics* section in "Reports Overview" (see page 30) for more information.
- To enable baseline reporting, an Admin must enter a value, in total watts, for the previously installed lighting system. See the *Reporting Metrics* section in "Reports Overview" (see page 30) for more information.
- The top right corner of the report displays key summary statistics.
- Mouse-over a time interval in a chart to display data for that interval.
- Use the slider below the chart to edit the date range.
- Click **Export** to download the chart data to an XLS file.

Week Grid Reports

User Considerations: Only Reporting users can access this feature. See "User Roles" (see page 6) for more information.

(✲NEW) Week Grid reports display facility occupancy data across the hours of the day and the days of the week, providing detailed information on occupancy over time.



Running Week Grid Reports

Select **Report** > **Week Grid** from the menu.

The week grid report shows data for the entire facility, with automatically selected parameters. Customize the report by altering the following:

- **Display**: Select Occupancy, Active Percentage, Energy Usage, or Energy Cost.
- **Date Range**: Enter a custom date range and click **Update**.

Filter by Room or Zone

1. Select **Report** > **Week Grid** from the menu.
2. Select a room from the list below the chart.
   LightRules auto-refreshes the results, displaying data for the selected room and providing a list of zones below the chart.
3. Select a zone from the list below the chart.
   LightRules auto-refreshes the results, displaying data for the selected zone and providing a list of lights below the chart.

Example Cases

- Facility managers can use the week grid to identify downtime during which they can schedule maintenance.
- The week grid can also be used to ensure security by showing activity outside of operating hours. This helps you understand when people are traveling to certain areas of the facility or retail space.

Best Practices

- Hover over a time interval in the week grid to display data for that interval.
- Hovering on the grid provides exact occupancy at that time while the number in the top right hand corner provides an average for the space over the chosen date range.
- Hover over a room /zone/ light in the list below the week grid to filter results for the selected item.
- To enable energy cost reporting, an Administrator first needs to enter a flat rate energy cost. See the *Reporting Metrics* section in "Reports Overview" (see page 30) for more information.
- LightRules reports have unique URLs that let you bookmark and share customized reports links. Copy and paste the URL to share with coworkers, or bookmark the link using your browser's guidelines.

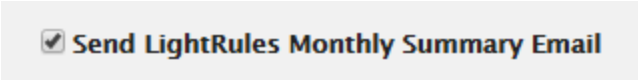
Email Summary Reports

(✳NEW) The information found on the Dashboard is easily accessed from a LightRules Email Report that can be sent to your inbox each month.

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

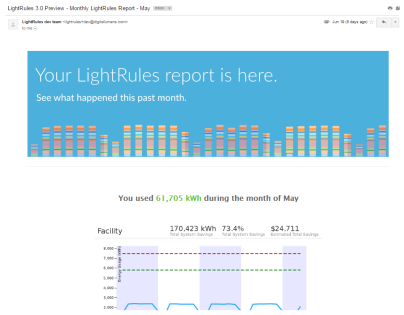
Sign up for the Email Summary Report

1. Select **Admin** > **Users** from the menu.
2. Click **Edit** in the row of the user you wish to sign up.
3. In the *Edit user* window, check the option to **Send LightRules Monthly Summary Email:**

4. Click **Update User**.

The selected user will now receive monthly LightRules Summary Reports that they can view and forward to colleagues.



LightRules Power Reports

> **User Considerations:** Only Reporting users can access this feature. See "User Roles" (see page 6) for more information.

After LightRules Power is configured, additional energy use and energy cost reports appear in the *Reporting* menu under *Power Reports*.

Run a Report

1. Select **Report** > **Power Reports** from the menu.
2. Click **Run** for the desired LightRules Power report.
3. (Optional) Change the date using the back and forward buttons or by selecting from the calendar widget.
4. (Optional) Change the display by selecting *Energy Cost* or *Percentage*.
5. (Optional) Change the Meter Group by selecting from the *Power Meter Group* dropdown. LightRules auto-refreshes the results.
6. (Optional) Download / Print the report by selecting an option from the *Chart Context Menu* in the top-right corner of the report screen.

Edit a Metered Power Report

1. Select **Report** > **Power Reports** from the menu.
2. Click **Edit** for the desired LightRules Power report.
3. Modify one or more of the parameters.
4. Click **Update Report**.

Create a New Report

1. Select **Report** > **Power Reports** from the menu.
2. Click **New Report**.
3. Type a name for the report.
4. Modify one or more of the parameters.
5. Click **Create Report**.

Clone an Existing Report

1. Select **Report** > **Power Reports** from the menu.
2. Click **Clone** for the desired report.
3. Click **Edit** for the copied report.
4. Change the report name.
5. Modify one or more the parameters.
6. Click **Update Report**.

Delete a Metered Report

1. Select **Report** > **Power Reports** from the menu.
2. Click **Delete** for the desired report template.
3. Click **OK** to confirm deletion.

Chapter Five:

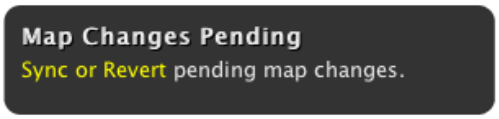
Config

Perform a Sync

When you update a room, zone, or light, you have changed the map file and LightRules requires a sync operation to push the new settings over the lighting network to the lights in the facility. LightRules displays a prompt when one or more pending map file changes require syncing; you can sync more than one change at a time.

Syncing the Map File

1. On the dashboard, in the *Map Changes Pending* prompt, click **Sync or Revert**



2. Review the description of the pending map file changes.
3. Click **Sync** to push the new settings to the lights,
   - or -
   click **Revert** to cancel all changes.
4. Click **OK**.

Diagnostics

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

LightRules continually checks the lighting network for connectivity and/or changes to the map file that have not been received by the lights. If there are no issues, LightRules displays "All Clear" on the diagnostics screen.

If there is an issue, LightRules identifies the affected portion of the network and displays an alert icon. Additionally, if LightRules Power is in use, LightRules checks the connectivity of all power meters and power gateways.

Access the diagnostics screen by selecting **Conifg** > **Diagnostics**

Diagnostic Alerts

The diagnostics screen displays various categories of alerts:

- **Network Interfaces** – Summarizes any issues with the Ethernet portion of the lighting network. An alert indicates an issue with a network switch or cable.
- **Networks** – Summarizes any communication issues with the wireless portion of the lighting network. An alert indicates a gateway hardware issue or a change to the map file that has not been synced.
- **Light Fixtures**– Summarizes any communication issues with individual lights. An alert indicates a light hardware issue or a change to the map file that has not been synced.
- **Uncalibrated Devices** – Lists all DLA devices requiring additional programming. DLA programming is performed using Digital Lumens "Commissioner Software" (see page 85)
- **Control Disabled** - Displays a detailed list of disabled lights.
- **Keypads** – Displays any communication issues with the keypads. An alert indicates a hardware issue.
- **Power Gateways** – Displays any communication issues with individual power gateways. An alert indicates a hardware issue (power gateway configuration changes do not require a sync).
- **Power Meters** – Displays any communication issues with individual lights. An alert indicates a hardware issue (power meter configuration changes do not require a sync).
- **System Health** - Summarizes health of the system including disk name, state, and model.

Facility Map

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

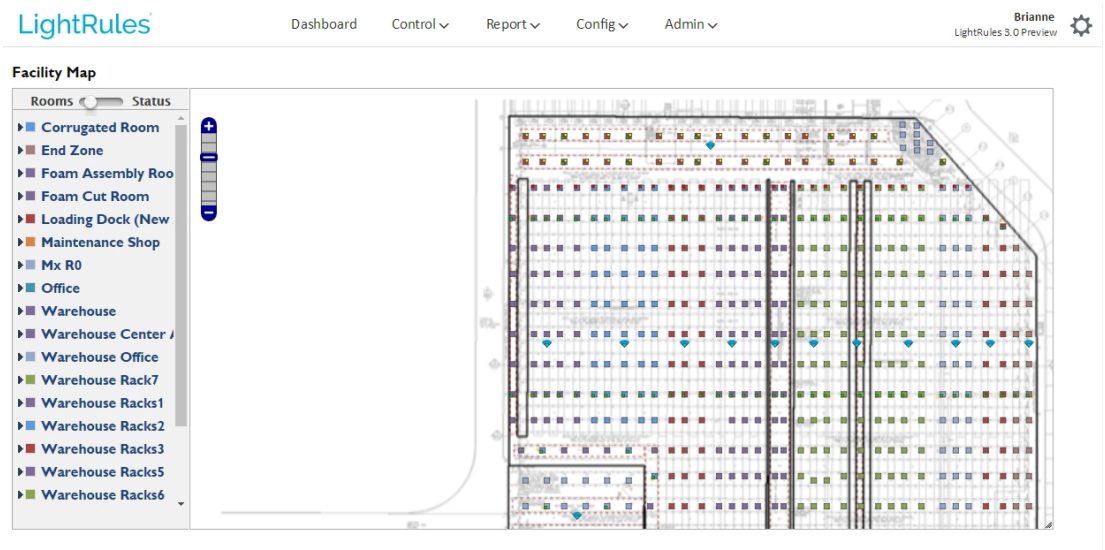
The facility map displays lighting system information as an overlay on the facility floor plan.

> **Note:** To use the facility map feature in LightRules, the map file created with Commissioner software must contain the facility drawing (typically a PNG file).

Select **Config** > **Map** from the menu to open the facility map, which displays lighting system information as an overlay on the facility floor plan. There are two map views: *Rooms* view and *Status* view.

Rooms View

Rooms view shows all light, zone, and room details at a glance. Each light appears as a square on the map. You can ping lights and access light settings via each light's quick-view popup.



Use the *toggle button* to switch between rooms view and status view.

The *legend* lists each room and zone in the facility. Rooms are color-coded: All lights in the same room appear have the same color on the map. Click a room to expand the zone list for that room. Click a zone to highlight all lights in that zone.


In rooms view, all lights display as square icons.


If a light is calibrated and enabled for daylight harvesting, the icon contains a yellow box.


If a light is configured as a coordination master, the icon contains a red box.


If a light is battery backup enabled, the icon contains a green box.

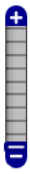

All gateways appear as wedge icons.


All keypads appear as boxed circle icons.


Power meters appear as meter dial icons.


Power gateways appear as rectangular icons.

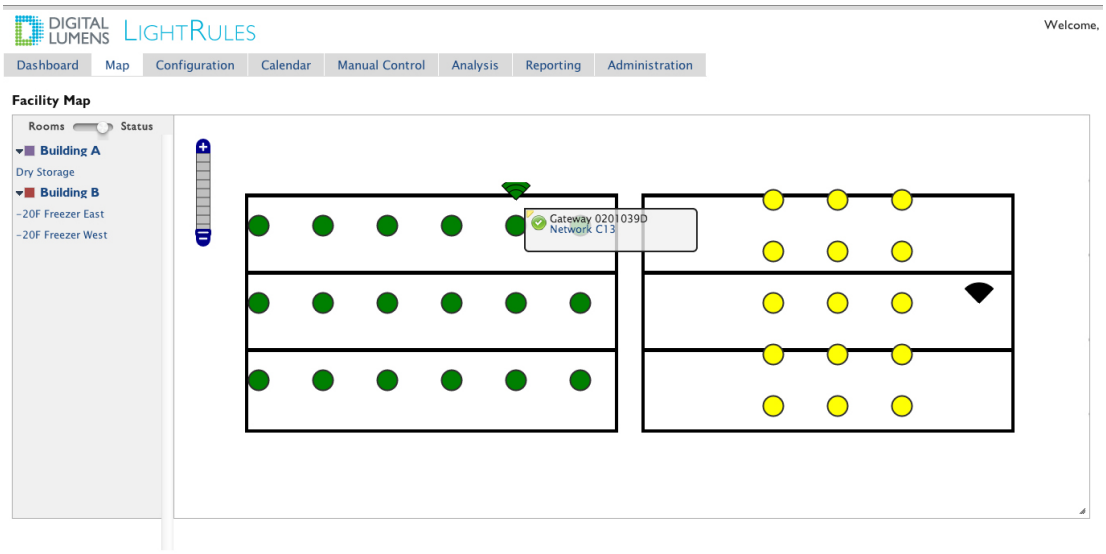
When you click on a light or gateway icon, that device's quick-view popup appears. The popup shows the name and zone assignment. The status icon indicates if the device is actively communicating with LightRules (green icon), if the device has not communicated with LightRules in 24 hours (yellow icon), or if the device is out of sync or has never communicated with LightRules (gray icon). Click on the status icon to ping the device and update its status in the map. Additionally, if you click on the name, the configuration page for that device appears. Note that the yellow tab in the upper-left or upper-right corner of the popup points to the device whose information is being displayed.


Click anywhere on the *zoom control* to zoom in or out.


In the lower-right corner of the map, click-and-drag the *re-size control* to re-size the map window.

Status View

Use the toggle button to switch between Rooms view and Status view. Status view shows the state of each light.



Communicating lights and gateways appear as green icons.

Non-communicating lights and gateways appear as yellow icons.

If a light is out of sync, or if a light has never communicated with LightRules, it appears as a gray icon.

Map File Changes

During LightRules installation, the installer uses building drawings and information gathered during the planning process to create a map file specific to your facility. The map is created with "Commissioner Software" (see page 85). The map file is a configuration file containing all fixtures, zones, gateways, and rule sets, and it contains all of the configurable settings LightRules needs to perform manual control, automated control, and reporting. Networks, rooms, zones, lights, coordinated control settings, and daylight harvesting settings are also configured during system installation. All settings are distilled into the map file.

When you make changes to zones, lights, rooms, keypads, power meters, or power gateways, you are effectively changing the map file. When you make these changes, Commissioner software is used to perform the programming.

Tip: You will need to use Commissioner software to move lights from one network to another, move the visual position of a light in the facility map, and/or update the facility map background image.

Manage the Map File

Downloading the Map File

Commissioner requires the latest version of the map file before any new programming work can occur.

To download (save) the map file, follow these steps:

1. Select **Config** > **Manage Map File** from the menu.
2. Click **Download**.
3. Browse to the desired save location, and then click **Save**.

Back up the Current Map File

If site configuration is enabled, the map file is automatically saved once per day following changes. To start an immediate backup:

1. Select **Config** > **Manage Map File** from the menu.
2. Click **Back Up**.

For more information on site configuration, go to .

Uploading the Map File

(After editing the map file in Commissioner, you must upload the updated file to LightRules:

1. Select **Config** > **Manage Map File** from the menu.
2. In the *Upload Map File* section, click **Choose File** to browse to the desired save location
3. Click **Upload**.
4. "Perform a Sync" (see page 44).

Networks

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

A network is a group of ≤ 50 lights, not separated by any walls, and managed by a single gateway. LightRules uses networks to manage wireless communications and tracks those networks according to unique Network IDs.

View All Networks

1. Select **Config** > **Networks** from the menu.

A list of all the networks in your facility displays.

View Detailed Network Information

1. Select **Config** > **Networks** from the menu.
2. Click the **Network Name** or click **View** for the network you wish to view.

Detailed information for the selected network displays.

Add a Network Description

1. Select **Config** > **Networks** from the menu.
2. Within the row of the network you wish to modify, click **Edit**.
3. Enter a description.
4. Click **Update Network**.

Rooms

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

Rooms correspond to the physical spaces in your facility, such as freezer, dry storage, and so on. Each room can contain one or more zones. As your facility floor plan changes over time, you may need to edit rooms in LightRules. LightRules utilizes the room designations you create in order to create detailed room reporting.

Create a New Room

1. Select **Config** > **Rooms** from the menu.
2. Click **New Room**.
3. Type a new room name and/or text description.
4. Click **Create Room**.
5. Assign one or more "Zones" (see page 52) to the new room.
6. "Perform a Sync" (see page 44).

Edit an Existing Room

1. Select **Config** > **Rooms** from the menu.
2. Within the row of the light you wish to modify, click **Edit**.
3. Type a new room name and/or text description.
4. Click **Update Room**.
5. "Perform a Sync" (see page 44).

Zones

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

Zones are groups of lights. When you configure a zone, you define a default rule that specifies the dimming levels and occupancy sensor settings for the lights assigned to that zone when no other profile is operating. Rules assigned to a zone apply to all lights in that zone, controlling all light's behavior. LightRules typically does not apply settings to individual lights; however, you can create a zone containing a single light, effectively controlling just that light.

> **Tip:** The rule assigned to a zone applies to all lights in that zone, controlling all lights' behavior. LightRules does not assign settings to individual lights. However, you can create a zone containing a single light, effectively controlling just that light.

Designing Zones

Be thoughtful when creating or editing the zones in each area of the facility. Think about the way each area of the facility is used and design the zones accordingly.

For example, to create visual cues corresponding to the beginning and end of each aisle (where the rest of the lights are off if there is no occupancy), create zones for those areas when the lights are configured as night lights. Similarly, create a zone with night lights if there is a cross-aisle running through the middle of a warehouse area.

Guidelines for Designing and Editing Zones

- Create night light zones at the beginning and end of each aisle.
- If there are cross-aisles, create night light zones containing the lights in those cross-aisles.
- In freezer areas, or any areas with low occupancy, create zones with shorter occupancy sensor delays.
- In busy warehouse storage areas, or any area with high occupancy, create zones with longer occupancy sensor delays.

Creating a New Zone

1. Select **Config** > **Zones** from the menu.
2. Click **New Zone**.
3. Type a name for the zone.
4. Select a **Network ID** from the dropdown list (use the same Network ID as used by the gateway in that zone).

5. Select the room in which the zone resides from the dropdown list.
6. (Optional) Check **Ignore Occupancy Sensors** only if the facility has opted not to use occupancy sensing.
   For example, some aircraft hangers do not use occupancy sensing.
7. (Optional) Check **Safety Lighting** to activate minimum active power/inactive power levels for this zone.
8. (Optional) Check **Coordination Enabled** to permit coordinated control for this zone.
9. (Optional) Enter descriptive text.
10. (Optional) Enter the active and inactive power levels.
11. (Optional) Enter the desired sensor delay.
12. Click **Create Zone**.
13. Select **Config** > **Lights** from the menu.
14. For each light you wish to add to the new zone, click **Edit**, select the newly created zone name from the dropdown list, and then click **Update Light**.
15. "Perform a Sync" (see page 44).

> **Tip:** The new zone becomes active when you (a) add "Lights" (see page 55) to it and (b) schedule "Profiles" (see page 57) containing the new zone.

Editing an Existing Zone

1. Select **Config** > **Zones** from the menu.
2. Within the row of the zone you wish to modify, click **Edit**.
3. (Optional) Change the zone's room assignment.
4. (Optional) Check **Ignore occupancy sensors** if the facility chooses not to use occupancy sensing.
   (Optional) Check **Safety lighting** to activate the minimum active/inactive light level specified in Administration General Settings.
   (Optional) Check **Coordination enabled** to activate coordination control.
5. (Optional) Change the text description.
6. Click **Update Zone**.
7. "Perform a Sync" (see page 44).

Merging Two Zones

With the merge feature, you can combine two zones with the same Network ID into a single zone:

1. Select **Config** > **Zones** from the menu.
2. Within the row of the zone you wish to merge into another zone (the zone you select here will disappear after the merge), click **Edit**.
3. Click **Merge**.

4. Select the destination zone from the dropdown list on zones with the same Network ID.
5. Click **Merge**.
6. "Perform a Sync" (see page 44).

> **Note:** When you merge zones, the rule of the destination zone is retained.

Splitting a Zone

With the split feature, you can split a single zone into two separate zones. This is a quick way to change the zone rule for a subset of a zone:

1. Select **Config** > **Zones** from the menu.
2. Within the row of the zone you wish to split, click **Edit**.
3. Click **Split**.
4. Name the new zone and select the lights you want to add to that zone.
5. Click **Split**.
6. "Perform a Sync" (see page 44).

Lights

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

Each light has a built-in microprocessor that enables software control and assignment to a zone. LightRules identifies lights by their serial numbers.

Viewing all Lights

1. Select **Config** > **Lights** from the menu.

A list of all the lights in your facility displays.

Viewing Detailed Light Information

1. Select **Config** > **Lights** from the menu.
2. Select the **Serial Number** for the light you wish to view.

Detailed information for the selected light displays.

Edit Light Settings

1. Select **Config** > **Lights** from the menu.
2. Within the row of the light you wish to modify, click **Edit**.
3. Edit light settings as needed:
    - Name
    - Select / deselect Disable Control: The Disable Control feature increases network speed when a light in the map is known to be missing, powered off, or experiencing connectivity issues. Only check this option for lights meeting these conditions.
    - Select / deselect Daylight Harvesting Enabled
    - Select / deselect Coordination Master
    - Select a new Zone
    - Enter a new Description
4. Click **Update Light**.
5. "Perform a Sync" (see page 44).

Note: You can move a light between zones with the same Network ID. If the desired destination zone has a different Network ID, you must use "Commissioner Software" (see page 85) to make the change.

Download Raw Usage Data

LightRules software features expanded data access on a per-light basis. The raw data file includes the following:

- Total time since the light was last reset.
- Total time the light has been in active mode.
- Total energy usage.

1. Select **Config** > **Lights** from the menu.
2. Select the **Serial Number** for the light you wish to view.
3. Click **Raw Usage**.
4. Enter a date range and then click **download**.
5. Open the CSV file using a simple text editor or spreadsheet software.

Profiles

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

A profile is a list of rules for some or all configured zones. To take effect, the profile must be pushed manually or scheduled as a block in the calendar.

Each light is set up with a default profile during commissioning. To use the LightRules calendar and create a lighting schedule that automates your facility's lighting management, you first have to set up one or more additional profiles.

> **Note:** To create a profile, you first have to create zones. See "Zones" (see page 52) for more information.

Designing Profiles

Think about occupancy on weekdays versus weekends and also occupancy by shift. Design profiles accordingly.

For example, create profiles with the night lights inactive power level turned down. Similarly, you can adjust occupancy sensor delays to match the lower occupancy.

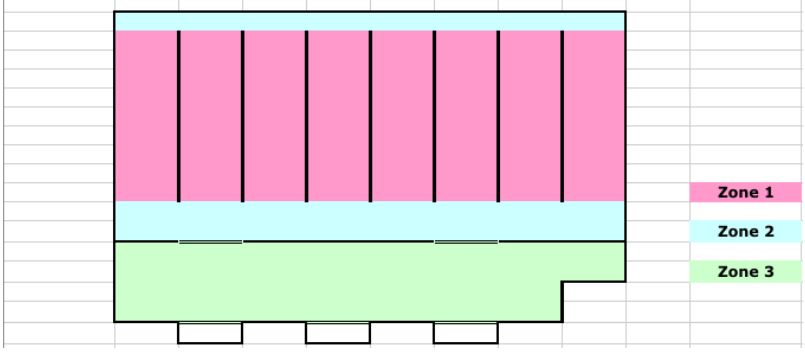
Guidelines for Designing and Editing Profiles

- Create and schedule profiles for weekdays versus weekends.
- Create and schedule profiles according to the time of day / shift.
- Create and schedule holiday profiles.

Example Profiles

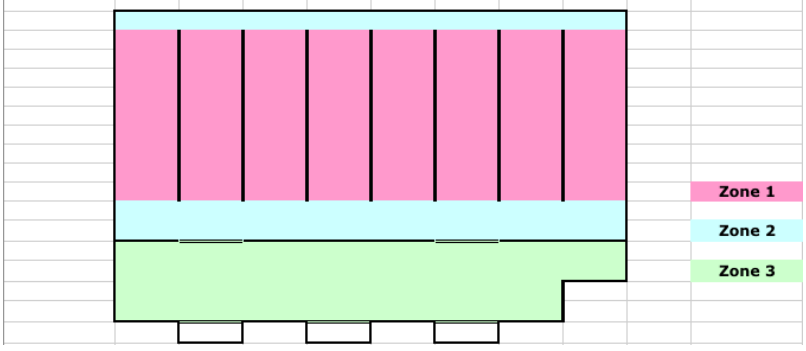
Normal Operations Profile

Profile	Normal Operations			Backshift			Maintenance		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Active	100	100	100	80	80	80	100	100	100
Inactive	0	5	20	0	0	0	30	30	30
Sensor Delay	60	30	180	30	30	30	300	300	300



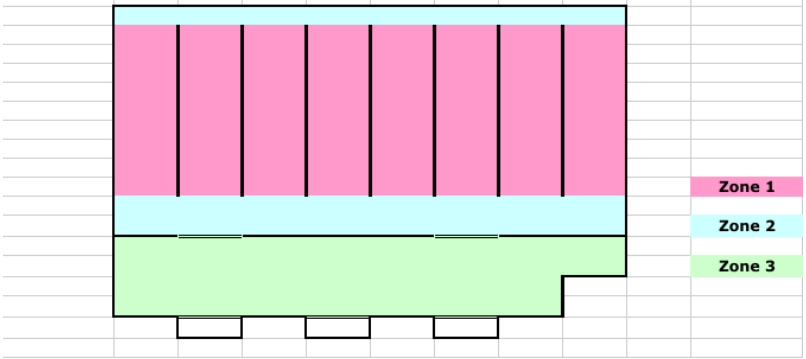
Backshift Profile

Profile	Normal Operations			Backshift			Maintenance		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Active	100	100	100	80	80	80	100	100	100
Inactive	0	5	20	0	0	0	30	30	30
Sensor Delay	60	30	180	30	30	30	300	300	300



Maintenance Profile

Profile	Normal Operations			Backshift			Maintenance		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Active	100	100	100	80	80	80	100	100	100
Inactive	0	5	20	0	0	0	30	30	30
Sensor Delay	60	30	180	30	30	30	300	300	300



Creating a new profile

1. Select **Config** > **Profiles** from the menu.
2. Click **New Profile**.
3. Type a name for the profile.
4. Select a zone.
5. Modify the rule set for the selected zone:
    - Use the right slider to adjust the active power level (20 -100).
    - Use the left slider to adjust the inactive power level (0 - 100).
    - Enter the desired sensor delay (minimum 30 seconds).
6. Click **Add Rule** and then repeat step 5 for all desired zones.
7. Click **Save**.

> **Note:** The active power level has a minimum level of 20, for safety purposes.

Editing or cloning an existing profile

1. Select **Config** > **Profiles** from the menu.
2. Within the row of the profile you wish to modify, click **Edit** or **Clone**.

3. Modify the rules for each zone, as desired.
4. Click **Save**.

Deleting a profile

1. Select **Config** > **Profiles** from the menu.
2. Within the row of the profile you wish to modify, click **Delete**.
3. Click **OK** to confirm deletion.

> **Note:** You cannot delete a profile that is in use or scheduled in the calendar.

LightRules Keypad

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

Keypads are an optional accessory that allows users to push a lighting profile to a zone or zones of lights from a physical keypad. The LightRules Keypad is a wall-mounted controller with eight configurable buttons. When a user presses buttons 1-8, the keypad triggers the assigned manual profile. Typically one keypad per room in the facility is sufficient.

Working with Keypads

Configuration in LightRules

Each keypad needs to be configured with manual profile assignments for buttons 1-8. This step is done in LightRules.

When adding or removing keypads, the map file must be updated; use Commissioner software to update the map file. However, if you are making changes to the button assignments, Commissioner software is not needed.

Control a Keypad via LightRules

You can "press" the buttons on any keypad virtually via LightRules:

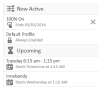
1. Select **Config** > **Keypads** from the menu.
2. Click on the serial number of the keypad you wish to control.
3. The currently selected button appears highlighted in blue.

4. Click on any button to activate the manual profile associated with that button, as if you were pressing the same button on the actual keypad hardware. The newly selected button will appear highlighted in blue after a few seconds.

Cancel a Keypad-Activated Manual Profile

From the LightRules dashboard, you can cancel any manual profile activated by a keypad:

1. If not viewing the dashboard, click the **Dashboard** tab.
2. In the *Now Active* list, identify the manual profile you wish to cancel.
3. Click the **"X"** to the right of that manual profile.



4. Click **Cancel Profile**.

Edit Keypad Button Assignments

Each keypad has eight configurable buttons. Assign a manual profile to each button:

1. Select **Config** > **Keypads** from the menu.
2. Click on the serial number of the keypad you wish to edit.
3. Click **Edit**.

4. For each button, select a manual profile from the dropdown list. You can also leave one or more buttons unassigned.
5. (Optional) To specify a duration, in minutes, use to up and down arrows or type in a number.

> **Note:** If a duration is specified, then the manual profile activated with that button will expire after the specified number of minutes. If no duration is specified ("0"), the manual profile will remain active until canceled.

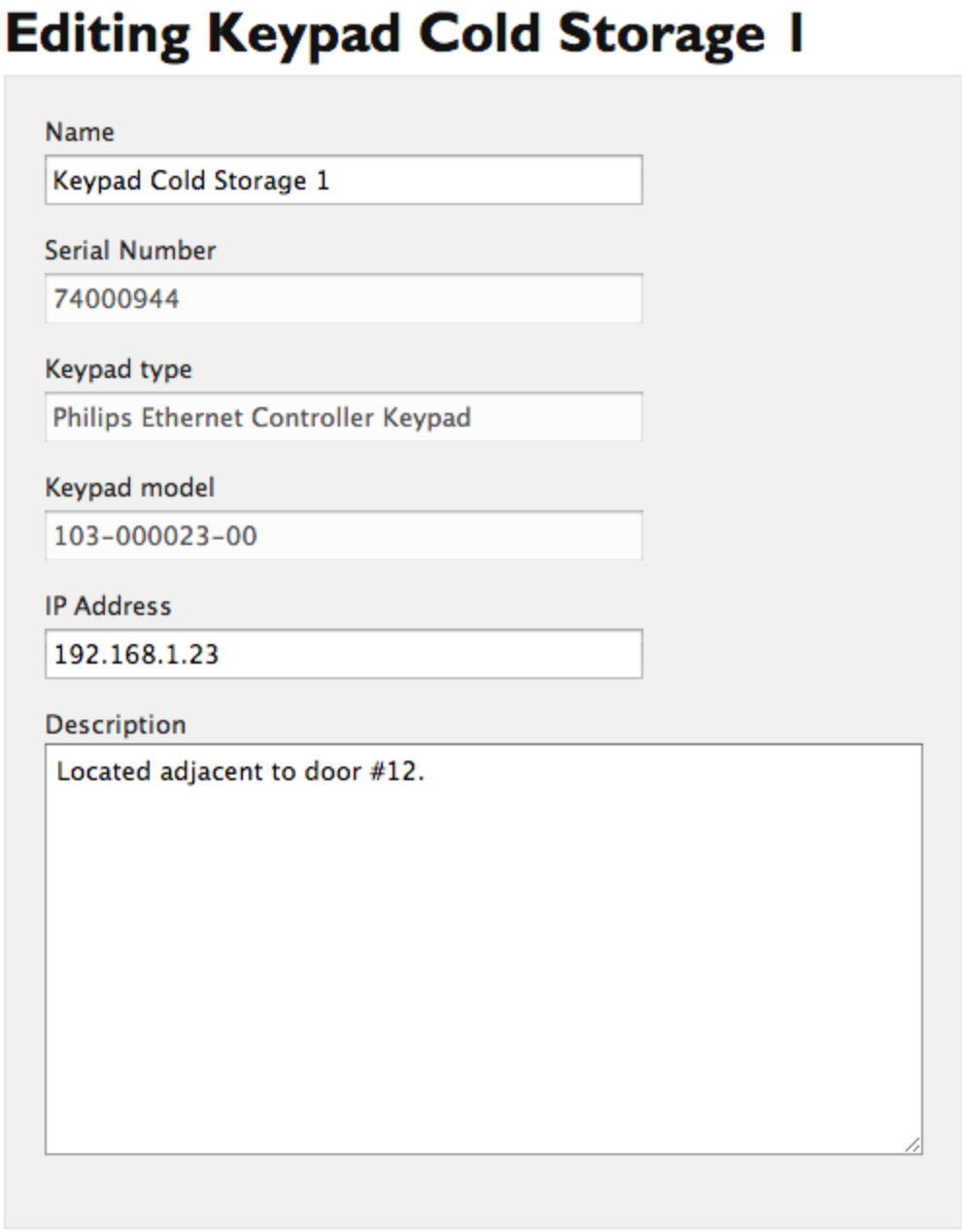
6. Click **Update Keypad**.

Edit Keypad General Settings

In general, you will use Commissioner software to edit keypad general settings. However, in some instances — for example, an IP address conflict — you may need to edit certain keypad general settings right away.

1. Select **Config** > **Keypads** from the menu.
2. Click on the serial number of the keypad you wish to edit.
3. Click **Edit**.

4. Click **Edit** again.



5. Edit the keypad name, description, or IP address.
6. Click **Update Keypad**.

Coordinated Control

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

LightRules is compatible with coordinated control-enabled lights. Coordinated Control is enabled at the global level by default, and fixture coordination master settings are automatically copied from the map file. In the Profile editor, zone settings are copied from the map and may be changed at any time.

> **Note:** During installation, installers enable coordinated control and assign coordination masters using Digital Lumens "Commissioner Software" (see page 85).

Designate a Light as a Coordination Master

> **Tip:** For best performance, limit the number of Coordination Masters to ten.

A light designated with a coordination master flag will trigger all lights in its zone. Designate a light as a coordination master by editing the light settings:

1. Select **Config** > **Lights** from the menu.
2. Within the row of the light you wish to modify, click **Edit**.
3. Check the **Coordination Master** checkbox.
4. Click **Update Light**.
5. "Perform a Sync" (see page 44).

> **Note:** If Coordinated Control is disabled at the Global level, the *Coordination Master* checkbox is disabled in the Edit Light screen.

Disable Coordinated Control at the Profile Level

Once enabled, coordinated control is operating at all times by default. To turn off coordinated control for certain times, disable the function in a specific profile:

1. Select **Config** > **Profiles** from the menu.
2. Within the row of the profile you wish to modify, click **Edit**.
3. Check the **Disable CC** feature.
4. Click **Save**.

Disable Coordinated Control at the Global Level

Coordination Control is enabled by default at the global level. To turn off coordinated control:

1. Select **Admin** > **General** from the menu.
2. Click **Edit General settings**.
3. In the *Feature Control* section, deselect **Enable Coordinated Control**.
4. Click **Save Settings**.

Daylight Harvesting

> **User Considerations:** Only Operations or Admin users can access this feature. See "User Roles" (see page 6) for more information.

LightRules is compatible with daylight harvesting-enabled lights. Daylight Harvesting is enabled by default at the global level for all new installations. When a map file is loaded with fixtures calibrated for Daylight Harvesting, zone settings in the profile editor are automatically copied from the map.

> **Note:** To control daylight harvesting-enabled lights with LightRules, you must first calibrate those lights with Digital Lumens "Commissioner Software" (see page 85).

How to change Daylight Harvesting Settings

1. Select **Config** > **Lights** from the menu.
2. Within the row of the light you wish to modify, click **Edit**.
3. Check the **Enable Daylight Harvesting** feature.
4. Click **Update Light**.
5. "Perform a Sync" (see page 44).

> **Note:** LightRules displays a "**DH**" next to each light that is actively daylight harvesting.
> If no fixtures are calibrated in the map file or Daylight Harvesting is disabled at the Global level, these settings are disabled.

How to turn Daylight Harvesting on/off

Once enabled, daylight harvesting is operating at all times by default. To turn off daylight harvesting for certain times, disable the function in a specific profile.

Daylight Harvesting at the Profile Level

1. Select **Config** > **Profiles** from the menu.
2. Within the row of the profile you wish to modify, click **Edit**.
3. Select / deselect the **Enable DH** feature.
4. Click **Save**.

> **Note:** If no fixtures are calibrated in the map file or Daylight Harvesting is disabled at the Global level, these settings are hidden on the *Edit Profile* screen.

Daylight Harvesting at the Global Level

1. Select **Admin** > **General** from the menu.
2. Click **Edit General Settings**.
3. In the *Feature Control* section, select / deselect **Enable Daylight Harvesting**.
4. Click **Save Settings**.

Chapter Six:

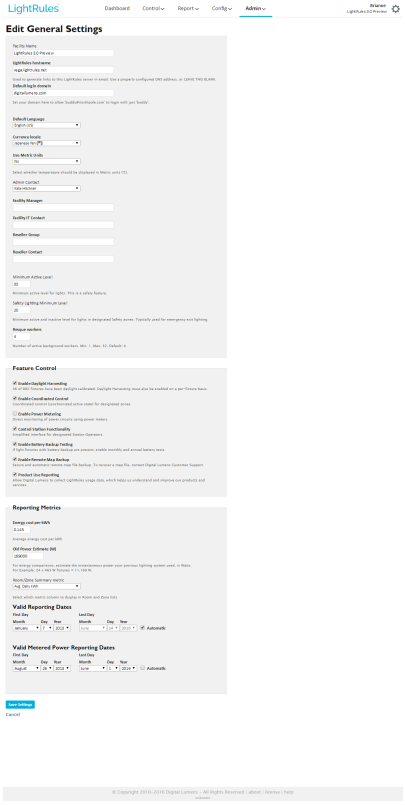
Admin

General Settings

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

Most of the general settings are configured during installation, however, you may edit general settings at any time by doing the following:

1. Select **Admin** > **General** from the menu.
2. Click **Edit General Settings**:



3. Modify settings as desired:
    - Facility Name:
    - LightRules hostname:
    - Default login domain:
    - **Default Language:** During system installation, the installer specifies a default language setting and also the currency type. To change the language setting for an individual user session, make a new language selection at login, and the language selection remains active until logs out.

- **Currency Locale:** Select a currency from the drop down list.

  > **Note:** Language and currency are independent. For example, changing the language from English (US) to French does not alter the default currency.

- **Admin Contact:** All user-related messages are sent from the Admin Contact's email address. For example, the invitation email sent to every new user is sent from the Admin Contact. The Admin Contact is editable.
- **Safety Lighting Minimum level:**
- **Feature Control:** Check the boxes for each setting to toggle the feature On or Off at the global level.
- **Energy Cost per kWh:** Enter an estimation of the facility's average energy cost to enable LightRules to report energy cost over time.

  > **Note:** LightRules does not currently support variable energy rates such as time-of-use or peak demand rates.

- **Old Power Estimate:** To enable baseline reporting, you must enter a value in total watts, for the previously installed lighting system.

  > **Tip:** The Old Power Estimate feature requires an entry of W (Watts), rather than an entry of kWh (kilowatt hours). Note that this function assumes 24 x 7 operation at constant power.

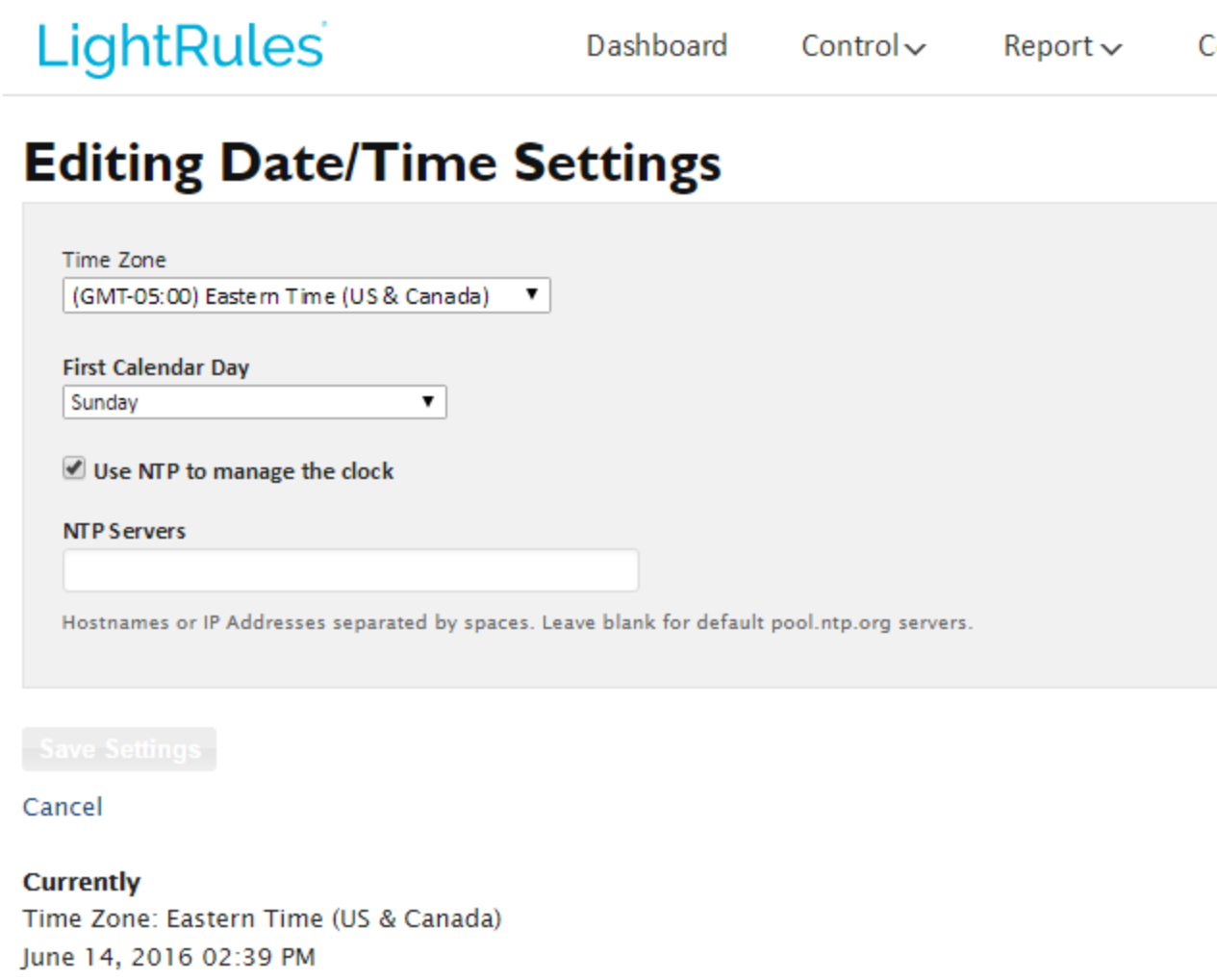
- **Room/Zone Summary Metric:** Change this value to change what appears in the Configuration tab, under rooms and zones. For example, by default, LightRules displays **[Avg. Daily kWh]** for each room and zone.

4. Click **Save Settings**.

Date and Time Settings

User Considerations: Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

1. Select **Admin** > **Date & Time** from the menu.
2. Click **Edit Date/Time Settings**.
3. Modify settings as desired:
    - **Time Zone:** Select the appropriate time zone from the dropdown list.
    - **First Calendar Day:** Change this value to specify the day that the calendar should begin each week. By default, the week starts on Sunday.
    - **Use NTP to Manage the Clock:** Use this option if you have enabled TLS Web Connections, as the TLS protocol may fail if the LRA clock drifts too far from the correct time. Enabling NTP in LightRules allows the LightRules Appliance to keep accurate time.
      When enabled, the *Set System Clock* option is removed, and a configuration option for custom NTP servers is presented:



Leave the **NTP Servers** field blank to use NTP servers maintained by the Network Time Foundation. To specify NTP servers in your network infrastructure, enter the IP addresses or hostnames of the servers separated by spaces.

> **Note:** NTP is not available in Stand-alone Console Mode.

- **Set System Clock:** If not using NTP, select this option and then enter the correct time and date.

4. Click **Save Settings**.

Network and Firmware Settings

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

During installation, for instructions on configuring network settings and firmware, refer to the LightRules Appliance Installation Instructions.

Post-installation, **Contact Digital Lumens Technical Support**[1] before altering the network or firmware settings.

[1] support@digtiallumens.com or +1 (617) 723-1200, extension 3.

Email Server Settings

User Considerations: Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

If the facility requires custom SMTP email server settings, use the following steps:

1. Select **Admin** > **Email Server** from the menu.
2. Select **Edit**.
3. Modify settings as desired, based on information supplied by the facility IT department.
4. Click **Save Settings**.

Note: By default, LightRules uses the cloud-based Digital Lumens email server to send emails to users. Therefore, in most cases, the email server settings should be left blank. When you enter email server settings, you are effectively overriding the default email configuration.

User Settings

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

LightRules Administrators can create, delete, and edit user accounts.

Create a new user account

1. Select **Admin** > **Users**from the menu.
2. Click **New User**.
3. Enter the **user name**.

   > **Tip:** Use a consistent naming convention for all LightRules users.

4. Enter the **user's email address**.
5. (Optional) Select **Set a password now** if the LightRules system is stand-alone and not connected to the facility's enterprise network.
6. Select one or more "User Roles" (see page 6) by checking the corresponding boxes.
7. Enter the user's phone number for future reference by the system administrator (optional).
8. Click **Create User**.

After creating the account, the new user will receive an invitation email from LightRules. The invitation email contains login details and a link to the LightRules login page.

Edit an existing user's settings

1. Select **Admin** > **Users**from the menu.
2. In the row of the user account you wish to modify, click **Edit**.
3. Edit user parameters as desired.
4. Click **Update User**.

> **Note:** Click the **Invite to Mobile App** button to send an invitation to LightRules Mobile.

Change a user's password

1. Select **Admin** > **Users**from the menu.
2. In the row of the user account you wish to modify, click **Edit**.
3. Select **Change password**.

4. Enter the new password and then re-enter to confirm.
5. Click **Update User**.

Delete a user account

1. Select **Admin** > **Users**from the menu.
2. In the row of the user account you wish to delete, click **Delete**.
3. Click **OK** to confirm deletion.

Backup Settings

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

LightRules automatically performs nightly backups and also offers a feature allowing you to save data to an external hard drive. Administrators can then restore from a backup for a full system recovery.

Creating a Backup Drive

1. Choose a USB hard drive that is at least 8 GB (preferably 16 GB) and supports USB 2.0.
2. Plug the hard drive into a Windows® or Macintosh computer.
3. Verify that the hard drive is formatted for a EXFAT file system (this is typical for USB drives).
4. Set the Volume Name of the drive to **LRA-BACKUP**. This is typically done in the Windows® Properties dialog or the MacOS Get Info dialog (refer to your operating system help documentation for additional details).
5. Create a folder at the top level of the hard drive named **Backups**.
6. Eject the hard drive from the computer.
7. Plug the hard drive into any open USB port on the LRA. Note that there are USB ports on both the front and back of the computer. The ports on the back may be less likely to be accidentally disconnected.
8. Try a manual backup to verify that the disk drive is configured correctly.

Backup Process

If a backup drive is connected to the LightRules appliance, then LightRules automatically performs nightly backups at 3:30am. To keep the backup disk from filling up, backups older than 30 days may be automatically removed from the backup disk.

1. Select **Admin** > **Backups** from the menu.
2. Click **Backup Now**. The backup process typically takes 15-30 minutes, but may take longer for large databases.
3. The backup has finished when the State column indicates "Complete".

Restore Process

Only restore from a backup for full system recovery. We do not recommend restoring for the sole purpose of reverting configuration changes, as restoring will permanently discard usage history.

1. Select **Admin** > **Backups** from the menu.
2. In the list, select the backup from which you would like to restore, and then click **Restore**.
3. Click **Yes** when prompted.
   The maintenance screen appears, signifying the beginning of the restore process, which takes about 15-30 minutes.
4. Once the restore has completed, the LightRules Appliance will automatically reboot and you will be directed to the login screen. You may now continue using LightRules.
   - Network configuration will be restored (i.e., IP address)
   - Log in using the restored email and password login information from the original backup.

Product Profile Settings

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

Digital Lumens offers a range of lighting products and gateways. To ensure that LightRules has current product information in its database, you can upload the latest version of the product spec file.

1. **Contact Digital Lumens Technical Support**[1] to request the latest product spec file.
2. Select **Admin** > **Product Profile** from the menu.
3. Click **Choose File**, and then locate and open the product spec file.
4. Click **Upload**.

[1] support@digtiallumens.com or +1 (617) 723-1200, extension 3.

Battery Backup Tests

> **User Considerations:** Only Admin users can access this feature. See "User Roles" (see page 6) for more information.

Battery Backup tests allow administrators to test emergency lighting on an interim or scheduled basis to ensure the safety of facilities and employees in the event of a power outage or emergency. Life-safety testing is fully automated for battery-backup-enabled fixtures. You can schedule automated tests, monitor performance, and document results of battery backup units.

> **Note:** To access Battery Backup tests, enable them at the General Settings level. To do this, go to **Admin** > **General**, and then select **Enable Battery Backup Testing** in the *Feature Control* section.

Start a battery backup test now

1. Select **Admin** > **Battery Backup Tests** from the menu.
2. On the *Battery Backup Tests* screen, click **Initiate a Battery Backup Test**. The *Initiate a Battery Backup Test* screen opens.

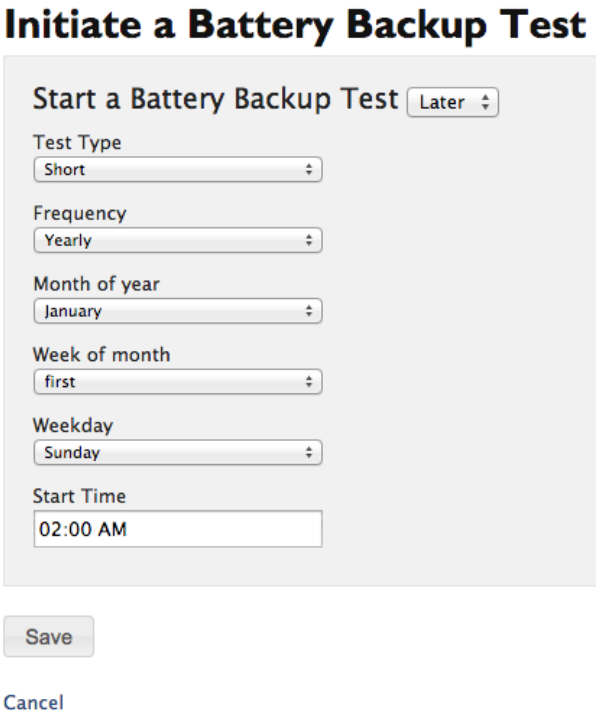
3. Select **Now**.
4. Select **Short** or **Long** as the test type.
5. Click **Save**.

A message appears on the screen indicating a test has started.

Schedule a battery backup test for later

1. Select **Admin** > **Battery Backup Tests** from the menu.

2. On the *Battery Backup Tests* screen, click **Initiate a Battery Backup Test**. The *Initiate a Battery Backup Test* screen opens.



3. Select **Later**.
4. Select **Short** or **Long** as the test type.

> **Note:** Long tests can only be scheduled for one time. The **Frequency** field is removed when scheduling a Long test.

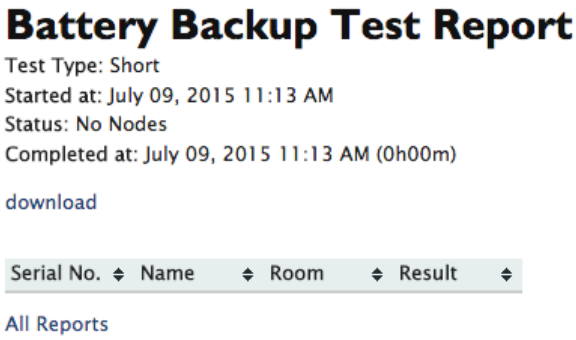
5. Select a **Frequency** if scheduling a Short test.
6. Enter or select all **Date** parameters.
7. Enter a **Start Time**.
8. Click **Save**.

A message appears on the screen indicating a test has been scheduled. The new test also appears in the *Scheduled Tests* list.

> **Note:** Edit or delete a scheduled test from the main Battery Backup Tests screen by selecting either Edit or Delete next to the test you wish to change.

View lighting test results

1. Select **Admin** > **Battery Backup Tests** from the menu.
2. Select the start time for the test you wish to view. The *Battery Backup Test Report* screen opens.



3. Click **download** to view a csv copy of the report.

Battery backup test messages

The following test messages may appear when running a battery backup test:

- success: Test passed
- unreachable: Light unreachable at test time
- short: Insufficient duration
- 1: Battery disconnected
- 2: Battery over temperature
- 3: Lightbar powered from PSU
- 4: Lightbar voltage out of range
- 5: Emergency activated
- 6: Battery drained
- 7: Unexpected lightbar pattern
- 8: Certification mismatch

Shutdown

To ensure that your LightRules database is not damaged, **Contact Digital Lumens Technical Support**[1] prior to using the LightRules Appliance shutdown administrative command.

[1] support@digtiallumens.com or +1 (617) 723-1200, extension 3.

Commissioner Software

Commissioner software is the toolset used to create map files and calibrate daylight harvesting lights during system installation.

Using Commissioner software helps ensure proper equipment installation and connectivity. After Commissioning, the LightRules server is then integrated onto the facility's enterprise network and lighting profiles and schedules are established to match the facility's needs and energy goals.

More information on Commissioner software is available on the project portal at support.digitallumens.com.

Chapter Seven:

FAQs

How do I Contact Digital Lumens Technical Support?

- If you need installation or advanced troubleshooting information, please contact technical support via email at support@digitallumens.com.
- In case of emergency, or if you need immediate assistance, please contact Digital Lumens technical support by phone at **+1 (617) 723-1200, extension 3**.
- If you are a partner, to open a support ticket, go to support.digitallumens.com.

How Do I Reset My Password?

1. On the LightRules login screen, click **Reset forgotten password**.
2. On the *Reset Password* screen, type your email address, and then click **Reset Password**.
3. Open the auto-generated email from LightRules and click the link.
4. Enter your new password in the top and bottom fields.
5. Click **Change Password**.

> **Note:** If you are using LightRules in console-only mode (no network connection), you will need to **contact support**[1] to reset your password.
> Prior to contacting support, please locate your service code/system ID and account registration email.

[1] support@digtiallumens.com or +1 (617) 723-1200, extension 3.

How Do I Upgrade LightRules?

This document describes how to upgrade LightRules Appliance (LRA) to the latest version (3.0), using the LightRules Appliance Software Upgrade USB Thumb Drive.

Depending on how long the system has been operational and how many lights are installed, the upgrade may take an hour or more to complete. While the upgrade is taking place, the lights will continue to operate using the last profile they received. However, changes to manual profiles will not be possible while the upgrade is occurring, and scheduled profiles will be deferred until the upgrade has completed. Plan the upgrade accordingly.

LRA Upgrade PDF

To upgrade your LightRules appliance, please **contact support**[1].

[1] support@digtiallumens.com or +1 (617) 723-1200, extension 3.

How Do I Register LightRules?

Registering LightRules with Digital Lumens Support provides several key advantages including secure map file backup and streamlined authorization for product returns:

- **Backup Site Information**: Digital Lumens will retain private and secure map file back-ups for customers, to restore lighting system settings in the event of data loss, ensuring that your building is not disrupted in the event of a crash.
- **Faster Fixture Replacements**: Digital Lumens has streamlined return merchandise authorization for customers and resellers who register their products. By registering your products, the Digital Lumens Support team will already have many of the necessary product details needed to diagnose issues more quickly. This results in a more efficient fixture replacement process and less downtime at your facility.
- **Improved Support**: Product Registration ensures that Digital Lumens has the most accurate support information needed to efficiently diagnose and solve any potential issues with the lighting system.

How to Register

During LightRules installation, the installer creates a map file using Commissioner Software. The map file contains all of the configurable settings the system needs to perform manual control, automated control, and reporting. To register your products, a Partner / Reseller must send a synced facility map with site configuration to Digital Lumens Support using one of the following methods:

For Customers with LightRules 2.12 and Over

1. Go to **Admin** > **General** > **Edit General Settings**.
2. In the Feature Control section, check **Enable Remote Map Backup**.

By enabling *Remote Map Backup*, LightRules now securely shares the map file with the Digital Lumens Support team allowing for streamlined product registration.

For Customers with Earlier Versions of LightRules — or do not have their LRA enterprise network connected

1. Download the map file from LightRules.
2. Email registration@digitallumens.com with the map file attached.

When Digital Lumens Support receives the map file, they will review and respond with an approval message. The site will also then be marked as eligible for auto-authorized RMAs.

What Support Plans are Available?

Continuous software enhancements from Digital Lumens help make your intelligent lighting system better over time. For a fraction of the initial LightRules investment, you will receive updates, new features, and access to Digital Lumens' support team, ensuring you can make the most of your system in the future.

Contact Digital Lumens Technical Support[1] to subscribe to the Software Maintenance and Support plan.

Features

Product Upgrades

Digital Lumens works diligently to make each version of LightRules more powerful than ever before. Powerful new features are released several times each year, and Software Maintenance & Support subscribers receive full access to the latest software as it is available, at no additional cost.

Remote Updates and Maintenance

LightRules customers connected to secure Digital Lumens servers can have software updates installed remotely by the Support Team, eliminating on-site visits and manual updates.

LightRules Mobile

Active subscribers to the Software Maintenance & Support plan gain access to LightRules Mobile, our dedicated mobile app that allows you to control your lights from any device connected to the facility network.

Unlimited Support

Subscribers are covered for an unlimited number of software-related support inquiries. Our support team is ready to assist you, available via phone or email.

[1] support@digtiallumens.com or +1 (617) 723-1200, extension 3.

How do I Schedule Night Lights?

Night lights never turn completely off — they dim when not in use, creating spatial reference points within large rooms where the other lights are off. Night lights are also useful for illuminating cross-aisles.

On the weekends when there is less building occupancy, turning down night lights can reduce energy consumption.

1. Create a new profile (for help, see "Profiles" (see page 57)).
2. Name the profile "Weekend Night Lights" or similar.
3. Using a known value that is acceptable, specify an inactive power level lower than the existing setting across some or all zones containing night lights.

   > **Note:** To identify a safe and acceptable inactive power level, test settings first by creating and running a manual profile.

4. Save the profile and open the calendar (for help, see "Calendar" (see page 12)).
5. Click and drag to create a block on the calendar, select the "Weekend Night Lights" profile you just created and then specify the following settings:
   - Start time: 12:00 am
   - End time: 12:00 am
   - Repeat option: Every Saturday and every Sunday.
6. (Optional) Enter an end date.
7. Save the block.

How do I fine-tune night lights to improve the facility's energy efficiency?

In some instances, you can reduce the amount of light produced by night lights to improve your facility's energy efficiency:

1. Create a manual profile that, for example, reduces the night lights' inactive power level from 30 to 20.
2. During facility downtime, activate the manual profile and evaluate the new settings, using a light meter.
   Make sure that new light levels are adequate to meet facility operations safety requirements.
3. Tune the manual profile until the inactive power level is desirable. Record the new rule settings.
4. Create and block a scheduled profile that automatically triggers new night light settings.

How Do I Schedule Lights to "All On?"

On a recurring basis, it may be necessary to set all lights to active power level 100 / inactive power level 100 (fully on, no dimming). For example, to accommodate weekly inspection on Friday mornings from 9 am to 11 am, you can schedule a recurring block:

1. Create a new profile (for help, see "Profiles" (see page 57)).
2. Name the profile "Inspection" or similar.
3. Specify active and inactive power levels of 100 across all zones in the facility.
4. Save the profile and open the calendar (for help, see "Calendar" (see page 12)).
5. Click and drag to create a block on the calendar, select the "Inspection" profile you just created, and then specify the following settings:
    - Start time: 9:00am
    - End time: 11:00am
    - Repeat option: Every Friday
    - (Optional) Enter an end date.
6. Save the block.

How do I temporarily turn lights "All On?"

For an unscheduled event, you can temporarily set all lights to active power level 100 and inactive power 100 (all lights fully on, without any dimming):

1. Clone the default profile.
2. Create a logical name like: "Entire Facility, all lights ON 100," or similar.
3. Across all zones, specify active and inactive power levels of 100, and then run the manual profile.
4. Cancel the manual profile when the event is over.

> **Tip:** Create and save an "all lights ON 100" manual profile for future use.

How Do I Schedule Maintenance in One Room?

Use the following steps to, for example, schedule a period of maintenance in one room for each weekday in the following week.

1. Clone the weekday full occupancy profile and rename it "Maintenance," or similar (for help, see "Profiles" (see page 57)).
2. For zones that are located in the desired room, adjust the light power levels to override the occupancy sensor: set both the active and inactive power levels to 100.
3. Save the profile and open the calendar (for help, see "Calendar" (see page 12)).
4. Click and drag to create a block on Monday of the following week, and then select the **Maintenance** profile you just created.
5. Select the **Repeating Weekdays** option and then check **Mon, Tue, Wed, Thu, and Fri**.
6. Save the block.

How Do I Find New Hardware?

When a new light, gateway, keypad, or power gateway has been installed, you can identify the new hardware via the discover diagnostic feature.

> **Note:** A new light from the factory will be assigned the default Network ID, "Factory Default Network." Prior to installation, the light must be configured with a new Network ID via "Commissioner Software" (see page 85).

Discover a New Light

1. Select **Config** > **Networks** from the menu.
2. Click on the Network ID you believe contains the light.
3. Click **Discover Lights**.
4. LightRules indicates a newly discovered light (return to step 2 if no lights are discovered).
5. Use "Commissioner Software" (see page 85) to update the map file.

Discover a New Gateway

1. Select **Config** > **Networks** from the menu.
2. Click **Discover Gateway** and then click **OK**.
3. LightRules lists the serial numbers of all found gateways. Compare the quantity of serial numbers and the serial number strings to the information displayed on the All Networks screen:
   - (A) If the quantity of serial numbers is the same, and the strings are the same, then no new gateways have been discovered. Verify proper hardware installation.
   - (B) If the quantity of serial numbers is the same, but the strings are different, then a gateway has been replaced with a new device.
   - (C) If the quantity of serial numbers is greater, then a gateway has been added.
4. For (B) and (C), the map file needs to be updated. Use "Commissioner Software" (see page 85) to update the map file.

Discover a New Keypad

1. Select **Config** > **Keypads** from the menu.
2. Click **Discover Keypads** and then click **OK**.
3. LightRules indicates a newly discovered keypad (return to step 2 if no keypads are discovered).
4. Use "Commissioner Software" (see page 85) to update the map file.

How Do I Clear an Alert?

In many instances, pinging a device will refresh its state and clear alerts. To ping a device:

1. From the *Diagnostics* screen (**Config** > **Diagnostics**), hover over an alert icon for a description of the alert state.
2. Click the icon to ping the affected network or device.
3. When the icon refreshes, if the alert state changes to a green check mark, then the network or device is functioning normally and no further action is required.

If the alert state does not change, then do the following:

- Verify that the device is powered (by observing the device's indicator LED).
- Use the Discover Feature (see "How Do I Find New Hardware?" (see page 96)) to determine if there has been a hardware change. If a new device is discovered by LightRules, you must update the map file using Commissioner software from Digital Lumens.
  - or -
- If the hardware has not changed, reboot the hardware associated with the alert.

If the alert still appears after you perform the above steps, **contact support**[1].

[1] support@digtiallumens.com or +1 (617) 723-1200, extension 3.

How Do I use Power Limiting?

Power limiting enables a facility to drop a portion of the wattage used by the lighting system. For example, during summer months when HVAC compressors are running at high levels, reducing the active power level of all lights (for example, from 100 to 90) is an effective way to temporarily limit total facility power consumption. This practice may be especially beneficial when a facility is facing peak demand surcharges or demand-response calls from electrical utilities.

Use the following method to perform power limiting:

1. Create and activate a manual profile for a portion of the facility that reduces the active power level, starting with a reduction of 10.
2. Using a light meter, evaluate the new illumination level. Ensure the new illumination level is adequate to meet facility operations safety requirements.
3. If the illumination level is adequate, try reducing the active power level by another 5 and then re-evaluate.

   Repeat the process until the maximum reduction is achieved.

   > **Tip:** Click the gang toggle next to multiple zones, and then use a single slider to make simultaneous changes across those zones (instead of changing them one-by-one).

4. Apply the final settings across all zones.
5. Activate the manual profile for a measurable period of time and then run LightRules reports s to compare the reduction in both energy use and cost.
6. Save the manual profile and energy metrics for future use.

How Can I Improve Active Power or Sensor Delay Energy Efficiency?

Every zone has an active power level setting and a sensor delay setting. You can improve your facility's energy efficiency by identifying areas with low occupancy and then adjusting the active power / sensor delay rules for those zones.

1. Run a Heatmap Occupancy report (see "Heatmap Reports " (see page 32)) to look for patterns showing low occupancy. For example, look for certain days of the week or hours of the day that have substantially lower occupancy levels.
2. Note any patterns of low occupancy.
3. Validate with facility operations that the patterns in fact correspond to lower occupancy.
4. If improving active power efficiency: create a manual profile that reduces the active power level setting from 100 to 90.
5. If improving sensor delay efficiency: create a manual profile that reduces the sensor delay from 1 minute down to 30 seconds.
6. If improving active power efficiency: during facility downtime, activate the manual profile and evaluate the illumination level using a light meter.
7. If improving sensor delay efficiency: during facility downtime, activate the manual profile and evaluate the sensor delay setting.
8. Tune the manual profile until the active power level / sensor delay setting is desirable. Record the new setting.
9. Create and schedule a profile for the time periods identified in steps 1-3, and then apply the setting recorded in step 8.

How is Access to the LightRules Appliance Controlled?

The LightRules Appliance (LRA) is a closed embedded Linux system, running on a compact industrial appliance in a “headless” mode. Digital Lumens also offers a 1U rack-mounted server-grade hardware option for larger installations. The LRA software architecture is built around a stable Gentoo Linux distribution, set up as a dedicated server. System updates are applied to this base system.

It is helpful to think of the LRA as two different computers because there are two different Network Interface Cards (NICs). One NIC controls communications on the lighting network and the other is designed to be connected to the enterprise network. As a web application, LightRules listens for web traffic on both the NICs.

Additionally, the LRA comes configured with an internal firewall enabled to continuously characterize network traffic and prevent unauthorized access. The firewall is configured to support inbound traffic only — internal gateways and switches cannot be compelled to solicit outside connections.

The only user access to the LRA is via the LightRules web application running on the LRA. Through a browser running on a computer connected to the enterprise network, the user can login to a password-protected LightRules account to access and modify lighting network settings.

How is LightRules Connectivity Integrated?

There are three levels of integration connectivity:

Standalone / Console Mode: No connection to any other network, and the lighting network is connected to the LRA. System access is limited to local, physical presence at server via monitor/keyboard/mouse. Very few customers choose to implement in this mode.

- Advantages: simplest implementation, physical security at server location.
- Disadvantages: Inability to export reporting data, inability to access system remote from server, no opportunity for remote access for additional features, updates, remote diagnostics, and support.

Locally Networked Mode: The LRA is assigned a static IP address and connected to the facility LAN. Users access the system through a password-protected web application via web browser on any device on the local network.

- Advantages: able to realize the full LightRules feature set including reporting, control, and diagnostics. Can access the system securely from anywhere on your local network.
- Disadvantages: no remote access for additional features, updates, remote diagnostics and support.

Remote Access: Users working with systems Locally Networked Mode can opt to allow Digital Lumens to securely access the system via SSH (Port 22) for remote diagnostics and support. This is the optimal system implementation.

- Advantages: takes full advantage of Digital Lumens remote support and software tools, access to remote updates.
- Disadvantages: typically requires approval from local or enterprise network manager.

How Are Security Updates Managed?

The LRA runs a Digital Lumens OEM version of Gentoo Linux. The LRA is shipped with the latest security patches tested and installed. The Light Rules Appliance functions as an embedded system — as such, patches and updates have to be handled with care and precision. Periodically, Digital Lumens will issue a software update to fix bugs, address performance issues, add new features, or resolve security issues. Security updates are generally packaged with LightRules updates to ensure complete compatibility and functionality of the control software.

There are two mechanisms for applying software updates. If Digital Lumens has remote access we can usually apply the update directly, after coordinating with the customer. The other software update mechanism is via DVD-ROM update disk or USB Update stick. The purchase of your Intelligent Lighting System includes one-year of free software upgrades and maintenance. Additional years of software upgrade and maintenance are available for purchase (see "What Support Plans are Available?" (see page 92))

Does IEEE 802.15.4 wireless interfere with WiFi communications?

The Digital Lumens Intelligent Lighting System is designed to communicate over a distinct “lighting network” using a completely different wireless protocol. IEEE 802.15.4 is a low-power, low-bandwidth communications protocol. In general, the IEEE 802.15.4 protocols minimize the time the radio is on, helping to reduce power use. In beaconing networks, nodes only need to be active while information is being transmitted. It is a self-healing, line of sight protocol — if a node in the network is removed, the message will take the next best route to the destination. IEEE 802.15.4 is designed to require minimal power (1mW) with a sight range of about 50 feet (15 meters) in ambient warehouse spaces.

The IEEE 802.15.4 protocol is specifically designed to limit interference with 802.11 traffic. Some IEEE 802.15.4 channels do overlap with WiFi (in 2.4 GHz band), but are so weak in comparison that they don’t interfere.

The nature of IEEE 802.15.4 communication limitations, combined with access controls surrounding the LRA, make it exceedingly difficult to either a) influence the fixtures themselves, or b) use the lighting network as a conduit to infiltrate the enterprise network. However, if there is concern about the intelligent lighting system and associated components meeting local security requirements, **please talk to us**[1] — there are many potential architecture implementations.

[1] support@digtiallumens.com or +1 (617) 723-1200, extension 3.

What Services are Open on the LightRules Appliance?

There are two Network Interface Cards (NICs) configured on the LRA. One NIC is configured to work with the lighting network, and the other is configured to connect to the enterprise network. The Dynamic Host Configuration Protocol (DHCP) is only configured on the NIC connecting to the lighting network. It is used to assign IP addresses to the gateways, and LightRules utilizes this addressing scheme to disseminate control signals throughout the lighting network. Always, a standard lighting network installation will be a separate subnet from the enterprise network to prevent any possibility that the gateways and switches are reachable via the enterprise network.

The other NIC is connected to your enterprise network and has secure shell (SSH) and HTTP open. Secure Shell is used for remote administration, and HTTP (inbound traffic only) is left open to allow people to use the LightRules web application from other points on the enterprise network—it allows you to take the power of LightRules beyond the telecommunications closet. Optionally, HTTPS (Port 443) can be enabled and HTTP (Port 80) disabled for secure access on the enterprise network.

The LRA comes labeled to show which NIC connects to the lighting network, and which one connects to the enterprise network.

What Security and Encryption Options are Available?

All communication on the Enterprise network can be encrypted by enabling TLS encryption and requiring it for all connections. Users have the option of using a self-signed certificate issued by Digital Lumens or issuing their own certificate. Use of the Digital Lumens self-signed certificate will result in a browser warning, so configuring a site-specific certificate is preferred. Proper configuration of TLS also requires configuring internally-hosted DNS servers to resolve certificate hostnames as well as configuring NTP server access.

Communication on the wireless IEEE 802.15.4 network can be encrypted using AES-128 during time of installation. When enabled, all IEEE 802.15.4 communications on all site networks is encrypted.

Can I Install Anti-Virus Software on the LightRules Appliance?

At this time, the LRA does not support installation or configuration of anti-virus systems or external intrusion detection agents. The LightRules Appliance is specifically built with a Linux variant due to its innate resiliency—an architecture deliberately designed to operate at different user and privilege levels — and the relatively low pervasiveness of malware affecting Linux systems. To further mitigate the risk of malware introduction or propagation through the lighting network, the internal firewall is configured to characterize and reject any anomalous network traffic, and system critical files are write protected.