

Design Studio 3.0

USER MANUAL



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Design Studio Overview

Features

Ketra’s Design Studio and companion software, Tech Tool, offer a multi-faceted interface for comprehensive control of an installation. With Design Studio, you can configure settings on lights and controllers, craft scenes and shows to assign to Ketra or Lutron keypads, and perform more technical functions like establishing an emergency-lighting protocol or integrating other companies’ lighting systems. Tech Tool offers even more advanced features.

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What’s New in 3.0?

Design Studio 3.0 is Ketra’s first release tailored to support integration with Lutron technology in residential applications. You can now choose between two installation types: **Ketra Only** and **Ketra with HomeWorks QS**. **Ketra Only** installations have access to Design Studio’s full range of functionality, whereas **Ketra with HomeWorks QS** installations use a simpler interface to integrate with a Lutron control system.

The table below summarizes the differences in available functionality between the two installation types. Note that the differences in workflow between the two installation types are described in [Commissioning Workflow](#), page 17.

	Ketra Only (Commercial)	Ketra with HomeWorks QS (Residential)
Configuring N4 Hubs on the network	✓	✓
Adding and configuring Ketra lights	✓	✓
Adding and configuring third-party lights	✓	✓
Dividing linear runs into separate groups	✓	✓
Using Design Studio’s color picker to customize light content	✓	✓
Setting default states for groups of Ketra lights	✓	✓

Table continued on next page

	Ketra Only (Commercial)	Ketra with HomeWorks QS (Residential)
Building scenes and shows	✓	✓
Assigning scenes and shows to Ketra keypads	✓	
Integrating DMX outputs	✓	✓
Integrating sensors, DMX inputs, and third-party outputs	✓	
Performing firmware updates	✓	✓
Troubleshooting devices	✓	✓
Local autosaves (stored on computer)	✓	✓
Automatic backup to Ketra's cloud servers	✓	✓

In addition to the changes above, Design Studio 3.0 allows you to choose whether power-cycled Ketra lights return to their last-published default state or return to their state prior to power-cycling. Toggling this feature on and off is done by individual device in the **Device Settings** tab.

How to Use This Manual

This manual applies to:

- Design Studio 3.0 and firmware version 2.0 (For updating firmware, see [Updating Firmware](#), page 155)
- Installations that use Ketra N4 Hubs to communicate, not the N1 Network Dongle

This manual does not cover Lutron's HomeWorks QS software. For documentation on integrating Ketra with HomeWorks QS, we recommend Lutron's app note #696, [Integrating Ketra products into HomeWorks QS systems](#):

- [Web link](#) (Requires Internet access)
- [Appendix A](#), page 178

Navigation tips:

- We recommend using **Ctrl+F** (on Windows) or **Cmd+F** (on Mac) to search for terms or phrases.
- Any page references that appear in this document are clickable links to the referenced sections.

Key Concepts

You can easily understand many processes in Design Studio if you have a solid grasp of three fundamental concepts: groups, scenes, and triggers.

Groups are collections of devices intended to be controlled together. **Scenes** are combinations of color and intensity configurations for groups. **Triggers** are the events that switch between one scene and another (in some cases, one show and another). To use an analogy, a group is like a squad, a scene is like a command, and a trigger is the event that causes the command.

Groups

A **group** (sometimes known as a *control zone*) is a custom subset of an installation's devices (e.g., lights) that you intend to control as a unit. Any devices you intend to control together should be put into a group. For example, a residential installation will likely have a group called **Kitchen** and a group called **Living Room**.

Further, you can use nested groups or subgroups to represent zones within rooms, or rooms within suites. Commands issued to a nested group will only affect that group. Commands issued to a parent group, however, will affect that group as well as any nested groups it contains.

Figs. 1 and 2 provide two examples of groups and nested groups.

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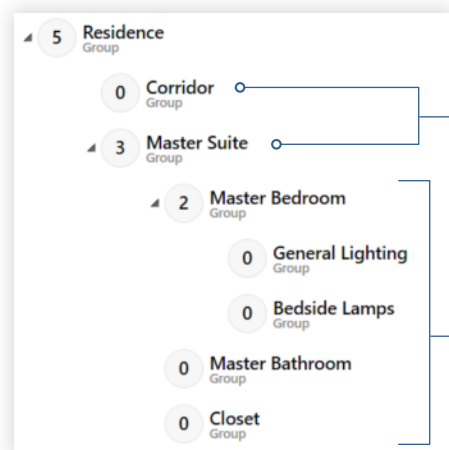


fig. 1

Same level of hierarchy; Controls from one can't affect the other

A Master Suite keypad could control all of these, but a Closet keypad could only control Closet

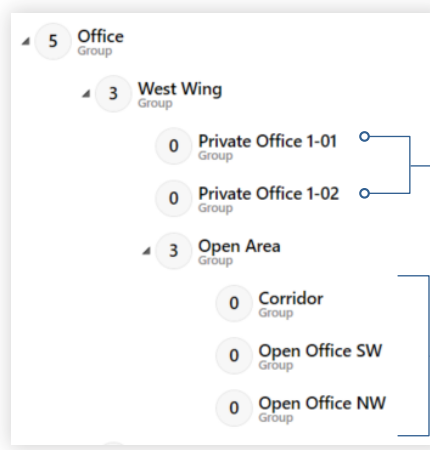


fig. 2

Same level of hierarchy; Controls from one can't affect the other

Could be controlled by different occupancy sensors

DESIGN STUDIO 3.0

GETTING STARTED

To control a single light or output, put it in its own group.



fig. 3

Groups can contain a variety of devices, depending on the type of installation.

- In a **Ketra with HomeWorks QS** installation, groups can contain either Ketra lights or nested groups, but not both. In other words, only leaf nodes (likely representing zones and small rooms) can have Ketra lights.

Note: A Ketra N3 Satellite with attached linear fixtures counts as a light.

- In a **Ketra Only** installation, groups can contain any combination of the following:
 - Ketra lights
 - Ketra keypads (and virtual keypads)
 - Third-party lighting (connected to an N3 Satellite or X2 Dimmer)
 - Other third-party outputs (connected to an N3 Satellite)

Keypads in Groups

In **Ketra Only** installations, groups can contain Ketra keypads in addition to lights and outputs. When a keypad is in a group, it can control the devices within that group as well as any devices in the nested groups, i.e., it can control from its point in the hierarchy down. However, keypads cannot control groups from other parts of the hierarchy.

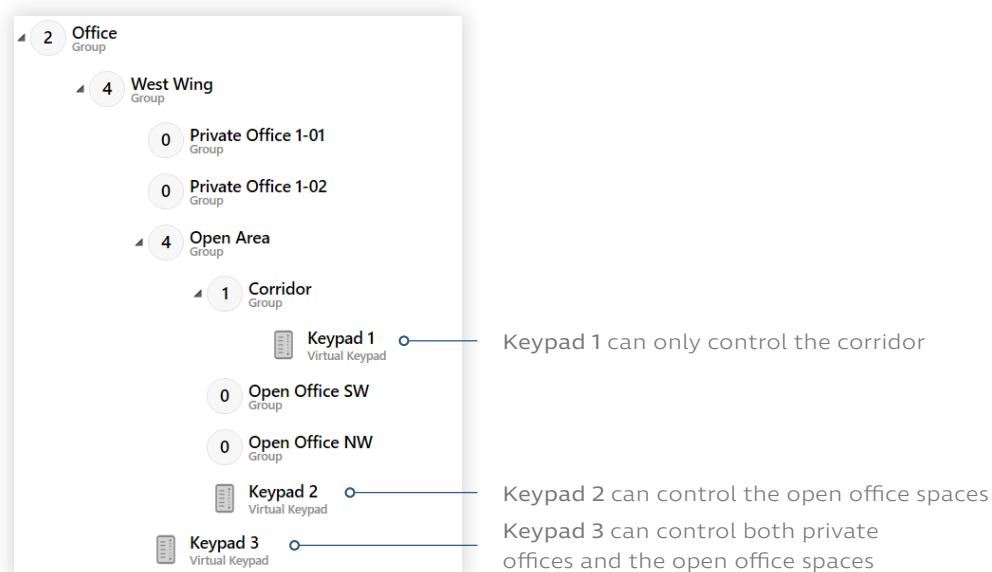


fig. 4

DESIGN STUDIO 3.0 GETTING STARTED

Grouping Hierarchy

In Design Studio's **Organization** tab, you will construct the installation's grouping hierarchy or grouping tree. Fig. 5 shows how two rooms might translate into a grouping hierarchy.

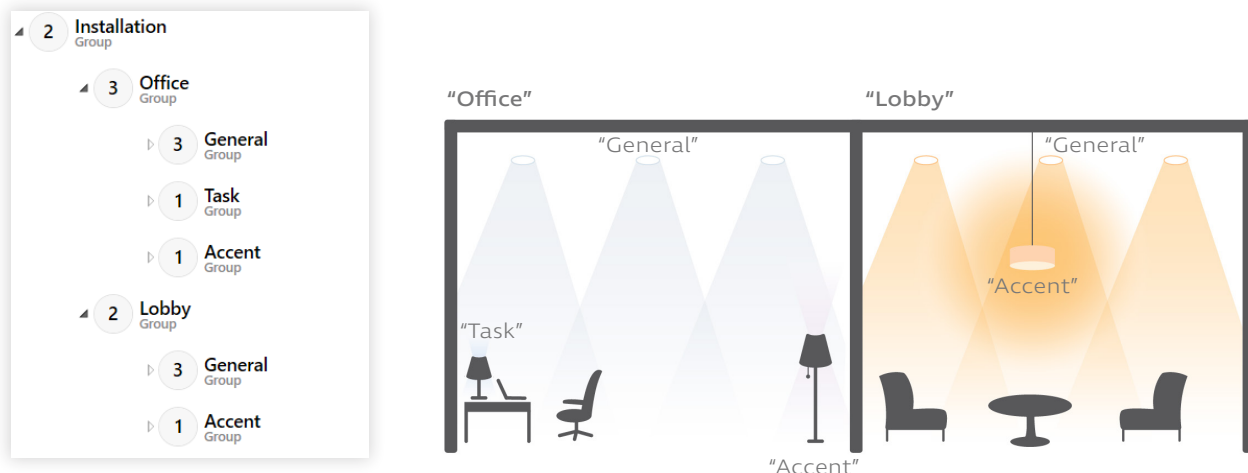
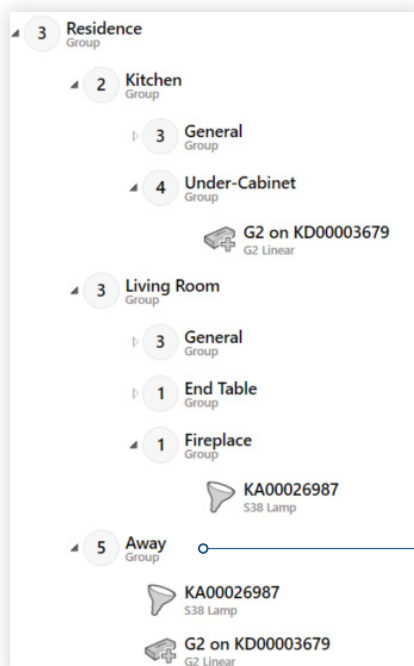


fig. 5

The grouping hierarchy is especially important in **Ketra Only** installations, because Ketra keypads can only control their own group and subgroups. Therefore the keypad's placement in the hierarchy determines which devices it can control.

One Device in Multiple Groups

Ketra lights and third-party outputs can belong to multiple groups. An example application is security or "away" lighting: an installation could have a **Kitchen** group and a **Living Room** group, as well as an **Away** group containing one or two lights from both. At night, the user could turn off both rooms' lights, then turn on the **Away** group for security.



Caution: A common mistake is to put a device into two groups and then include both groups in a scene. If the scene has different settings for each of those groups, the device will receive conflicting commands, causing it to behave unexpectedly.

The under-cabinet lighting and fireplace lighting can be controlled with their rooms, or they can be activated together in the "Away" group.

fig. 6

DESIGN STUDIO 3.0

GETTING STARTED

Scenes

A **scene** is a set of lighting configurations that applies to an installation's groups. These configurations may include color, intensity, and other parameters. For example, the *Daytime* scene, shown in fig. 7, sets all groups to 4500K at 100% intensity.

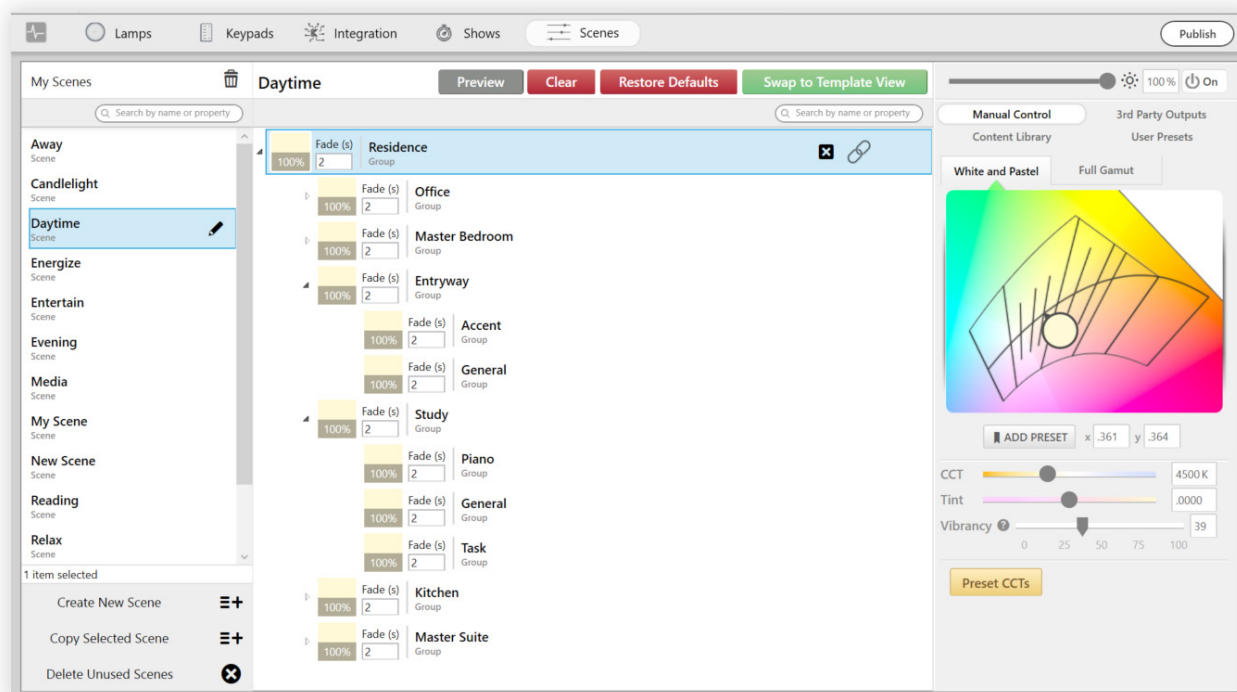


fig. 7

Note: As fig. 7 suggests, scenes always have content for every group in an installation. However, when you assign the scene to a trigger in the installation, you can specify which of those groups the scene applies to. This enables you to assign a single scene to multiple triggers affecting different sets of groups. For more information, see [Global Scenes, Local Applications](#), page 10.

Ketra curates a number of default scenes for any installation. When you add a keypad to your device list, some of these scenes get automatically assigned to the keypad based on the keypad's button names. You can always clear these scenes and custom-program any buttons you want.

Feel free to modify any of Ketra's default scenes, or create your own.

Scenes vs. Shows

Whereas scenes are static, shows are dynamic. When you play the *Daytime* scene, your lights will stay on the Daytime setting until some other change is triggered; by contrast, when you play the *Natural* show, your lights' color temperature will shift over the course of the day to match sunlight.

Shows are made up of any number of time triggers, each of which plays a scene. Thus the *Natural* show is actually a long series of scenes associated with times of day; in every scene scheduled to play before noon, the color temperature is slightly higher than before, while in every scene scheduled to play after noon, the color temperature is slightly lower than before.

Global Scenes, Local Applications

Note: This section applies to **Ketra Only** installations and does not cover managing Design Studio scenes in HomeWorks QS.

Scenes always have settings for every group in an installation. For example, in the *Daytime* scene shown in fig. 7, notice that every group has content (4500K, 100% intensity). However, when you assign a scene to a trigger, you have the opportunity to limit the number of groups that the scene affects.

The three bullets below describe how to limit groups for each kind of trigger. Triggers themselves are discussed in more detail in **Triggers**, page 12.

- **Ketra keypad buttons** - Ketra keypads can only control their own part of the grouping hierarchy, i.e., their own groups and subgroups. You can further narrow this by picking which subgroups to apply the scene to whenever a given button is pressed. In fig. 8, pressing the keypad's "Away" button will play the Away scene on the **Open Area** group and its subgroups. Note that the **West Wing** group is not the highest-level group in the installation; the keypad only has a subset of the larger grouping hierarchy.

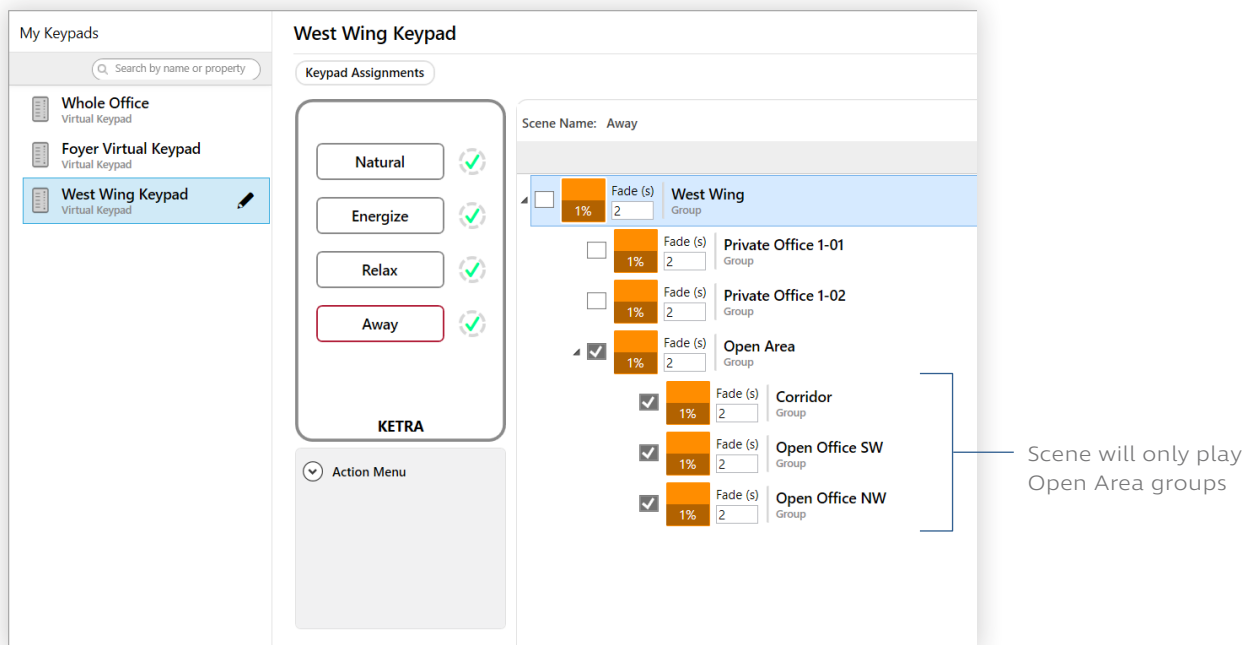


fig. 8

- **Contact-closure inputs** - Analog inputs that trigger scenes allow you to pick and choose any groups or subgroups in the installation to apply the scene to. In fig. 9 (next page), the N3 Satellite will play the Away scene on the **Open Area** group and its subgroups anytime the contact-closure input is put into a switched state.

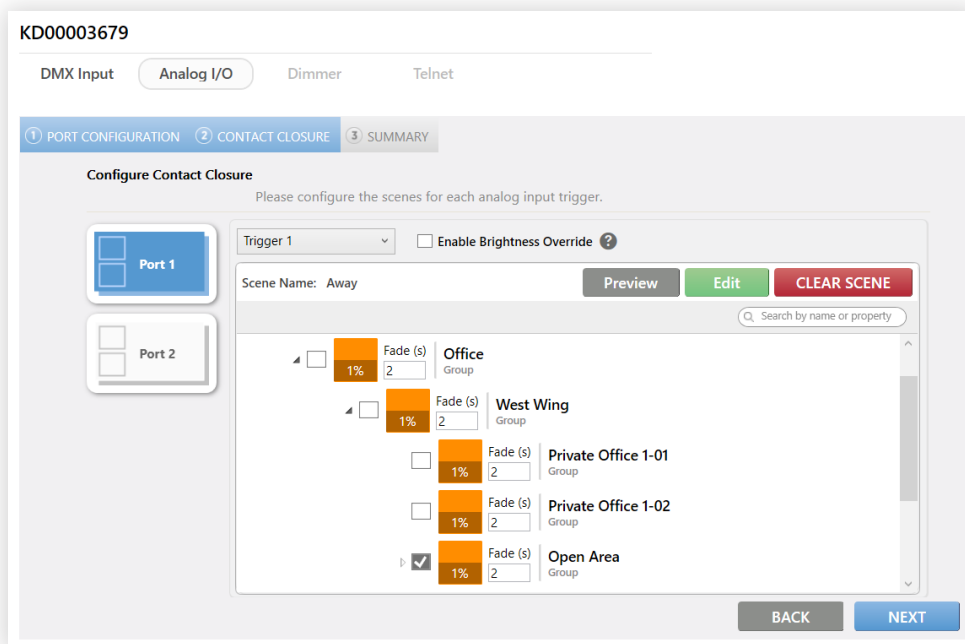
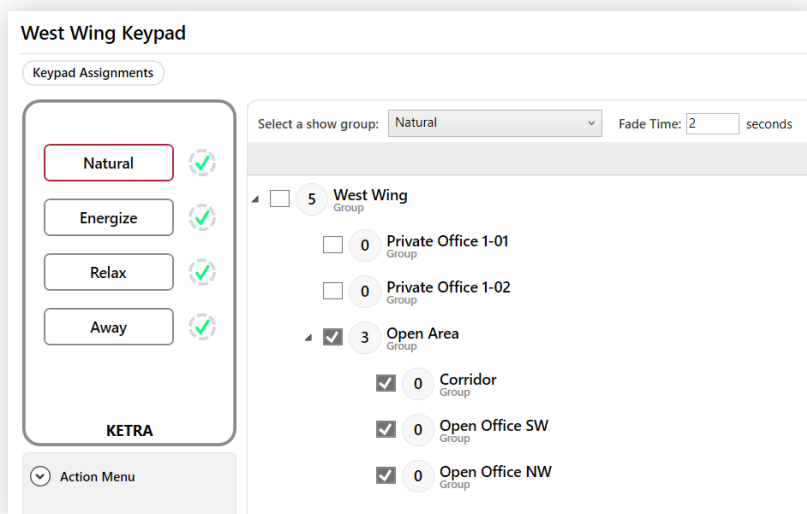


fig. 9

- **Time triggers in shows** - Timeclock events in shows control every group in the installation by default. Your method for excluding groups from shows varies depending on how the show is configured to run. (Both methods for excluding groups from shows are discussed in more detail in **Excluding Groups from Shows**, page 88.)
 - If the show is assigned to a keypad button or analog input trigger, you can use the checkboxes described in the previous two bullets to control which groups the entire show affects. In fig. 10, for example, the *Natural* show will only play on the **Open Area** group and its subgroups. Note that the **West Wing** group is not the highest-level group in the installation; the keypad only has a subset of the larger grouping hierarchy.

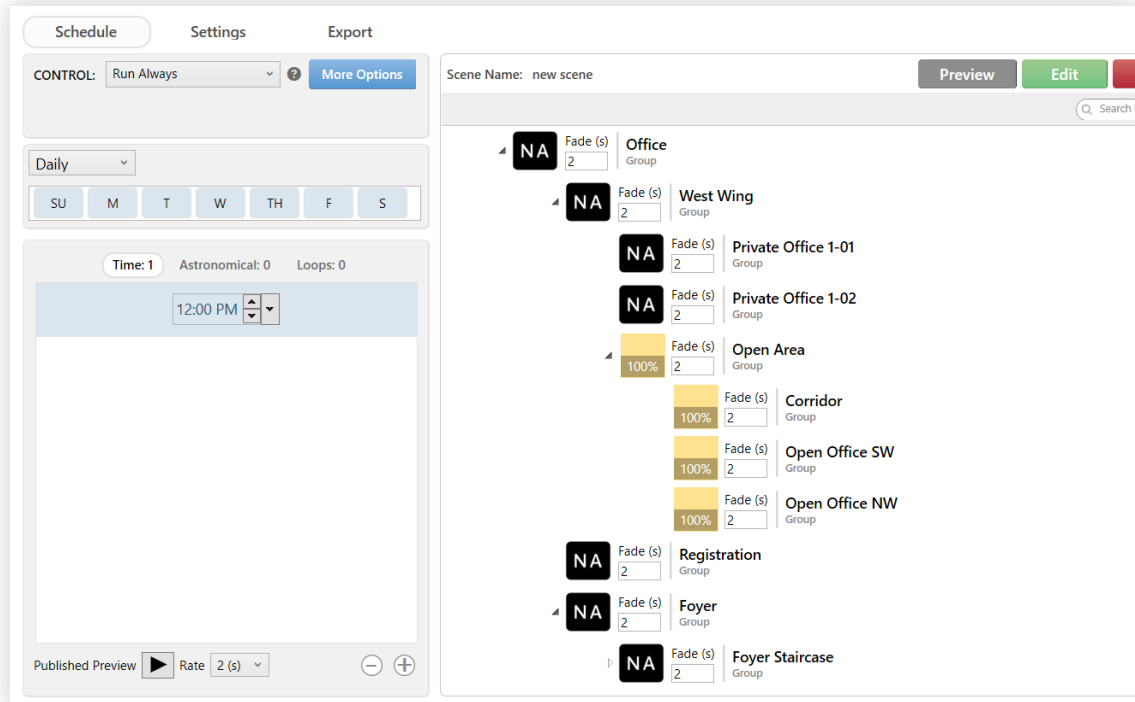


You can select and deselect groups when assigning a show to a keypad.

fig. 10

DESIGN STUDIO 3.0 GETTING STARTED

- If the show is set to run automatically, you should ensure that every scene shows **NA** for whichever groups you want to exclude from the show. In fig. 11, whenever the *Run Always* show is playing, the 12:00 PM trigger will only affect the **Open Area** group and its subgroups.



For Run Always shows, set groups you don't want to include to NA.

fig. 11

Triggers

A trigger is an event that causes a change in the state of your lighting. Generally, a trigger causes a scene or show to play. There are several kinds of triggers:

Keypad Button Press

When a user presses a keypad button, the keypad broadcasts a corresponding command to the Ketra devices it controls. Button presses can trigger scenes or shows to play.

For example, pressing the “Natural” button on a Ketra keypad causes the *Natural* show to play on whatever devices the keypad controls.

Note: Whenever a show is triggered from a keypad, it comes on at the correct setting for the current time.

Timeclock Event in a Show

A **show** is a series of *time triggers*, or events linked to times of day. For example, a time trigger might be set to take place at 4 PM, or at 2 hours before sunset, or every fourth minute in a loop. Each time trigger in a show causes a scene to play.

For example, a natural show may include triggers every 5 minutes, each shifting lights' color temperature and intensity to mimic shifts in sunlight over the course of the day.

Input Signal from a Sensor or Third-Party Device

Sustained contact-closure inputs and some 0-10V inputs can be thought of as causing trigger events, since they relay only one of two states.

For example, an occupancy sensor may trigger a scene when it detects occupancy, then trigger an off state when it detects vacancy.

| Installing the Software

The Design Studio software package (including Tech Tool) can be downloaded through your myLutron account at lutron.com. Design Studio is only available to users who have been through Ketra's technical training.

Qualified users who do not have myLutron accounts can get access to Design Studio and Tech Tool by contacting Ketra Support at ketrasupport@lutron.com.

System Requirements

Design Studio requires:

- A Windows 7 or later Windows operating system.
- At least 30 MB of free storage.

Note: Design Studio is not Mac-compatible.

Managing Accounts

Changing Account Information

Use **my.goketra** to change your account name, email, or password. Changing your Ketra account information will not affect your myLutron account.

- 1 In your web browser, navigate to <https://my.goketra.com/users/edit>.
- 2 Log in if prompted.
- 3 Use the same Ketra account information you use to log in to Design Studio.
- 4 Make the desired changes.
- 5 Enter your current password and click **Update**.

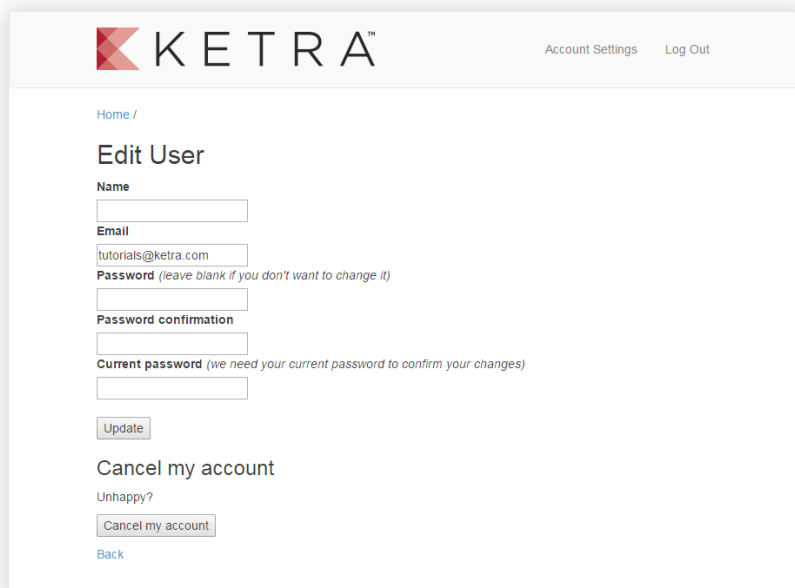
The screenshot shows the 'Edit User' page of the KETRA web application. At the top, there is a header with the KETRA logo on the left and 'Account Settings' and 'Log Out' links on the right. Below the header, a breadcrumb trail shows 'Home /'. The main heading is 'Edit User'. The form contains several input fields: 'Name', 'Email' (with the placeholder 'tutorials@ketra.com'), 'Password' (with a note '(leave blank if you don't want to change it)'), 'Password confirmation', and 'Current password' (with a note '(we need your current password to confirm your changes)'). There is an 'Update' button below the password fields. At the bottom of the form, there is a section titled 'Cancel my account' with the text 'Unhappy?' and a 'Cancel my account' button. A 'Back' link is located at the very bottom of the form.

fig. 12

Logging Out of Design Studio

Note: Logging out of Design Studio does not log you out of my.goketra in your web browser.

DESIGN STUDIO 3.0 GETTING STARTED

To log out of Design Studio, follow these steps:

- 1 In Design Studio, navigate to the Existing Installations list.

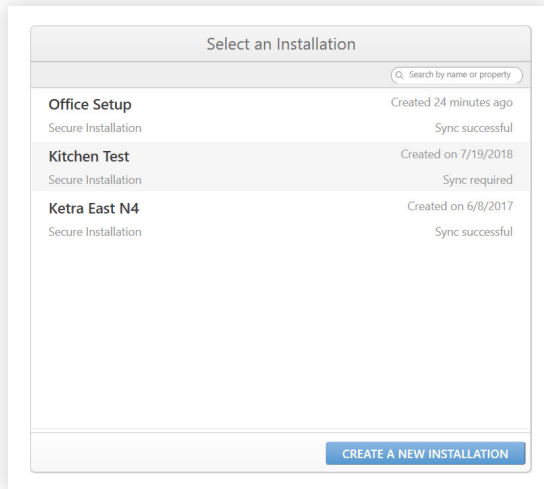


fig. 13

- 2 Open the sidebar by clicking the user icon in the top-left corner.

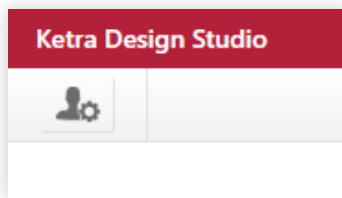


fig. 14

- 3 In the sidebar, click Log Out.

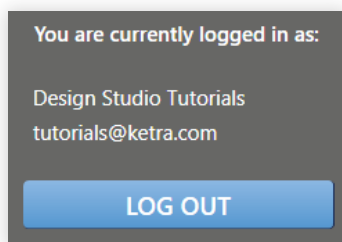


fig. 15

Commissioning Workflow

The Design Studio workflow varies significantly depending on whether the installation is **Ketra with HomeWorks QS** (Residential) or **Ketra Only** (Commercial).

Ketra with HomeWorks QS (Residential)

For a document that specifically covers integration between Ketra products and the HomeWorks QS system, we recommend referring to Lutron's app note #696, [Integrating Ketra products into HomeWorks QS systems](#):

- [Web link](#) (Requires Internet access)
- [Appendix A](#), page 178

The Design Studio workflow for **Ketra with HomeWorks QS** installations varies depending on whether you are programming on-site or off-site.

Note: We recommend saving progress regularly. If your computer has an Internet connection, the best way to save progress is to sync by closing out of the installation. If there is no Internet, the best way is to click **Publish and Save** in the top-right. For more information, see [Saving Your Progress](#), page 168.

If programming entirely on-site:

- 1 **Create an Installation** (page 21)
- 2 **Enable API Authentication on N4 Hubs** (only if commissioning without Internet access) (page 26)
- 3 **Build Groups** (page 31)
- 4 **Add Devices** (page 38)
- 5 **As needed:**
 - i **Divide Linear Runs into Groups** (page 47)
 - ii **Manage Power-On Lighting States** (page 59)
 - iii **Build Scenes** (page 68)
 - iv **Build Shows** (page 78)
 - v **Integrate Third-Party Lighting via DMX Output** (see [DMX Output](#), page 141)

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COMMISSIONING AN INSTALLATION

- 6 Publish Configurations (see [Publishing: Saving Configurations to Devices](#), page 152)
- 7 Return to HomeWorks QS, import the Design Studio installation, and continue commissioning

If programming partially off-site:

- 1 Create an Installation (page 21)

Note: If creating an installation off-site, skip the N4 provisioning steps.

- 2 Build Groups (page 31)
- 3 As needed:
 - i Build Scenes (page 68)
 - ii Build Shows (page 78)
- 4 Travel to site
- 5 Add N4 Hubs (see [Adding Additional Hubs](#), page 29)
- 6 Enable API Authentication on N4 Hubs (only if commissioning without Internet access) (page 26)
- 7 Add Devices (page 38)
- 8 As needed:
 - i Divide Linear Runs into Groups (page 47)
 - ii Manage Power-On Lighting States (page 59)
 - iii Integrate Third-Party Lighting via DMX Output (see [DMX Output](#), page 141)
- 9 Publish Configurations (see [Publishing: Saving Configurations to Devices](#), page 152)
- 10 Return to HomeWorks QS, import the Design Studio installation, and continue commissioning

Ketra Only (Commercial)

Ketra Only installations have an expanded range of features to support an entire installation's needs. A typical workflow is as follows:

- 1 Create an Installation (see [Creating an Installation](#), page 21)
- 2 Enable API Authentication on N4 Hubs (only if commissioning without Internet access) (page 26)
- 3 Configure Network Settings for N4 Hubs (As needed) (see [Managing N4 Hubs](#), pages 26–29)
- 4 Build Groups (page 31)
- 5 Add Devices (page 41)

- 6 As needed:
 - i Divide Linear Runs into Groups (page 47)
 - ii Manage Power-On Lighting States (page 59)
 - iii Build Scenes (page 68)
 - iv Build Shows (As needed) (page 78)
 - v Assign Scenes and Shows to Keypads (see **Programming Ketra Keypads**, page 103)
 - vi Configure Emergency Lighting (see **Enabling Emergency Mode Lighting**, page 118)
 - vii Configure Sensors and Other Inputs (see **Enabling Sensor Control**, page 113; **All Analog Integration Profiles**, page 131; and **DMX Input**, page 136)
 - viii Integrate Third-Party Lighting and Other Outputs (see **All Analog Integration Profiles**, page 131; and **DMX Output**, page 141)
- 7 Publish Configurations (page 152)

Pre-Commissioning Checklist

Installation Conditions

- ☐ All Ketra products are installed in their intended fixtures and power is applied.
- ☐ All Ketra products are energized and operating. Light is emitting from lamps and luminaires, keypads are backlit, and N3 and N4 indicator lights are on.
- ☐ Visual diagnostic colors have been cleared. (Ketra fixtures should power on to a default white state. If any power on to a different color, they were most likely installed incorrectly. A table of diagnostic colors and their meanings can be found in the respective products' installation guides.)

If you detect an error in the installation conditions, contact service@ketra.com immediately.

N3 Satellites

- ☐ Integration wiring (if applicable) matches Ketra submittal. Wires of the expected color are connected to the correct ports.

Documentation (If Applicable)

- ☐ N4, N3, and X2 product serial numbers have been noted on RCP and in the Satellite key provided in the submittal.
- ☐ Occupancy, vacancy, and daylight sensors marked on RCP, including physical location and intended control zones.
- ☐ Ketra-controlled third-party loads are marked on RCP indicating physical location.
- ☐ All documentation for wiring and implementation of non-Ketra loads is available for reference.
- ☐ Network credentials have been documented for any N4 installation.

Note: Internet connection is not required for the computer or the N4s. However, the computer must be able to connect to the N4s' LAN (Local Area Network), either by Wifi or by hardwire connection to the N4s' router. For instructions on troubleshooting your connection to N4 Hubs, see [Troubleshooting N4 Hubs](#), page 25.

Creating an Installation

Creating an installation is the first step in the commissioning process. It generates a file for your Ketra configurations to live in.

What account should I use to create the installation?

We recommend using a specific account, e.g., one with your name in it as opposed to a company account. This ensures that there is a clear record of who created the installation.

Setup

To create an installation and perform the necessary setup, follow these steps:

- 1 Click Create a New Installation on the Design Studio home screen.

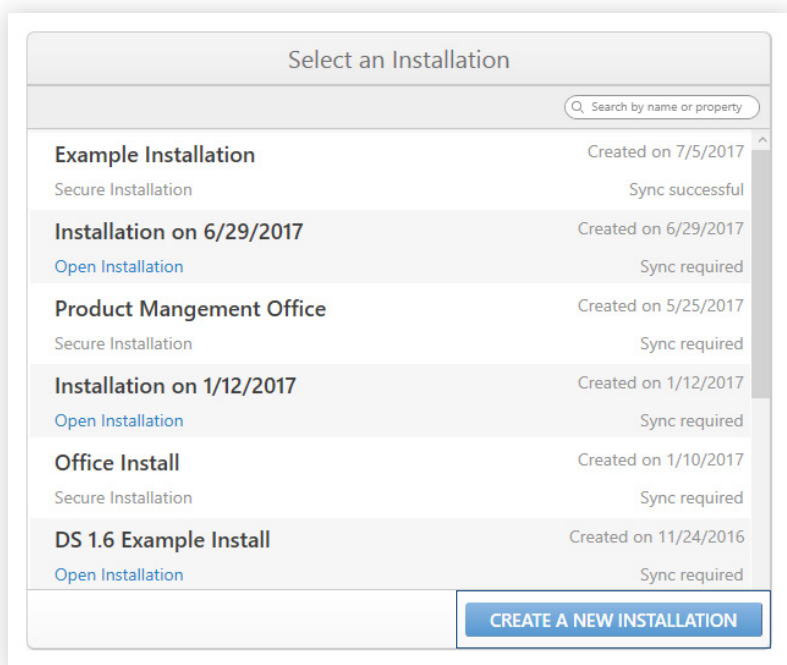


fig. 16

- 2 Name the installation.

Naming Convention

We recommend naming the installation after the project title on the Ketra submittal (if available), and/or the address of the project. This level of specificity will be helpful if technical support is needed later on.

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- 3 **Choose Secure Installation.** Open installations should be used only for temporary demonstrations of Ketra's lighting system.

In secure installations, devices are provisioned (added) to a private network unique to the installation, meaning no other installation will be able to access them unless you deprovision them first. Open installations, by contrast, leave devices on the public network, allowing use of the same products for multiple installations.

Open installations can be converted to secure installations once the installation setup is complete. See **Converting to a Secure Installation**, page 165.

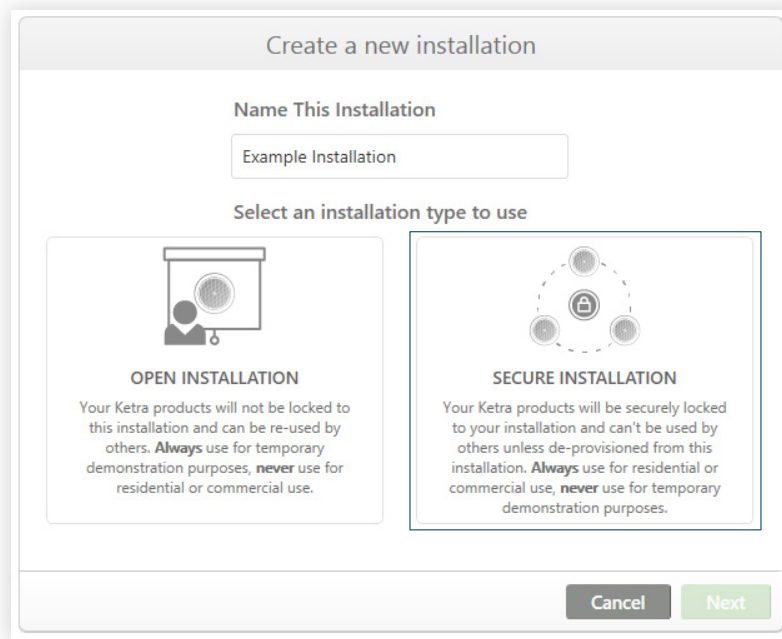


fig. 17

- 4 Click Next.
- 5 On the next screen, select N4 Hub(s).
- 6 Set whether you are building a Ketra Only or Ketra with HomeWorks QS installation (see fig. 18, next page). If you select a Ketra with HomeWorks QS installation, you will have a smaller number of available Design Studio features for the installation, since the Ketra software will only be used to set up groups, scenes, and shows prior to configuration in Lutron HomeWorks QS.

Note: Only Ketra with HomeWorks QS installations can be imported into the Homeworks QS software.

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Create a new installation

How will you connect your devices?

N4 Hub(s)
RECOMMENDED OPTION. Connect to your installation using your network.

N1 Network Dongle
Control your installation without a network connection.

With which type of system are you building?

☒ Ketra Only

☐ Ketra with Homeworks QS

Select one

Back Next

fig. 18

- 7 Click Next.
- 8 Set the installation location and pick an installation template. For a **Ketra Only** installation, we recommend using the *Office* template. For a **Ketra with HomeWorks QS** installation, we recommend using the *Residential* template.

Create a new installation

Installation Location

Design Studio needs the installation's location in order to create natural light shows that track your location's sunrise and sunset.

Austin, TX

Enter city in which this installation will be used. Press skip if city not found.
(This can be changed later)

Installation Template

Choose an installation template to get default content and group suggestions.

☐ Basic

☒ Office

☐ Residential

Skip Back Next

fig. 19

- 9 Click Next.

Provisioning N4 Hubs

Design Studio will now display a list of N4 Hubs available on the computer's LAN subnet. You can add the N4s in this list to your installation.

Note: If you are setting up an installation off-site and don't have access to the N4 Hubs, you can click **Continue** to skip this step.

If an N4 is missing from the list, click **Refresh**. If no N4s appear, see **Troubleshooting N4 Hubs**, page 25.

To add N4s to your installation, follow these steps:

- 1 **Highlight an N4 in the list.** Highlighting the N4 causes the hub to identify itself by flashing its indicator lights. We recommend that for the first few N4s you provision, you use the identify feature to confirm that the N4 has been installed in its expected place.
- 2 **Determine the KNet that the N4 should support.** Reference the KNet Diagram (if available) for the KNet locations and names. Note that each N4 supports one KNet.

Rename the N4 by clicking the pencil icon .

Naming Convention

We recommend renaming the N4 after the KNet it is supposed to support. For example, "1.01" might be a better name than "KP00002684."

- 3 **Change the N4's channel as necessary.** Adjacent KNets should be set at least 2 channels apart. This ensures that there will not be radio interference between them.
- 4 Repeat steps 1-4 for all of the other N4s you intend to add.
- 5 Highlight all of the N4s using **Shift+Click** and then click **Add Hubs to Installation**.
- 6 Click **Continue**.

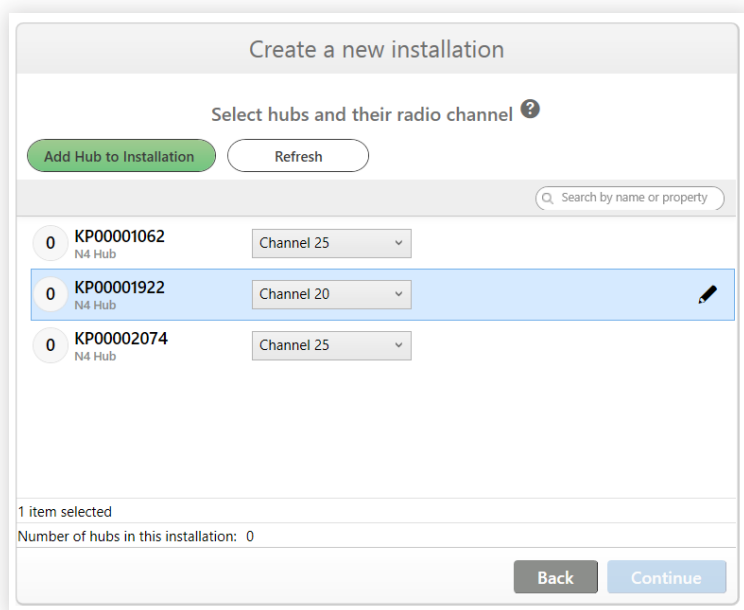


fig. 20

Troubleshooting N4 Hubs

If you are on-site and unable to discover any of the installation's N4s, there are several potential issues you may be encountering:

- The N4 Hubs might not have power
- The N4 Hubs might not be on a LAN
- The N4 Hubs might not be receiving DHCP addresses
- The N4 Hubs might be on a network with a firewall

Use this troubleshooting workflow to identify and fix N4 discovery problems:

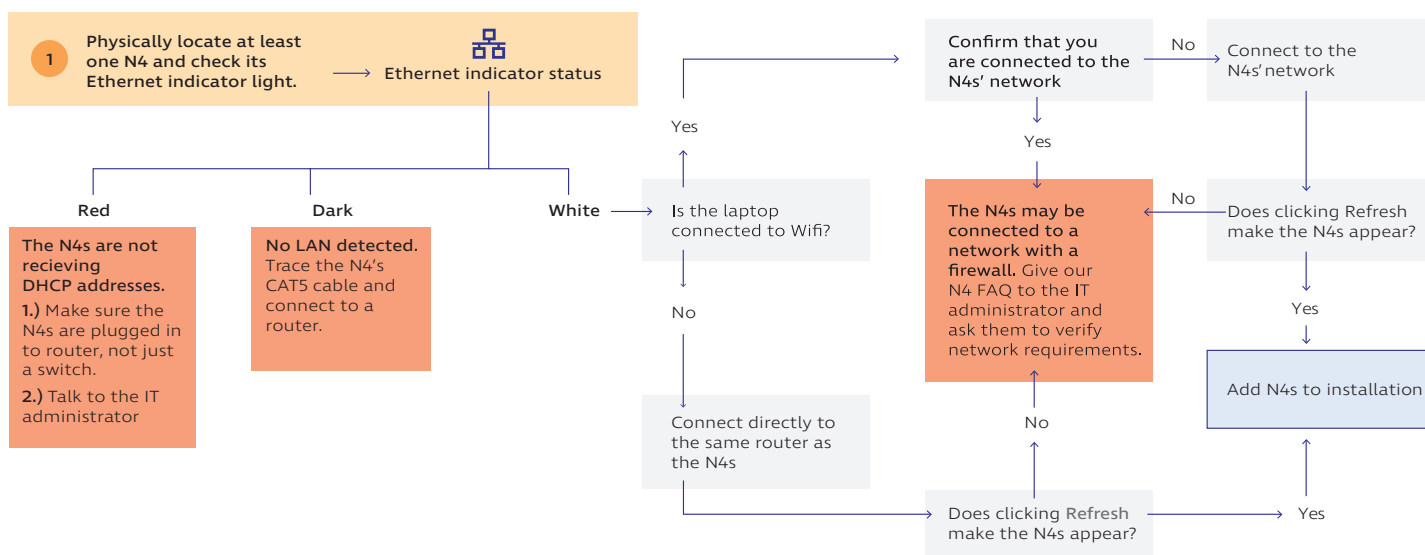


fig. 21

If you still cannot discover your N4s after performing those steps, contact Ketra Tech Support.

Next Steps

After creating the installation, you should be ready to commission.

What do I do next?

- 1 Check the **Toggling API Authentication** section of this manual, page 26, to see whether you need to enable authentication on your N4 Hubs. (Requires communication with hubs)
- 2 If the network's IT administrator has requested that the N4s be assigned static IP addresses or custom DNS addresses, see the relevant sections in pages 27-28. (Requires communication with hubs)
- 3 Start building groups. See **Building Groups**, page 31.

Managing N4 Hubs

Depending on the network requirements for the installation, you may want to perform some of these optional functions.

- **Toggling API Authentication:** Strongly recommended for any installation created without Internet access
- **Setting Static IP Addresses for Hubs:** Not necessary for most applications, but may be required by IT administrators in commercial spaces
- **Setting Custom DNS Addresses for Hubs:** Not necessary for most applications, but may be required by IT administrators in commercial spaces
- **Adding Additional Hubs:** Typically used if you realize you haven't added all of the hubs in the space
- **Changing a Hub's Channel:** Used to troubleshoot signal interference caused by two adjacent KNetS broadcasting at the same radio frequency

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Setting Custom DNS Addresses for Hubs	29
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Changing a Hub's Channel	30

Toggling API Authentication

The **Device Settings** tab allows you to toggle API authentication on and off for individual hubs. We recommend using the **Select All** checkbox to ensure that every hub gets the same setting.

Should I enable API authentication?

N4 Network	Enable/Disable
N4 network is connected to the Internet	Enable
N4 network is not currently connected to the Internet but will be in the future	<ul style="list-style-type: none">• Another person will use Design Studio or API before Internet is established: Disable• Internet connection will be established before anyone else uses Design Studio or API: Enable
N4 network will never be connected to the Internet	Disable

Disabling API authentication is not allowed when remote access is enabled.

Why does API authentication matter?

API authentication determines whether a Design Studio session or the API can connect to the installation.

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When API authentication is enabled, the N4 will authenticate any message's OAuth token against an onboard database of past tokens, and then against Ketra's cloud database of authorized tokens. However, if there is no Internet connection, the N4 will only be able to access its onboard database. That means it will only accept tokens it has encountered in the past. One consequence might be that the N4 refuses access to legitimate users who have different OAuth tokens or are working from a different Design Studio session. Therefore, authentication is recommended for N4 networks that have an Internet connection.

Conversely, when API authentication is disabled, the N4 will accept any message it receives via Ethernet without checking its access token. If the N4 network has an Internet connection, disabling authentication could allow any user on the Wifi network to send messages via the API. However, if the N4 network does not have an Internet connection, disabling authentication may be necessary to ensure that new OAuth tokens (from new Design Studio sessions or from other API users) are granted access to the installation.

How to toggle API authentication on and off:

- 1 In Design Studio, navigate to the **Device Settings** tab.
- 2 In the **Settings For** dropdown (top-left), select **"Hubs"**.
- 3 Use the **Select All** checkbox to highlight all N4 Hubs.
- 4 In the **Modify Hub Settings** pane, use the dropdown to set API Authentication to **"Enabled"** or **"Disabled"**.
- 5 Click **Apply To Selected**.

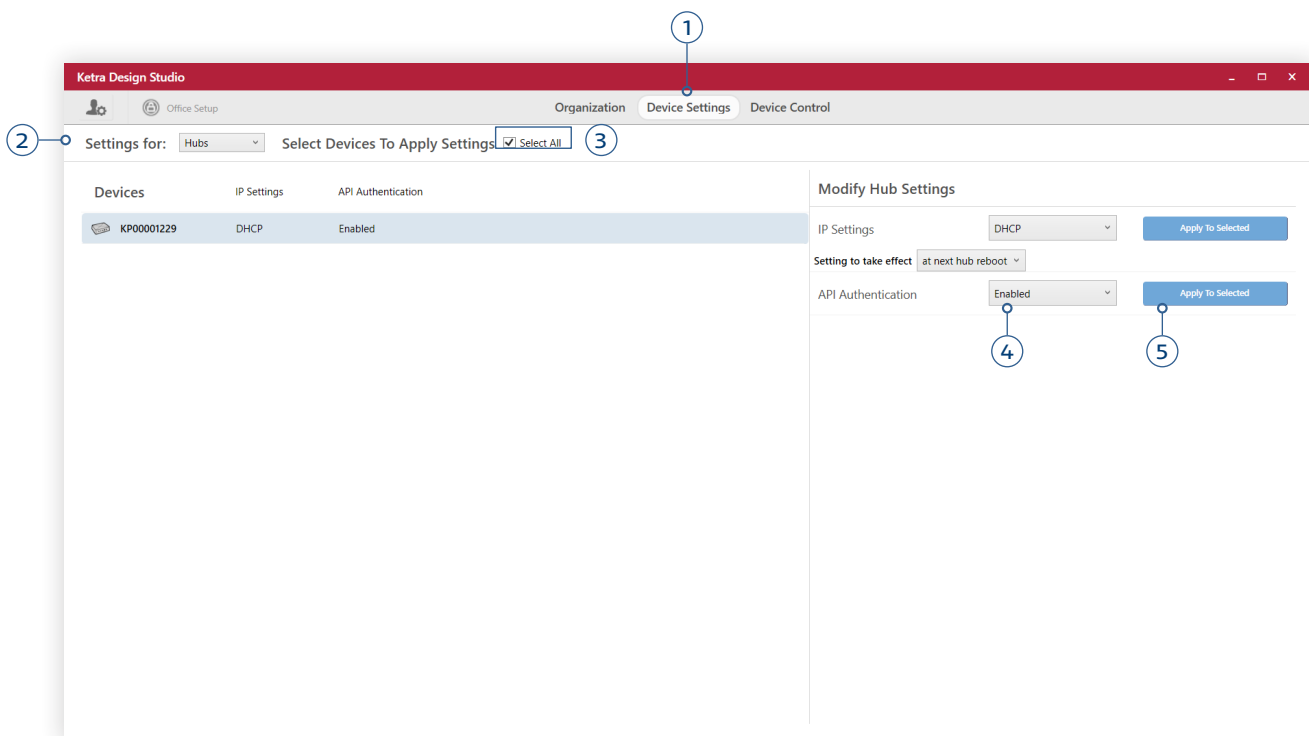


fig. 22

Setting Static IP Addresses for Hubs

Use the **Device Settings** tab to configure N4 Hubs' IP addressing per IT requirements. By default, N4s use DHCP addressing, but after receiving a dynamic IP address they can support static IPs.

Note: The best solution for static IP addressing is to reserve an IP address for each N4's MAC address on the DHCP server. Only when this is not an option should you set a static IP address for the N4 through Design Studio.

To set a static IP address for an N4 Hub, follow these steps:

- 1 Navigate to the **Device Settings** tab of Design Studio.
- 2 In the **Settings For** dropdown, select **"Hubs"**.
- 3 Select a hub from the list of devices on the left.
- 4 In the panel on the right, change the **IP Settings** dropdown to **"Static"**.
- 5 Fill in the **"IP Address"**, **"Subnet Mask"**, and **"Default Gateway"** fields. These values should be provided by the facility's IT administrator.
- 6 Determine when the change should take effect.
- 7 Click **Apply To Selected**.

Note: Each N4 Hub requires its own IP address.

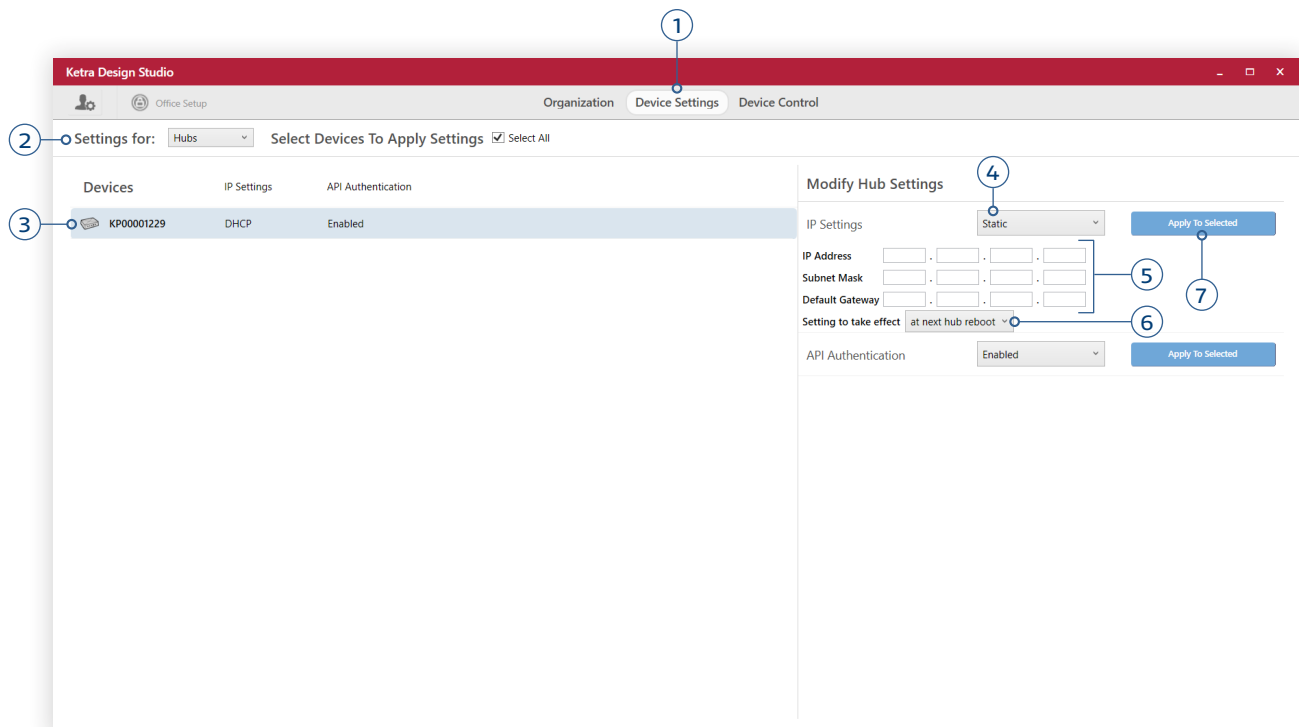


fig. 23

Setting Custom DNS Addresses for Hubs

Ketra Tech Tool enables you to set a primary and secondary DNS for individual N4 Hubs. This action should only be performed if specifically request by an IT administrator for the network.

To set custom DNS addresses, follow these steps:

- 1 Open the installation in Ketra Tech Tool.
- 2 Navigate to Tech Tool's Advanced Features tab.
- 3 Use the Select a Feature dropdown to select "N4 Settings".
- 4 Enter the primary and secondary DNS addresses in the text fields.

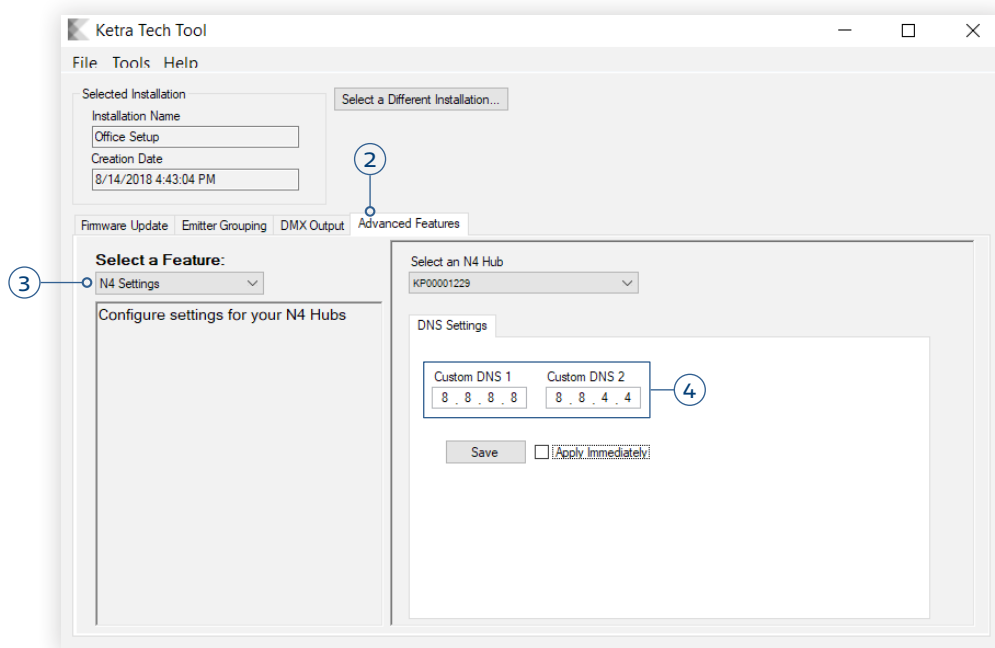


fig. 24

Adding Additional Hubs

On Design Studio's Organization tab, the top-right pane has a tab labeled Add Hubs. (See fig. 25.) This displays any N4s connected to your LAN (Local Area Network).

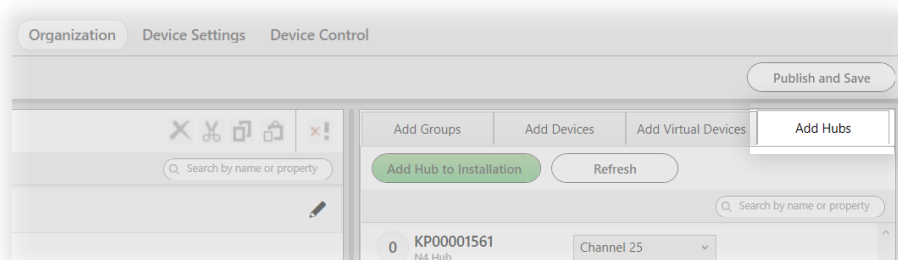


fig. 25

Notice that you can change a hub's channel before you add it. Only do this if you have multiple N4s that will be positioned close together in your installation. In that case, you will want adjacent N4s to be on different channels from one another to ensure ideal communication. If your N4s will not be close together, leave the hub on its default channel.

Changing a Hub's Channel

You can change the channels of hubs you've already added to your installation. Since adjacent KNetS on the same channel can cause mutual interference, changing a hub's channel may be the best way to ensure reliable communication.

Caution: Before changing a hub's channel, make sure that all of the KNet's devices respond to wireless control as expected (instructions below). If they fail to communicate for any reason, they will be left behind when the hub changes channels. The only way to reach them (after troubleshooting whatever error caused them to fail to communicate in the first place) will be to use [Find a Missing Device](#) in Tech Tool, which can search multiple channels. (See [Recovering an Unresponsive Device](#), page 174.)

To change an N4 Hub's channel, follow these steps:

- 1 Confirm that the KNet's devices respond to wireless control.
 - i Navigate to Design Studio's **Organization** tab.
 - ii In the My Devices list, expand the Hubs section.
 - iii Expand the N4 Hub for which you want to change the channel.
 - iv Using **Shift+Click**, highlight all of the hub's devices. This should cause all of them to identify.
 - v Confirm that all of the devices identify successfully. There should be a blue box next to the device name/serial that says "Identified." If any device fails to identify, troubleshoot the device. Do not change the hub's channel until you can successfully identify the device.
- 2 Open the installation sidebar. To do so, click the user icon in the top-left corner.
- 3 In the sidebar, select "Change Network Channel".
- 4 In the dialogue box, select the hub and a new channel, then click **CHANGE**. Pick a channel that is at least two channels away from any adjacent KNetS.

Building Groups

Building groups is a necessary step in all installations. We recommend building empty groups for the entire installation before you add any devices. This is much more efficient than adding devices first and then sorting them into groups, although you could technically do that too.

For an explanation of what groups are, see [Key Concepts](#), page 6.

Planning a Grouping Hierarchy

Before adding any groups, we recommend thinking about what your grouping hierarchy will be, possibly even laying it out on paper. After you create your hierarchy, you will not be able to drag and drop groups to relocate them, so knowing the structure before you build might prevent laborious rework later.

Planning your hierarchy should be done with consideration to the space and stakeholder preferences.

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Note: Groups can overlap KNetS.

Not every installation needs to use nested groups, but they can be helpful in many applications.

- **Use nested groups to represent zones within rooms.** This includes any group that you want to be discreetly controllable at any time. Examples:
 - General, task, and accent lighting in an office or study
 - Lights above a media station: Putting these into a nested group enables you to control them separately from the room's other lighting when a video or movie is playing, and to control them together with the room's other lighting when no video or movie is playing.
- **Use nested groups to represent rooms within suites.** These nested "room" groups might in turn have their own nested "zone" groups. **Example:**
 - A Master Suite group might contain subgroups "Master BR", "Master Bath", and "WIC". In turn, "Master BR" might contain several groups for zones, as in the previous example. Since these are all nested within "Master Suite", a "Master Suite" keypad could turn the entire suite off as needed. See fig. 26, next page.

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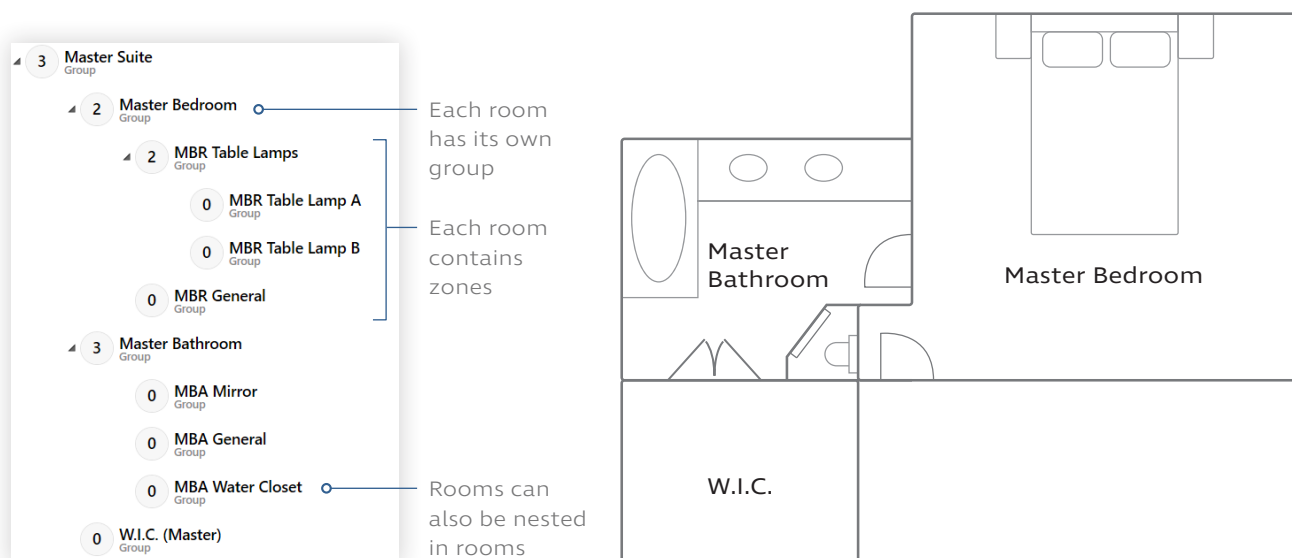


fig. 26

Adding Groups

To add new groups, use the top-right panel of the **Organization** tab. (See fig. 27.)

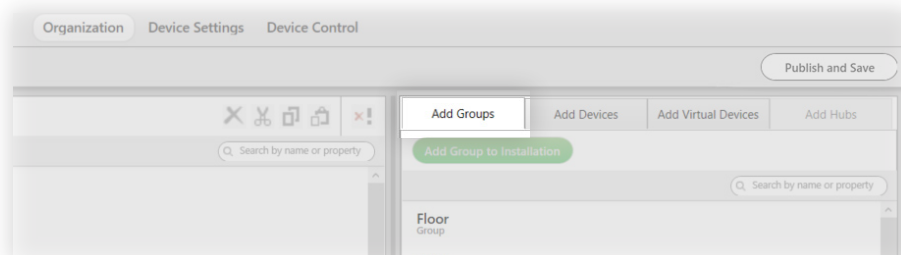


fig. 27

Group names are recommended based on the installation template. For example, the Residential template includes group recommendations like "Living Room," "Kitchen," or "Bedroom." In turn, most rooms contain "General," "Task", and "Accent" groups. You can also add a custom group by scrolling to the bottom of the list.

To add the group to its place in the hierarchy, follow these steps:

- 1 In the top-right pane of the **Organization** tab, select a group type to add. You can also scroll to the bottom of the list and select "Custom Group".

To select multiple groups at once, use **Ctrl+Click** or **Shift+Click**.

The group type you pick determines the **descriptors** (tags) that the group comes with. For example, the "Accent" group comes with the descriptor "accent." These descriptors determine what content the groups receive by default in each of the pre-curated Ketra scenes. However, both the descriptors and the Ketra scenes can be modified.

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- 2 Highlight the parent group in the My Devices panel. This could be the highest-level group in the installation or a group lower in the hierarchy.
- 3 Click the green Add Group to <Parent> button.

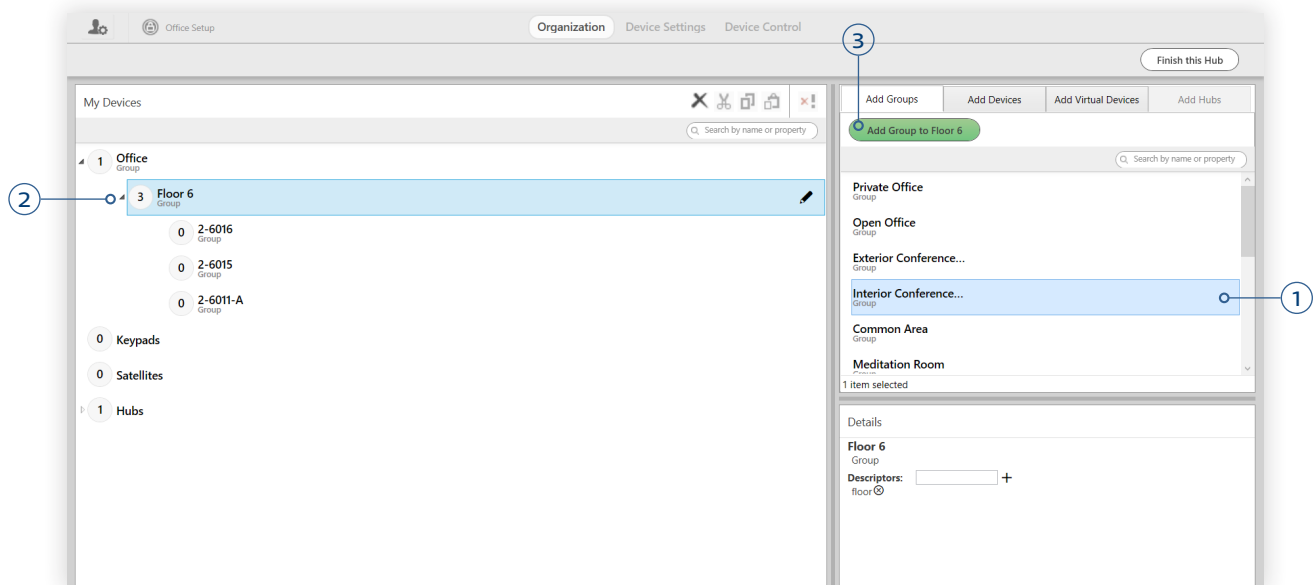


fig. 28

- 4 Rename the group by clicking the pencil icon next to its name.

Naming Convention

Each group should have a unique and specific name. For zone groups, we recommend including the name of the room—e.g., “Kitchen General” rather than “General (2).” In office spaces, we recommend naming room groups after the label in the KNet diagram, plus a descriptive blurb as needed—e.g., “2-6019 NW Office.”

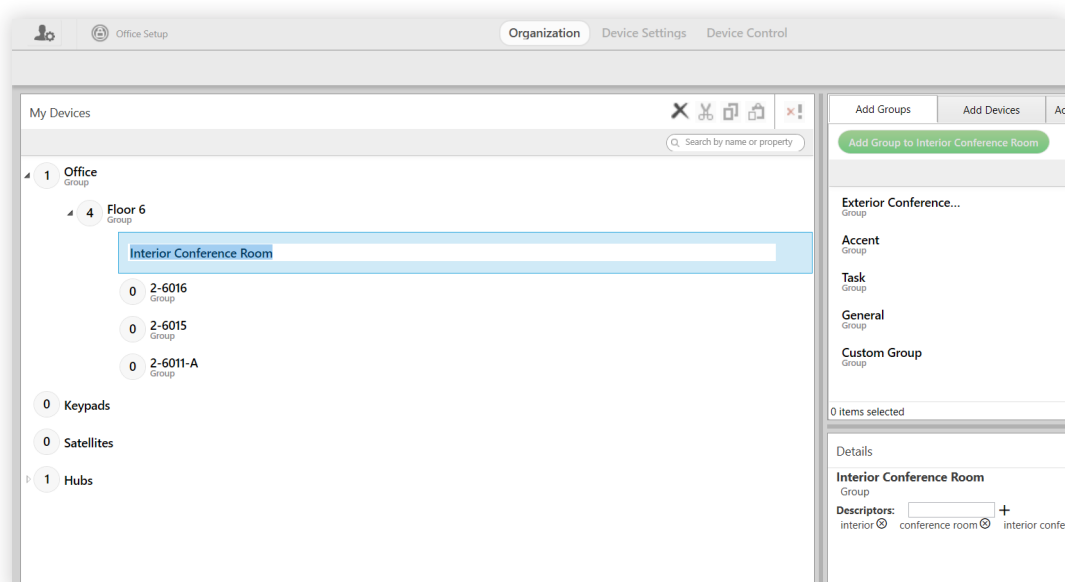


fig. 29

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Deleting Empty Groups

Groups can be deleted as long as they are empty. To empty out a group, either deprovision its devices or move them to other groups. Then, to delete the group, highlight it and click the X (Remove) button at the top of the My Devices panel.

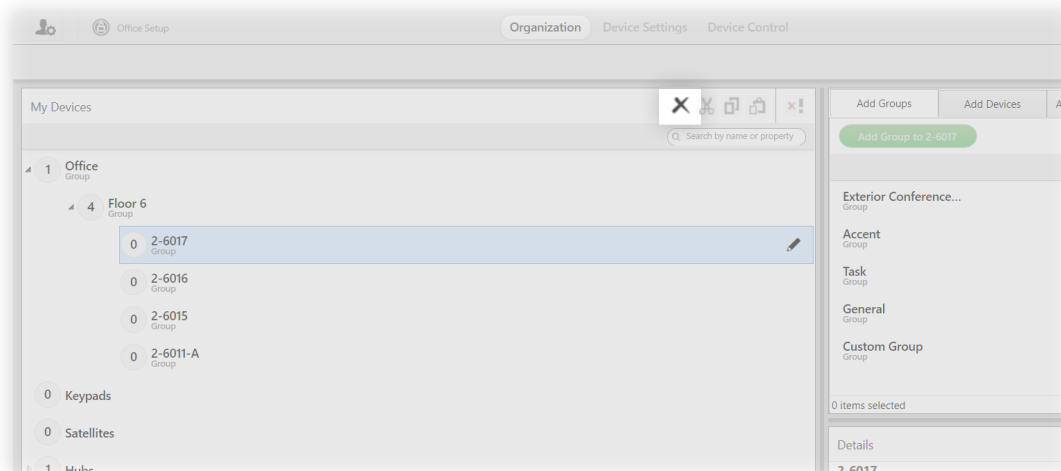


fig. 30

Managing Group Descriptors

Note: Groups come pre-loaded with descriptors. Changing group descriptors is optional, and unnecessary for most applications. If used incorrectly, custom descriptors can cause complications later during the programming workflow.

Descriptors are tags for groups. They can be added in the Details pane at bottom-right in the Organization tab.

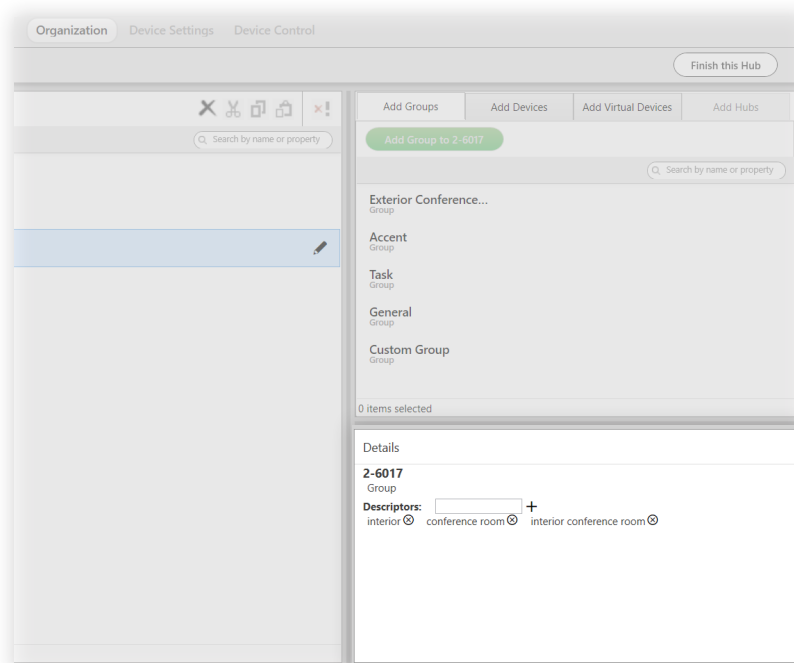


fig. 31

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When building scenes in template view (see [Template View](#), page 73), you will be able to apply content to any groups with a certain descriptor. Tagging groups with descriptors can therefore streamline your Design Studio workflow under some circumstances.

We recommend using descriptors for:

- Groups that are not siblings (i.e., belong to different parent groups in the hierarchy) but should have the same content in scenes
- Groups that are siblings but should be controlled differently from their other siblings

Example: An installation has 4 bedrooms, each with the same 3 zones: **overhead lights**, **standing lights**, and **bedside lights**. You want every bedroom keypad to have a scene where the overhead lights have one setting, the standing lights have another, and the bedside lights have a third.

A quick way to accomplish this would be to use 3 custom descriptors (e.g., "br overhead," "br standing," and "br bedside"), one for each type of zone. When you build the scene, you can save time by using Template View to assign content by descriptor rather than by group. Rather than having to make 12 settings (4 bedrooms x 3 zones), you can accomplish the same effect by making 3 settings (1 setting per descriptor).

Tips for Using Descriptors

Avoid deleting descriptors if you have already used them in a scene.

Descriptors can be removed from groups in the Details pane. However, deleting descriptors does not modify any scenes the descriptors are used in, and it will cause the group to NOT be included in the scene. For example, if a scene applies a setting to anything with the "residential" and "wood floors" tag, deleting the "wood floors" tag from a certain group will exclude that group from the scene.

Use as few descriptors as possible to get the job done.

Using superfluous or redundant descriptors can result in confusion, requiring you to delete descriptors from their groups for the sake of clarity. For the reasons discussed in the previous tip, this situation can cause complications and should be avoided.

For instructions on using descriptors in scenes, see [Template View](#), page 73.

Descriptor Inheritance

It is important to note that groups inherit the descriptors of their ancestor groups (i.e., groups higher in the hierarchy). These inherited descriptors do not appear in the Details pane (bottom-right) with the group's other descriptors.

For example, in fig. 32 (next page), the group "FL1 Bath General" has a descriptor called "general," which you can see in the Details pane. But it also has other descriptors:

- "bathroom," inherited from "FL1 Bath"
- "floor," inherited from "Floor 1"
- "residence" and "custom," inherited from "Residence"

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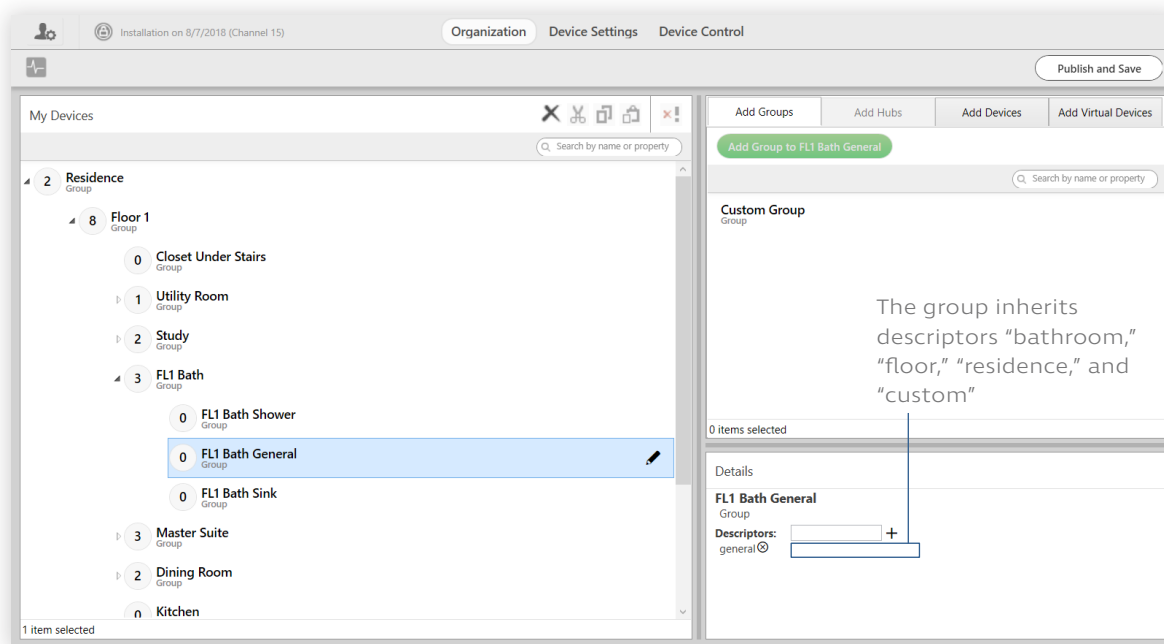


fig. 32

Overlooking descriptor inheritance can cause problems when building scenes in Template View. For example, you might assign content to any group with the descriptor "custom," only to find every subgroup of "Residence" playing that content.

The solution, in the case of the group "FL1 Bath General", would be to use Template View to assign the scene content to any groups with the descriptors "residence," "custom," "floor," "bathroom," and "general." This would only match "FL1 Bath General". If you wanted to target "FL1 Bath" and all its subgroups, you could assign the content to any groups with the descriptors "residence," "custom," "floor," and "bathroom." And so on.

Adding Descriptors

To add descriptors, follow these steps:

- 1 Select a group in the group hierarchy (in the My Devices panel).
- 2 In the Details pane (bottom-right), write a descriptor name in the textbox.
- 3 Click +.

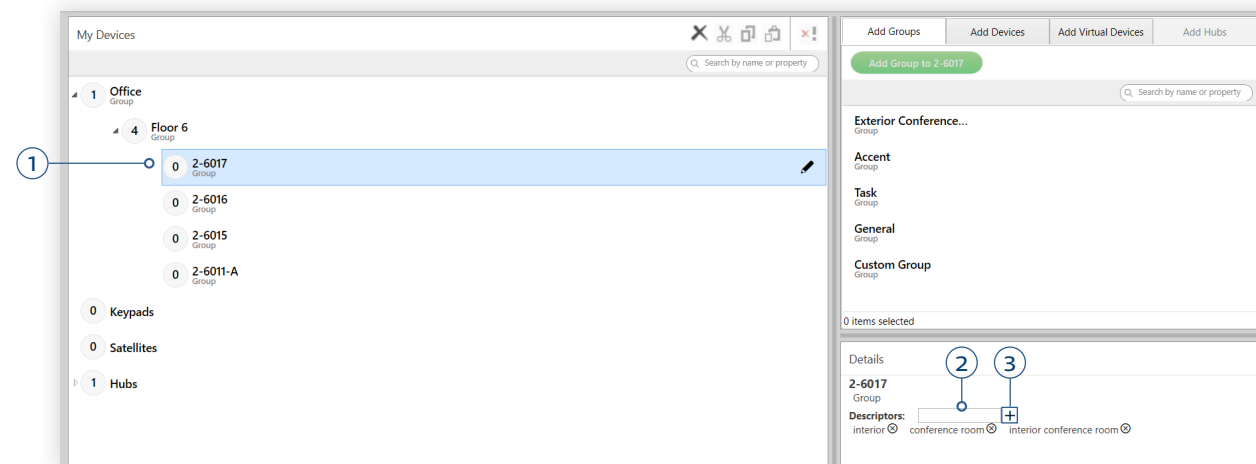


fig. 33

Note: Groups inherit the descriptors of their ancestor groups (i.e., groups higher in the hierarchy). These inherited descriptors do not appear in the Details pane.

Deleting Descriptors

You can delete a descriptor by clicking the X button next to its name in the same pane. For the reasons detailed in [Tips for Using Descriptors](#), page 35, we recommend against deleting descriptors.

Adding Devices

Adding devices is a necessary step in Design Studio and follows a simple workflow. For each KNet, you will first search for nearby devices on the public network, then provision (add) them to groups. In a **Ketra Only** installation, you can also add virtual keypads to use in the Ketra mobile app.

To search for and add devices to groups, use the top-right panel of the **Organization** tab.

Note: If you are using a **Ketra Only** installation, you can provision Ketra X2 Keypads or virtual keypads. When you provision these keypads, Design Studio automatically assigns content based on the button labels. For example, a button labeled "Media" would receive the default scene *Media*.

To change what scenes are assigned to each button label, we recommend setting default button content before you provision keypads. For example, if you want any button labeled "Media" to receive a custom scene called *My Scene*, you could set "media" as *My Scene*'s default button name, then provision your keypads. For instructions on setting default button names, see **Setting Default Button Names for Scenes**, page 44.

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Searching for Devices

The first step in adding devices to your installation is discovering them. This means searching for any powered-on devices (lights, keypads, and satellites) within a certain radius. Design Studio will display the search results, and you'll be able to select which devices you want to add.

To perform discovery, follow these steps:

- 1 On the **Add Devices** tab of the top-right pane, click **Find New Devices**.

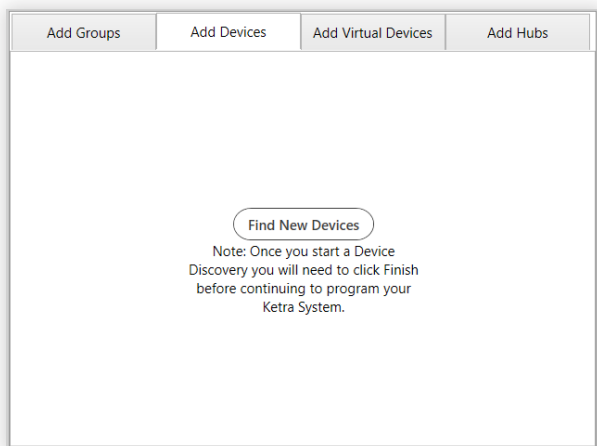


fig. 34

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Note: In an installation with only one N4, skip steps 2-4.

- 2 In the **Select Hub to Add Devices** box, designate an N4 with which to search. The N4 you select will search for any powered-on Ketra devices within a certain radius. You will then add devices to this N4's KNet.
- 3 Set the **discovery range**. This affects the number of devices that Design Studio tries to contact during the search. We recommend you pick a range according to these guidelines:
 - **Normal:** Use if your N4 is closely surrounded by more than 75 devices that have not been provisioned (added to a KNet).
 - **Extended:** Use if neither **Normal** nor **Maximum** returns the devices you expect.
 - **Maximum:** Use if there are fewer than 75 unprovisioned devices close to your N4.
- 4 Click **Find Devices** to begin the search.

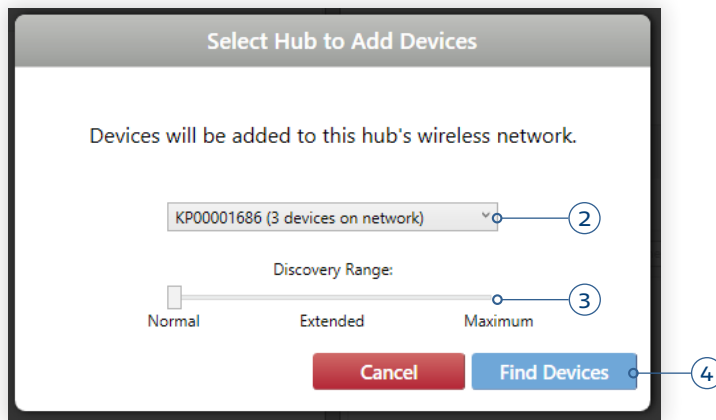


fig. 35

After you begin the search, the N4 will spend about thirty seconds searching. Any Ketra lights it finds will go to a dim blue. The results should look like this:

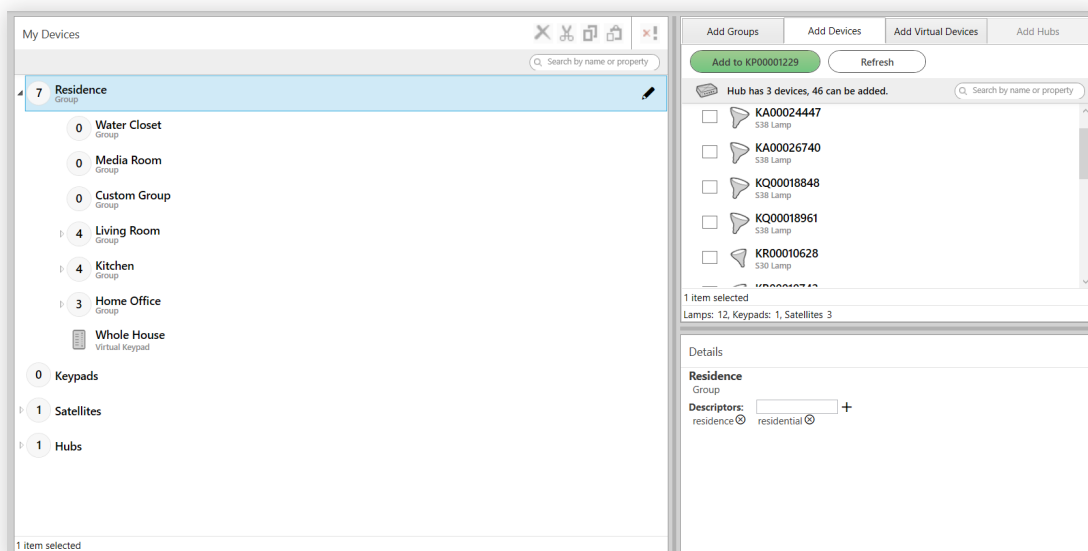


fig. 36

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An N3 with linear attached will look roughly the same as an N3 without linear attached. (See fig. 37.) Read the description beneath the serial number to tell them apart.

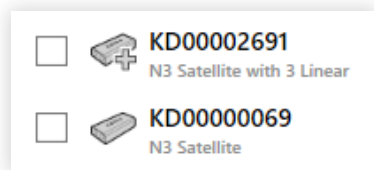


fig. 37

Note: In **Ketra with HomeWorks QS** installations, only Ketra lights (and N3 Satellites with Ketra linear fixtures attached) will appear in the search results. You cannot add Ketra keypads or independent N3 Satellites to a **Ketra with HomeWorks QS** installation.

What do I do about a missing device?

If a device is missing from the list, click Refresh to repeat discovery of available devices. If it still doesn't appear after several searches, confirm that the device is powered on and has not already been added to this installation or a different secure installation.

Why does my device say "Incompatible Device"? (See fig. 38.)

The device has been factory-programmed for Ketra Only installations, but you are operating a **Ketra with HomeWorks QS** installation (or vice versa). You may have received the wrong product type. We recommend contacting our support team to resolve the issue. **You can reach us Monday through Friday, 9 AM - 5 PM, CST. Call 1-844-588-6445, or email ketrasupport@lutron.com.**

Why does my device say "Requires Updated Firmware"? (See fig. 38.)

In **Ketra with HomeWorks QS** installations, a device may say "Requires Updated Firmware" next to its serial number. You will not be able to add that device until it has been updated. However, since updating firmware requires that the device be provisioned to some installation, you will have to create a temporary **Ketra Only** installation, add the device into it, update its firmware through Tech Tool, and then delete the installation. For instructions on updating device firmware, see [Updating Firmware](#), page 160. For instructions on deleting an installation, see [Deleting an Installation](#), page 166.

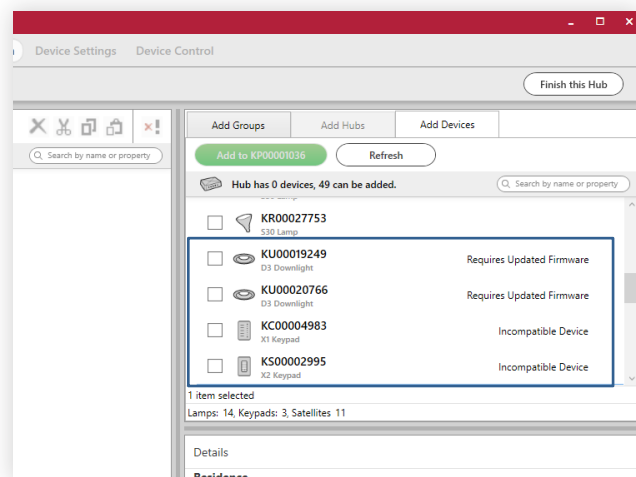


fig. 38

Adding Devices

To provision (add) one KNet's devices to groups, follow these steps:

- 1 Use your keyboard's **Up Arrow** and **Down Arrow** to go through the list of found devices. Each device will identify itself as you come to it—lights by shining a bright blue, keypads and satellites by flashing their indicator lights.

If you select an N3 Satellite with attached linear fixtures, confirm that the number of attached fixtures shown below the serial number matches the expected number.

- 2 Keypads and satellites: Rename the device(s) by clicking the pencil icon.

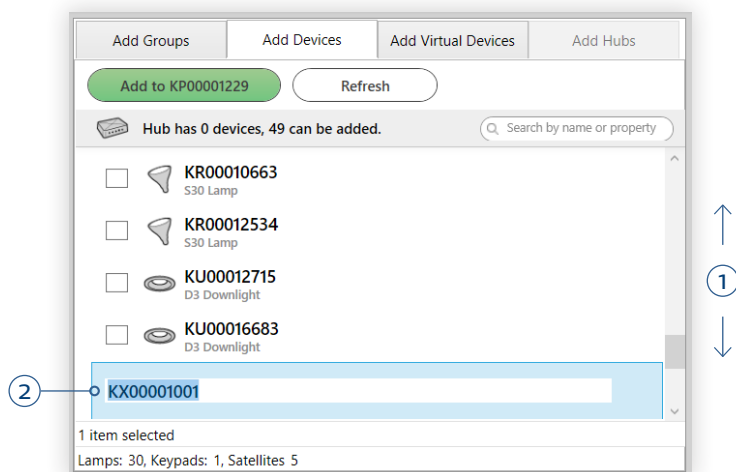


fig. 39

Naming Convention

We recommend renaming the keypad or satellite to whatever label appears on the Ketra submittal (if you have one). For example, an X2 keypad might be renamed from "KX00001001" to "6.02.06".

- 3 Press the **spacebar** to check the box of the device(s) you want to add. Lights will turn yellow when their boxes are checked.
- 4 Highlight the destination group(s) in the **My Devices** panel.

Note: If a run of linear fixtures should be subdivided into multiple groups, add the run to whichever group the first fixture belongs in. **Example:** If the N3 is located in a server room but the first Ketra fixture in the run is in Conference Room A, provision the run to the **Conference Room A** group, not the **Server Room** group.

After adding all of your devices, see **Dividing Linear Runs into Groups**, page 47.

- 5 Click the green **Add** button. The device will disappear from the right-side panel and reappear in the **My Devices** panel, on the left. Lights will temporarily shine green to show they've been added.

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Note: If a satellite does not have any attached linear fixtures, it does not go into a group; rather, it will appear in the Satellites list toward the bottom of the My Devices panel.

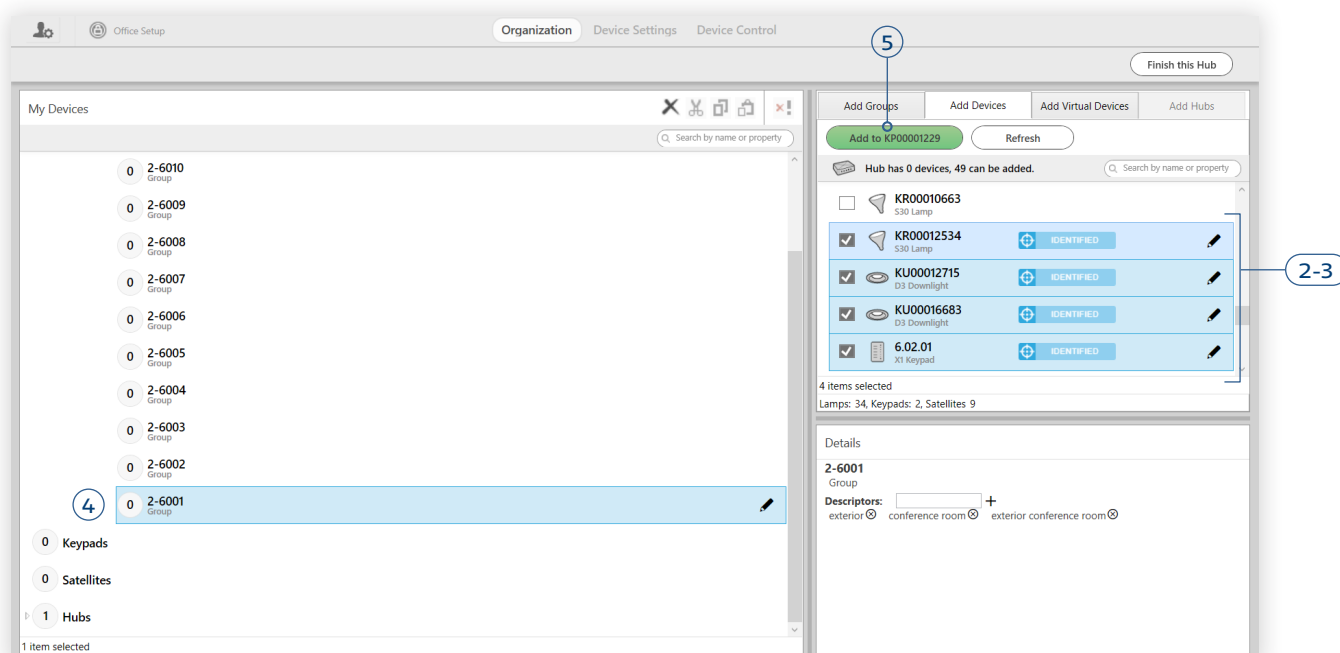


fig. 40

Note: If an error tells you your device is not compatible with the installation, it either requires a firmware update prior to adding or it is not suited for your installation type (**Ketra Only** or **Ketra with HomeWorks QS**). We recommend contacting our support team to resolve the issue. You can reach us Monday through Friday, 9 AM - 5 PM, CST. Call 1-844-588-6445, or email ketrasupport@lutron.com.

After adding all of a KNet's devices, finalize your additions by clicking **Finish this Hub** in the top-right corner.

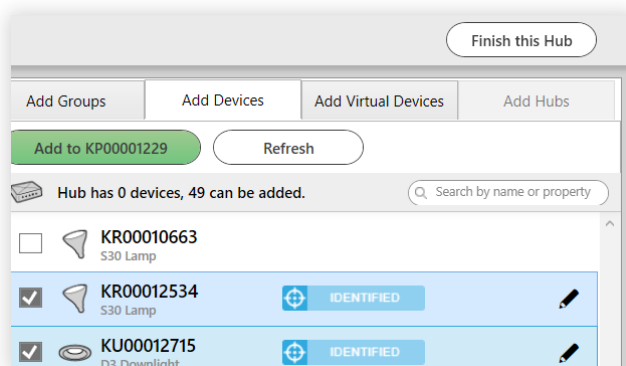


fig. 41

Adding Virtual Keypads

Note: Not available in Ketra with HomeWorks QS installations.

A virtual keypad is one that does not exist physically but that you can control through the Ketra mobile app or API. Like a hardware keypad, a virtual keypad can play scenes and shows and be linked to other keypads to control the same groups. Unlike a hardware keypad, it can have up to 19 buttons.

To add a virtual keypad to the installation, follow these steps:

- 1 Go to the **Add Virtual Devices** tab in the top-right pane of the **Organization** tab. (See fig. 42.)

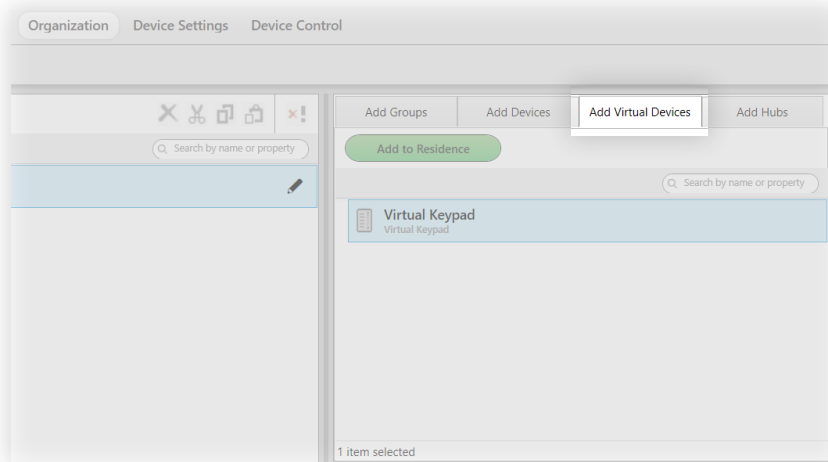


fig. 42

- 2 Highlight the destination group in **My Devices** and click the green **Add** button. (See fig. 43.)

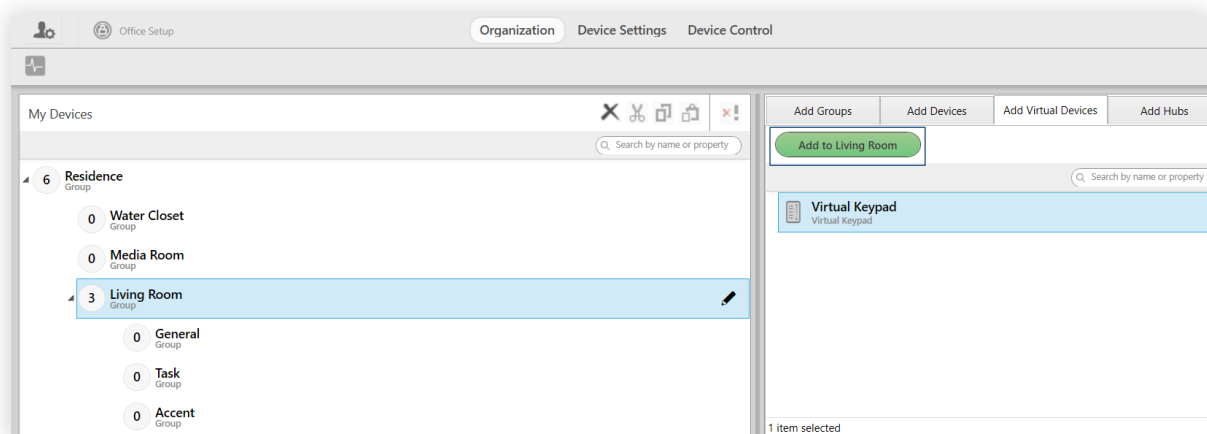


fig. 43

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- 3 In the dialogue box, set a template for the keypad. The template will determine the button names as well as the default scenes and shows that the buttons receive. You will be able to change the button names and content later, in **Device Control > Keypads**.
- 4 Set the number of buttons. Any buttons beyond the template's default quantity will not be assigned any content. You will be able to change the button quantities later on.

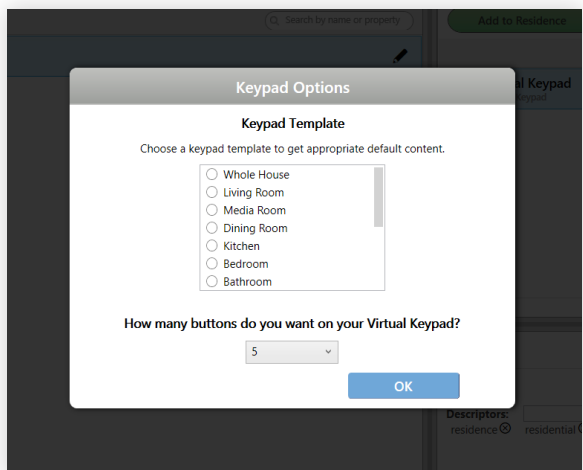


fig. 44

- 5 Click OK.
- 6 Rename the virtual keypad. Select the keypad in the My Devices panel, then click the pencil icon.

Virtual keypads are programmed in the same way as hardware keypads: using the **Keypads** tab of **Device Control**. For more details, see **Programming Ketra Keypads**, page 103.

You can remove virtual keypads from the installation by deprovisioning them.

Setting Default Keypad Button Content

When you provision a keypad, Design Studio reads its button names and then maps corresponding scene or show content to them. For example, a button labeled "Natural" will always get the pre-curated *Natural* show as soon as you provision the keypad.

By default, custom button labels do not get assigned any content. If you plan to add many keypads that use custom button labels, we recommend first associating those labels with scenes; this will ensure that the buttons do receive default content when you provision the keypads.

To associate default button names with scenes, follow these steps:

- 1 Navigate to **Device Control > Scenes**. You may need to click **Finish** or **Finish this Hub** in the top-right before you can leave the **Organization** tab.
- 2 Select the desired default scene from the **My Scenes** list at left. If you prefer to create a scene, you can find instructions on scene-building in **Building Scenes**, page 68.

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- Click the pencil icon next to the scene's name.

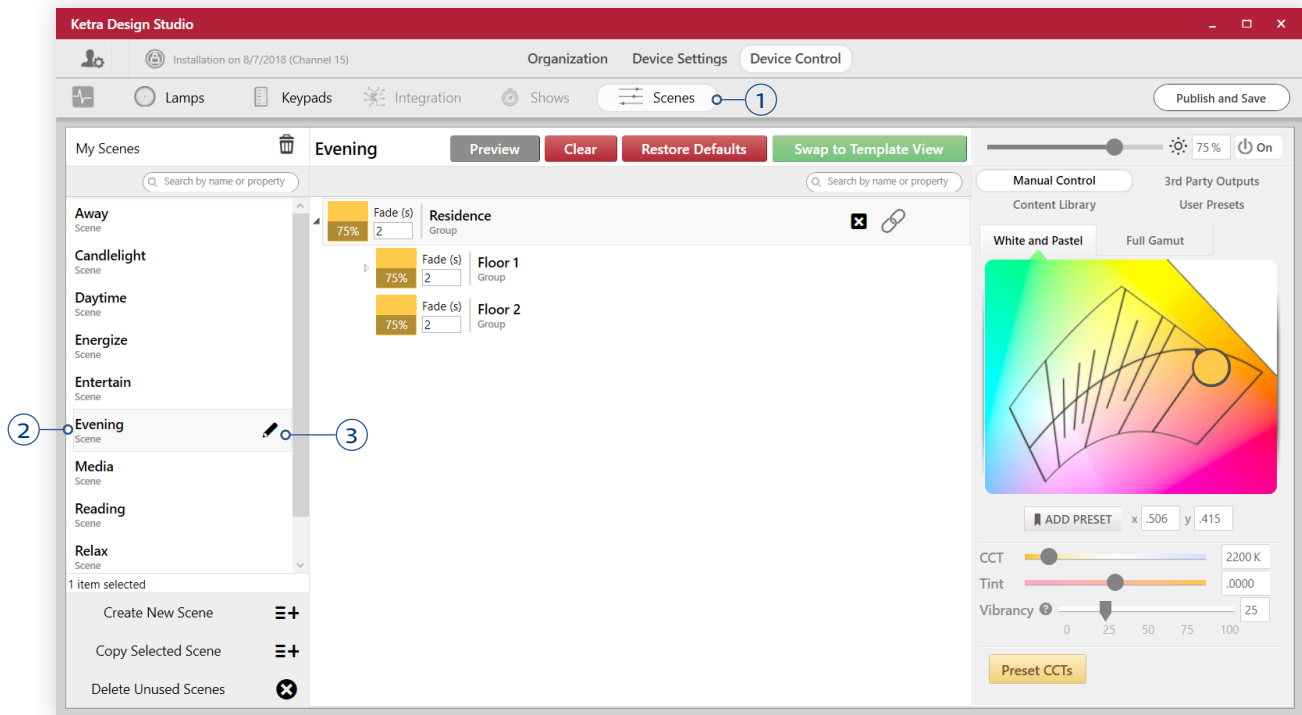


fig. 45

- Optional:** Rename the scene to match the custom button label.
- In the Default Button Names text field, enter the custom button label.
- Press +.
- Click OK.

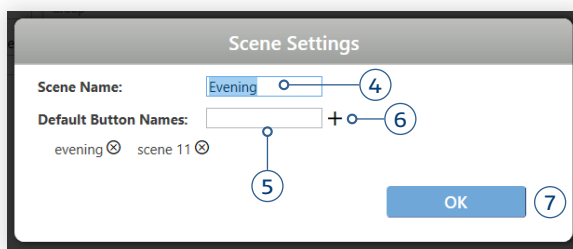


fig. 46

You can now return to the **Organization** tab and provision the keypads.

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Regrouping Devices

Design Studio supports **copy**, **cut**, and **paste** operations to move devices between groups. To use these features, click the icons at the top of the My Devices panel (fig. 47), or use any of the shortcuts below.

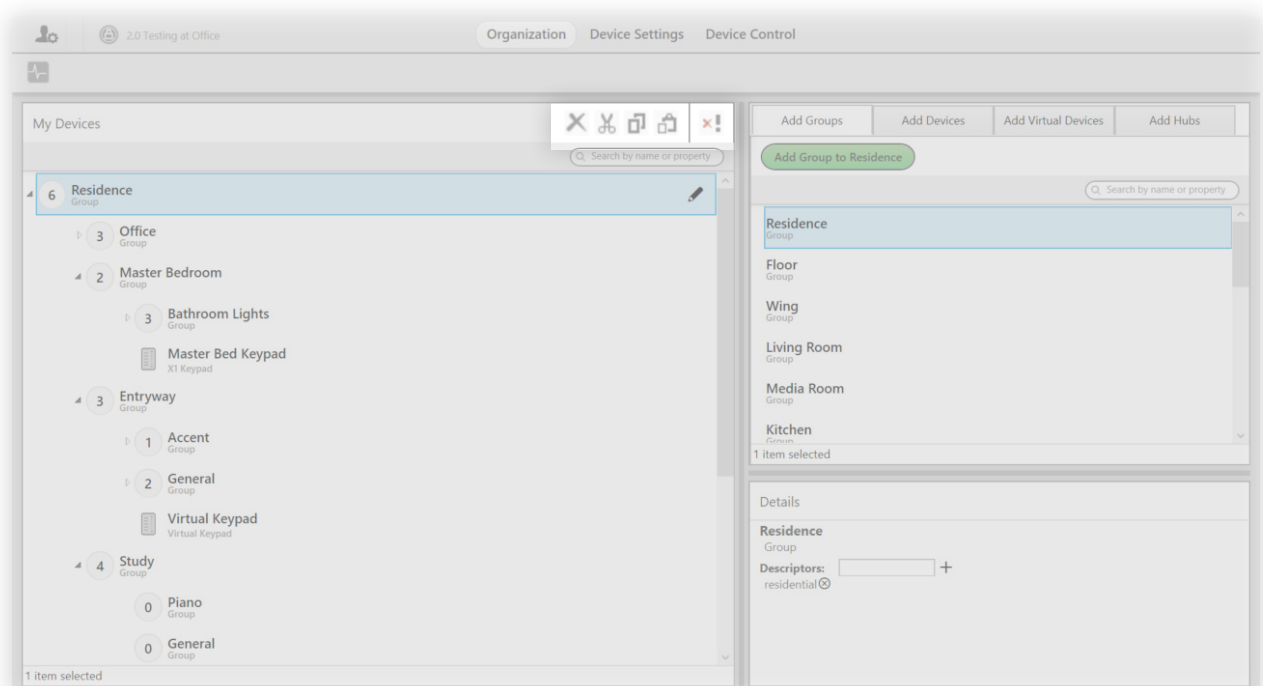


fig. 47

- **Ctrl+C:** Copy
- **Ctrl+X:** Cut
- **Ctrl+V:** Paste

Dividing Linear Runs into Groups

A run of linear fixtures is all of the Ketra fixtures attached to a single N3 Satellite. By default, Design Studio requires all fixtures in a run to be grouped together. However, you can divide a run into multiple groups to enable discrete control.

To do so, use Tech Tool's *ii* feature. Emitter Grouping can sort individual linear fixtures into groups, and even sort individual emitters within the fixtures into groups. It can also put fixtures and emitters from different runs into a group together.

Example applications:

- If a single run contains overhead fixtures in more than one room, use Emitter Grouping to divide the run into two groups—one per room. Each room can then be configured and controlled independently.

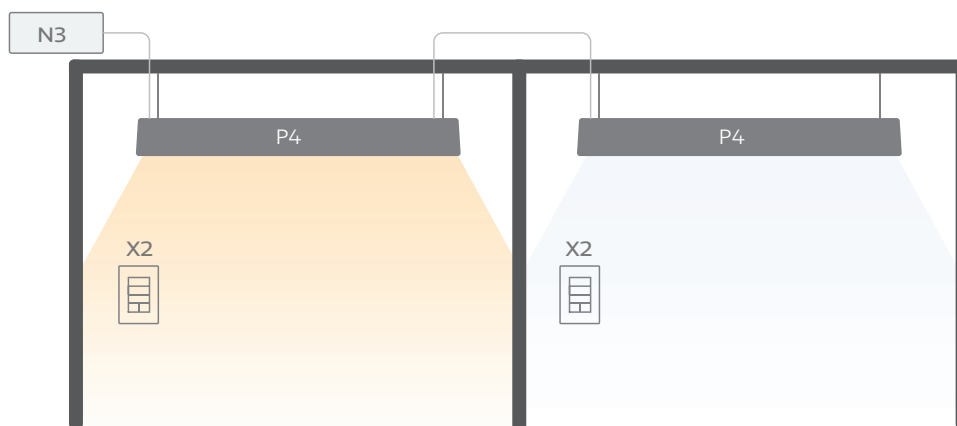


fig. 48

- If a single run contains recessed and pendant fixtures, you can use Emitter Grouping to divide the run into two groups—one per type of fixture. Each type of fixture can then be configured and controlled independently. (The groups can use consecutive or nonconsecutive fixtures.)

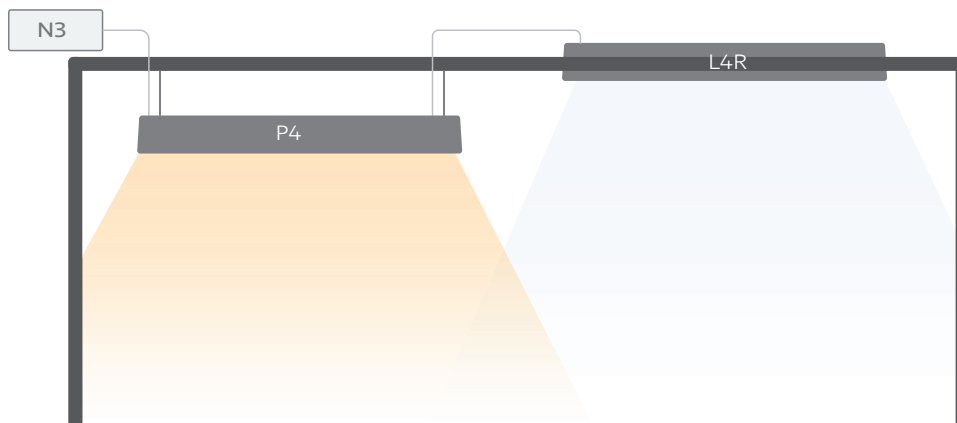
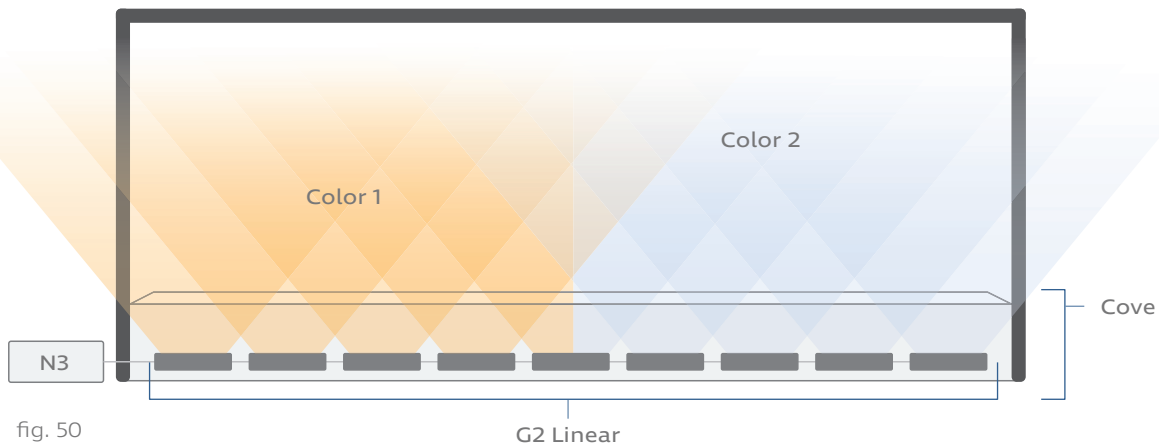


fig. 49

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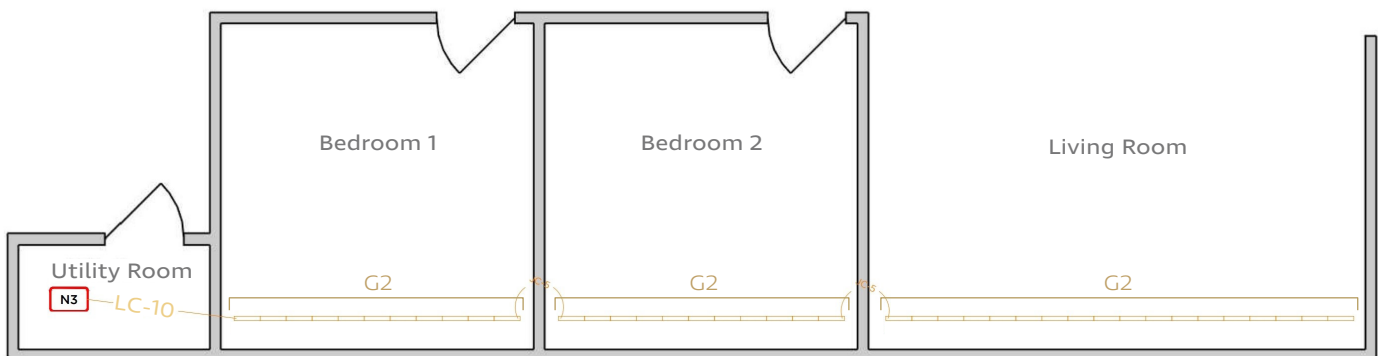
- 9 G2 Linear fixtures are washing a wall, and you want half of the wall to have one color and the other half to have another color. In this case, you would do the following math:

$$\frac{(6 \text{ emitters per G2 fixture}) \times (9 \text{ fixtures}) = 54 \text{ total emitters}}{2 \text{ groups}} = 27 \text{ emitters per group}$$



Note: Groups must be built in Design Studio prior to using Emitter Grouping. You cannot build groups in Tech Tool.

In the step process below, all example images will draw from this blueprint:



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To sort fixtures and emitters into groups, follow these steps:

- 1 If you haven't done so, create a group for each room or each run segment. If creating groups, be sure to add them to their proper place in the grouping hierarchy.
- 2 Add or cut/paste the N3 Satellite into the first group in which its fixtures appear.

Note: The N3 will not necessarily be located in the same room as the first fixture in the run. Always put the N3 into the first room that has fixtures. In our example, the N3 is located in the utility room, but we will add the N3 to "Bedroom 1".

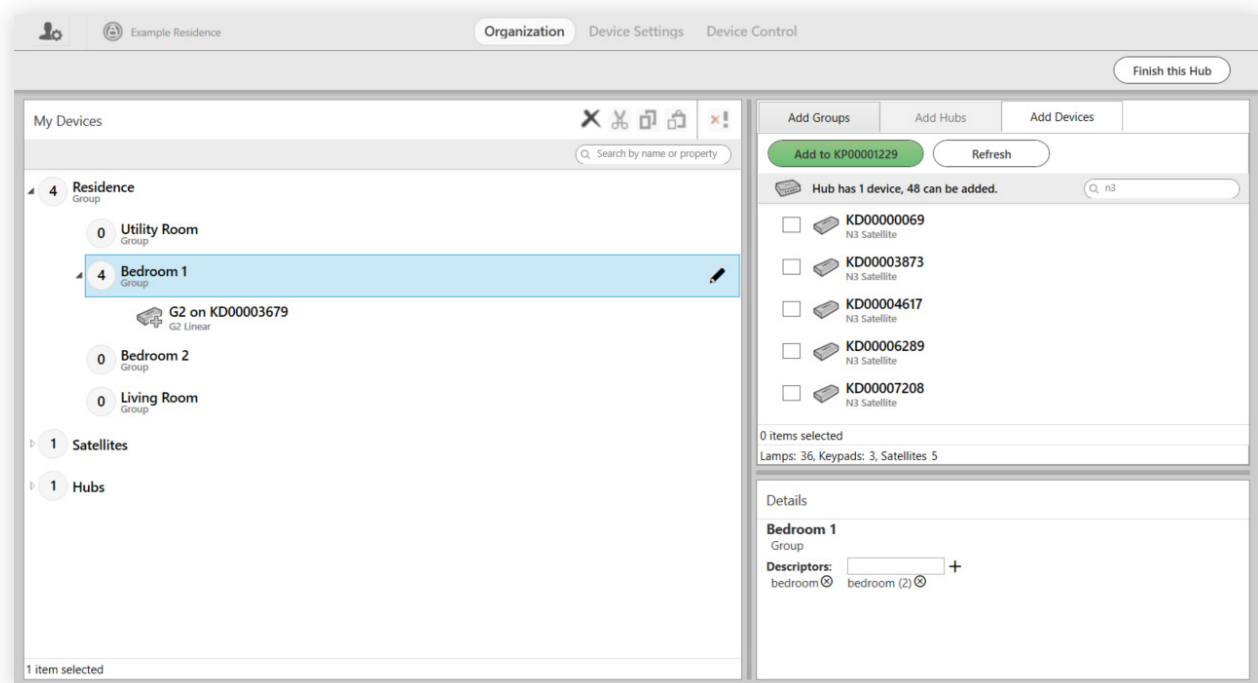


fig. 52

- 3 Make a note of the N3 Satellite's serial number or name. You will reference this serial number or name later in Tech Tool.
- 4 Click Finish This Hub to save your hub configurations.
- 5 Click Publish and Save.
- 6 Close Design Studio and open the installation in Tech Tool.
- 7 On Tech Tool's Emitter Grouping tab, use the Select a Hub dropdown to select the hub/KNet that hosts the N3 Satellite.

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- 8 In the **Select By** dropdown, pick the N3 Satellite's group (i.e., the first group in which fixtures appear). The checkboxes represent emitters connected to the N3.

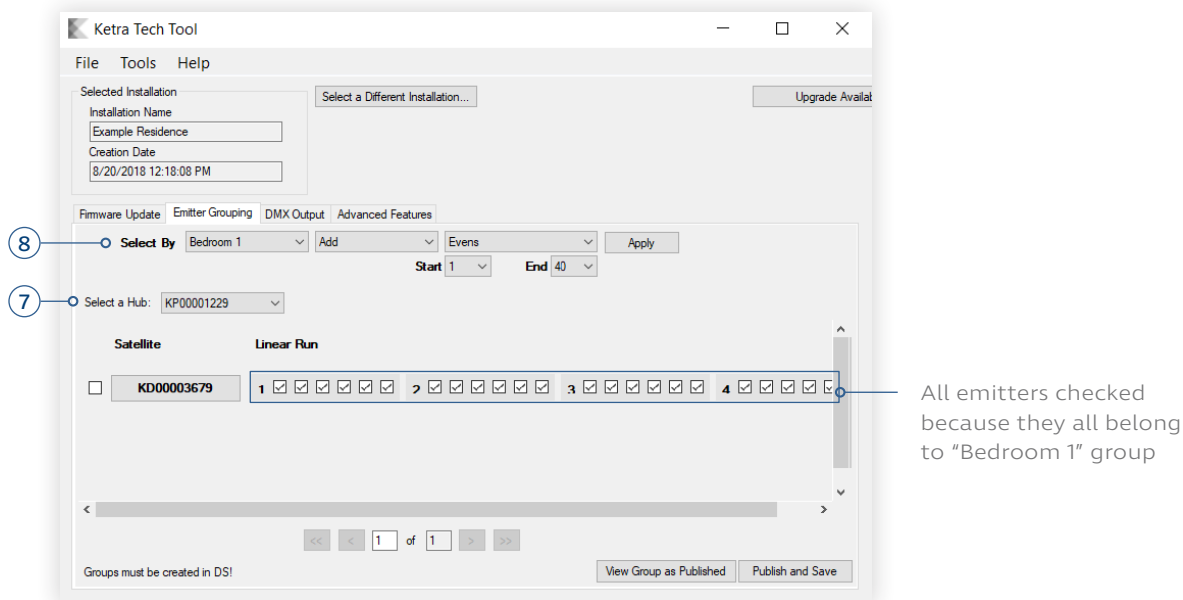


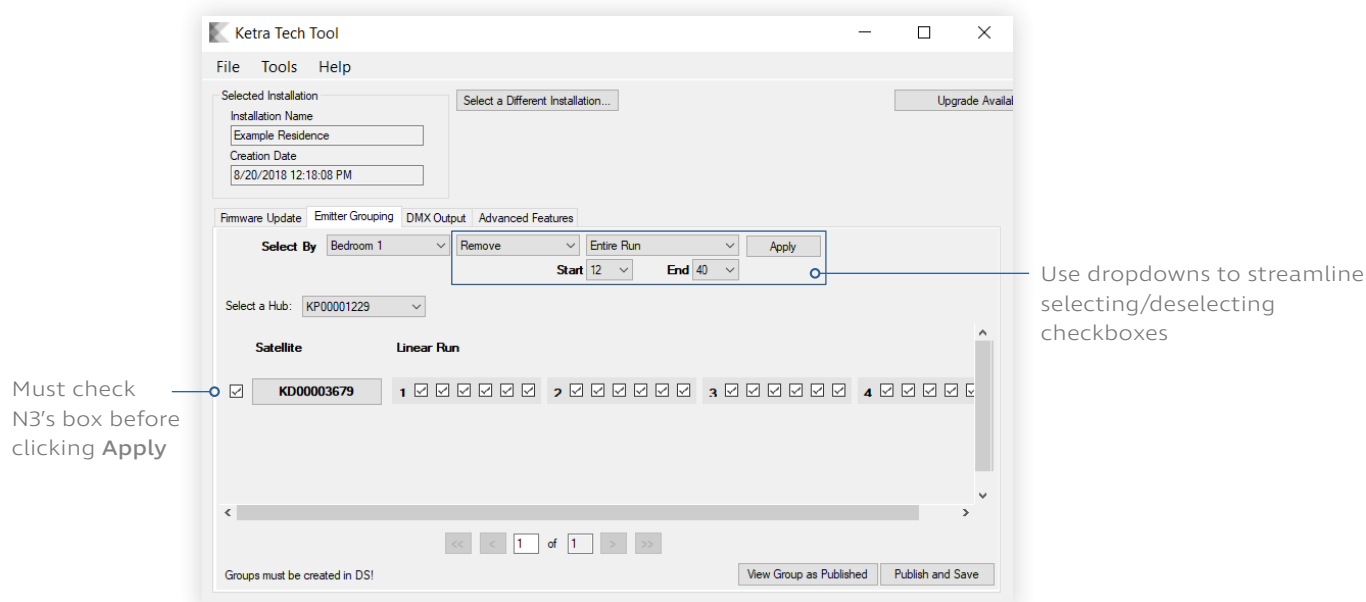
fig. 53

- 9 Remove any emitters that shouldn't be in the group. You can either do this by unchecking each emitter's box or by using the dropdowns as shortcuts.

If using the dropdowns:

- The dropdowns called out in fig. 54 (next page) (**Start**, **End**, and the unlabeled ones that default to **Add** and **Evens**) let you tell Tech Tool which boxes you want to uncheck. Once you click **Apply**, it will automatically uncheck those boxes for you. No changes will be made to the devices themselves until you click **Publish and Save**.
- Before clicking **Apply**, you must check the box to the left of the N3 Satellite's name or serial number.
- Use the **Add/Remove** dropdown to determine whether you want to check or uncheck boxes.
- Use the **Start** and **End** dropdowns to set a fixture range whose boxes you want to check or uncheck. This range is inclusive (e.g., to include first 10 fixtures, set **Start** to 1 and **End** to 10).
- Use the **Evens/Odds/Entire Run/etc.** dropdown to determine which boxes you want to check or uncheck within that range.
- **Example:** Uncheck (remove) all even-numbered emitters in fixtures 5-8.
- Click **Apply** to check or uncheck the boxes.

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Clicking Apply will deselect all checkboxes from fixture 12 to fixture 40.

fig. 54

- 10 Repeat steps 8-9, selecting the next group in the chain and adding emitters rather than removing.

Note: Be sure you are selecting the correct group. Once you place the emitters in the group and return to Design Studio, you will not be able to cut/copy/paste the subdivided run into a different group; you will have to return to Tech Tool to make changes.

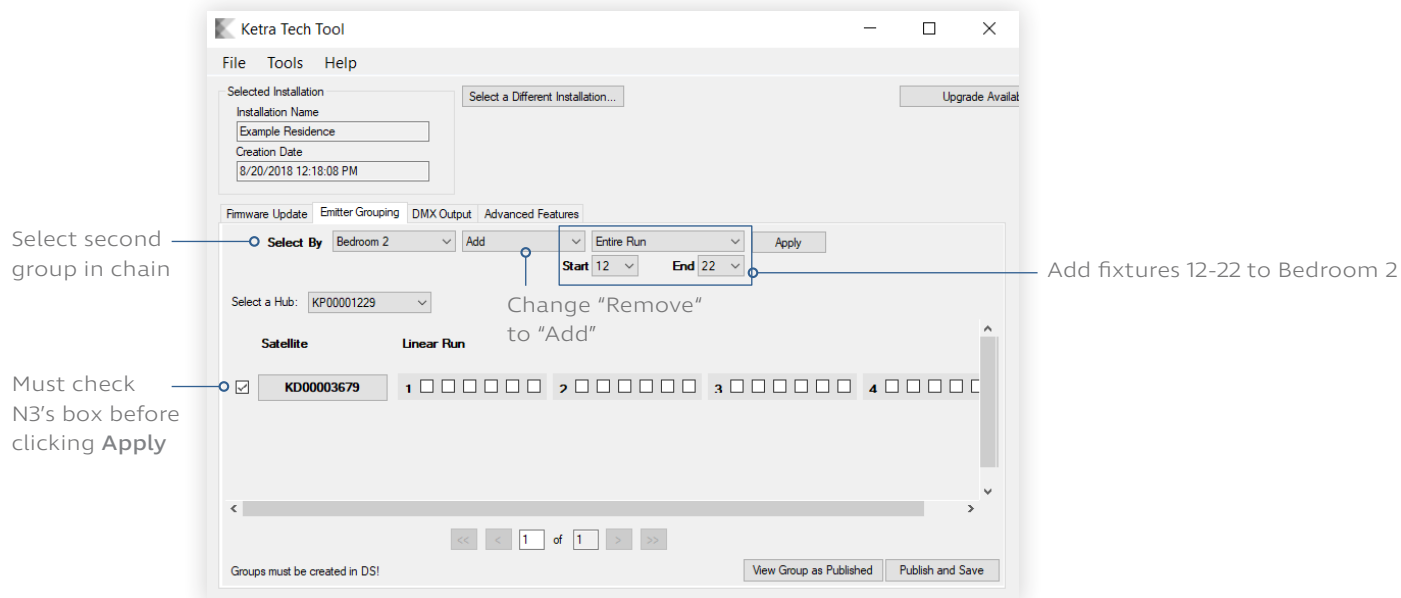


fig. 55

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Caution: Be careful to ensure that every emitter is sorted into a group, and that no emitter is sorted into two groups.

- 11 After dividing the entire run into groups, click **Publish and Save in Tech Tool**. This adds the emitters (or fixtures) you selected to the group you selected.

Caution: Clicking **View Group as Published** will turn the group green but also turn all other groups in the installation red.

Your emitters should now be sorted into their new groups, as shown in fig. 56. (In Design Studio, they will all be listed using the N3 Satellite's serial number or name.)

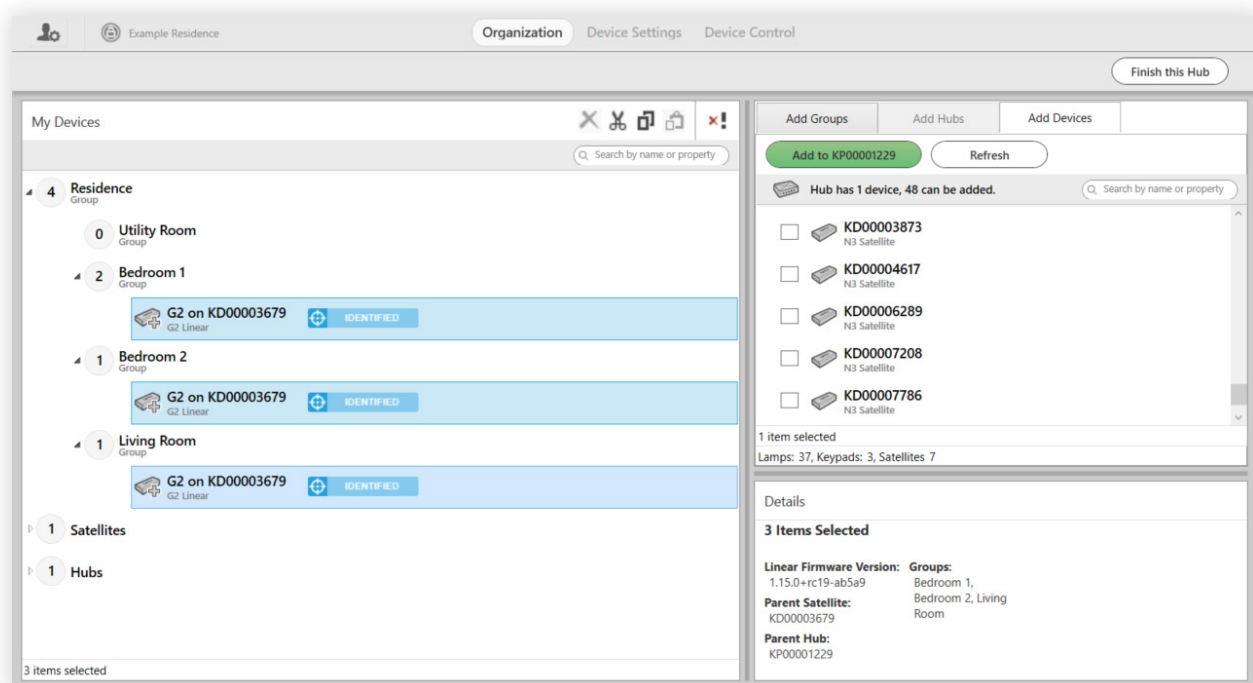


fig. 56

Note: You cannot cut/copy/paste the subdivided sections of the run(s). To move emitter-grouped linear fixtures between groups, you will need to return to Tech Tool and change their grouping using the same Emitter Grouping tool you just used.

Using the Color Picker

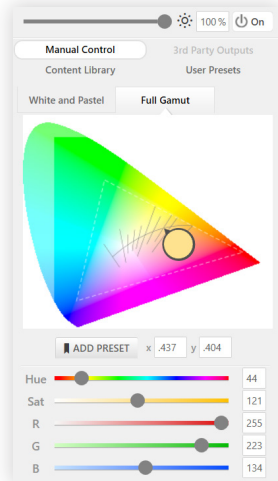
The color picker (fig. 57) enables you to control the color and intensity settings of Ketra lights, as well as controlling parameters of any third-party outputs in scenes. It is accessible from any of the tabs in Device Control and an essential part of your Design Studio toolkit.

Contents

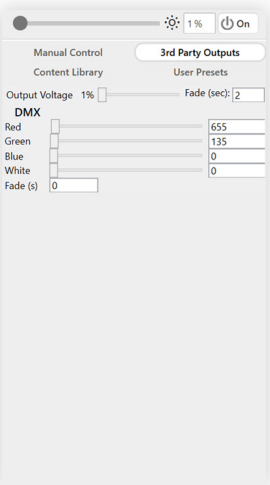
Intensity Slider	54
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White and Pastel	55
Full Gamut	56
Content Library	56
User Presets	57
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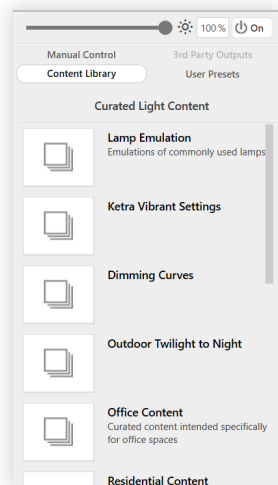
Manual control, white and pastel tab



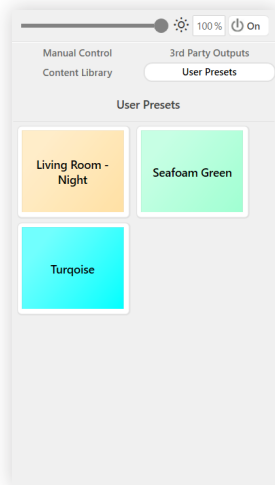
Manual control, full gamut tab



Third party outputs tab



Content library tab



User presets tab

fig. 57

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Using the color picker, you can:

- **Emulate classic lighting styles and dimming curves.** For easy lighting customization, select from popular presets in the **Content Library** tab. Presets include natural and colored light, warm dimming curves, and common light styles like incandescents. See **Content Library**, page 56.
- **Control advanced color parameters of your light.** For advanced customization, use the **Manual Control** tab of the color picker. There you can select your own color from a color diagram, set RGB values, and specify settings for hue, vibrancy, and other parameters. See **Manual Control**, page 55.
- **Save your own presets for later use across installations.** See **User Presets**, page 57.
- **Customize settings for third-party outputs in a scene.** If a group contains any third-party outputs wired to an N3 Satellite or X2 Dimmer, use the **3rd Party Outputs** tab to control output voltage, contact-closure state, and numerous DMX parameters. See **3rd Party Outputs**, page 57.

Note: The **3rd Party Outputs** tab is available for scene-building, but you cannot assign default states to third-party devices, so the tab is grayed out on the **Lamps** tab.

Intensity Slider

At the top of the color picker, a sliding scale controls intensity.

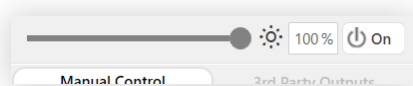


fig. 58

Note: While you cannot adjust the intensity to 0%, you can press the **On/Off** button to the right of the slider to determine whether the lights are on or off.

Ketra's intensity slider uses an exponential model rather than linear. When the slider is at 90%, your lights will be at approximately 50%. See graph in fig. 59.

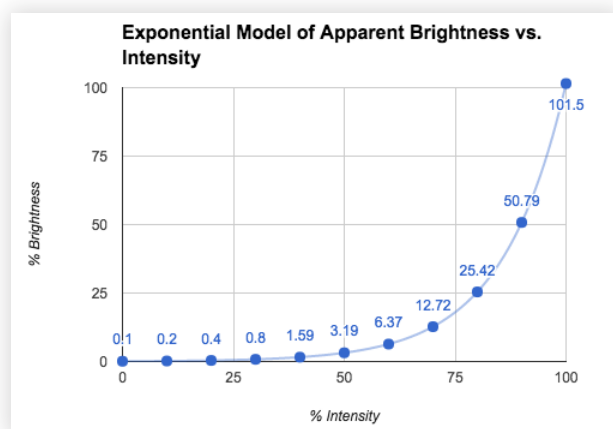


fig. 59

Manual Control

In **Manual Control**, Design Studio presents a CIE 1931 color diagram from which you can select color coordinates. Having the ability to control color as well as intensity (using the intensity slider) gives you 3-dimensional control over your lighting's color space.

White and Pastel

The **White and Pastel** tab, shown in fig. 60, lets you pick from the softer hues at the heart of a chromaticity diagram, which all Ketra lights can match with guaranteed accuracy. The curve at the center is the **black body locus**, representing the changing color of a theoretical black body radiator as its temperature increases in units of Kelvin.

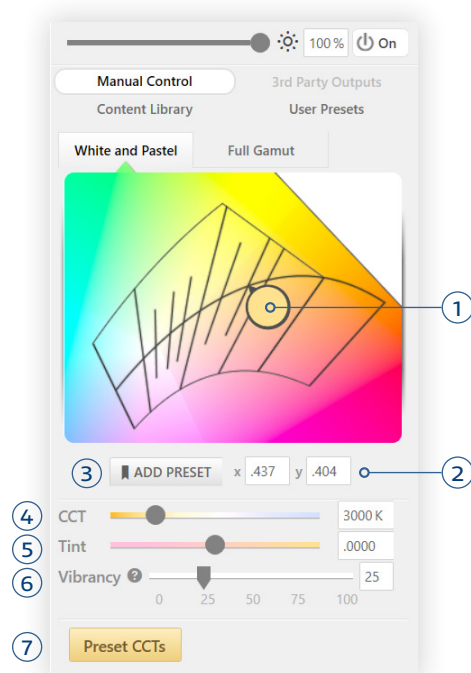


fig. 60

In **White and Pastel**, you can:

- 1 Freely set specific color coordinates within a subset of Ketra's available coordinates (all accessible in the **Full Gamut** tab). In order to match warm colors below 1700K, Design Studio may scale down your light's intensity.
- 2 Enter exact x, y chromaticity coordinates.
- 3 Add user presets to save coordinates and settings.
- 4 Adjust the CCT (Correlated Color Temperature, the temperature corresponding to a given point along the locus) via a sliding scale that follows the shape of the locus, or select from preset CCTs.
- 5 Adjust your light's tint via a sliding scale that follows the isotherms for a given CCT.
- 6 Adjust your light's vibrancy via a sliding scale.
- 7 Select from a list of common CCTs.

Note: When vibrancy is closer to 100%, illuminated objects can appear more vibrant. To understand vibrancy, be aware that every Ketra emitter has 4 LEDs: red, blue, green, and white. When you adjust the vibrancy of your light, you change the ratio of RGB to W output: at closer to 100%, output is generated more by the RGB LEDs; at closer to 0%, it is generated more by the W LED. In either case, the color points and intensity are the same, while the SPD output and CRI change.

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Full Gamut

The **Full Gamut** tab, shown in fig. 61, lets you select from Ketra's extended gamut of color coordinates.

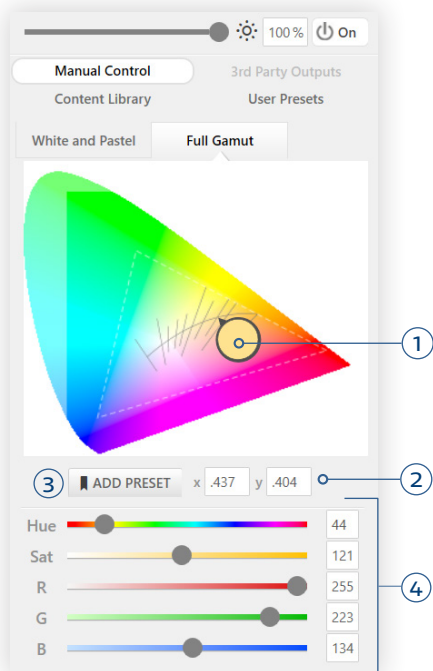


fig. 61

In this section, you can:

- 1 Freely set color coordinates across a full chromaticity diagram as well as the whites and pastels near the black body locus.
- 2 Enter exact x, y chromaticity coordinates.
- 3 Add user presets to save settings.
- 4 Adjust the hue, saturation, and red-blue-green composition of your light via sliding scales.

Note: For coordinates outside of the dashed triangle, and especially on the outer edges of the full gamut, you may notice some very slight variation in the color of your lights.

Content Library

The **Content Library** displays categories of presets that Ketra has saved, as well as warm dimming curve options for your lights.

Note: For circadian lighting that changes over time, do not use the collection called "Generic Circadian Settings." Instead, use a natural show, which is a collection of triggers set to offsets from sunrise and sunset. Design Studio comes with a default natural show. In a **Ketra Only** installation, this default natural show is automatically assigned to keypads that have a button labeled "Natural"; in a **Ketra with HomeWorks QS** installation, the natural show will be one of the presets you import into HomeWorks QS.

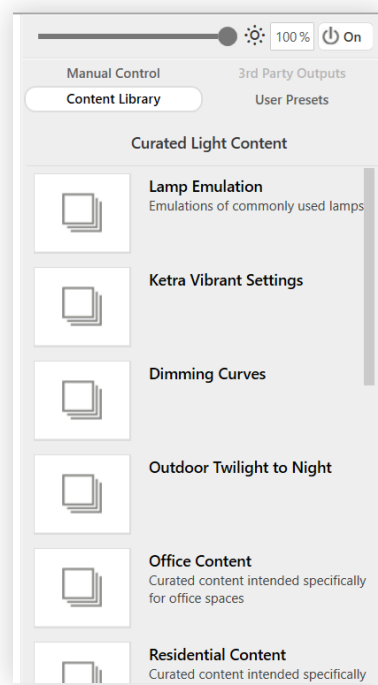


fig. 62

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As shown in fig. 63, hovering over a preset will give you 3 icons:

- 1 **Bookmark a setting.** Bookmarking saves the setting to your library of user presets. You will be able to access the preset quickly in this installation or any others tied to your account. (For more on user presets, see [User Presets](#), below.)
- 2 **Play a setting on your lights.** This makes the group preview the setting.

Note: Static configurations, such as light colors, that you select in the Content Library will be visible on your lights immediately upon selection. However, warm dimming curves—i.e. the options in the “Dimming Curves” folder at the end of the list—will not be visible on your lights until after you have clicked **Publish and Save**.

- 3 **Read information about a setting.** Each Ketra-curated preset has some brief text on the setting’s potential uses or significance.



fig. 63

User Presets

The **User Presets** tab itemizes all the preset configurations you have stored. Your presets are accessible across installations in your account.

Presets can be stored for any lighting configurations you’ve designed; just select *Add Preset* under the chromaticity diagram in Manual Control, or click the **bookmark icon** you see by hovering over any Ketra preset in the Content Library.

3rd Party Outputs

Note: Not available in Ketra with HomeWorks QS installations.

In a **Ketra Only** installation, the **3rd Party Outputs** tab is available after you have configured an N3 Satellite for analog or DMX output. On this tab, you can adjust the voltage output of a 0-10V output, switch the output state of a sustained contact closure, or adjust output configurations for a DMX master.

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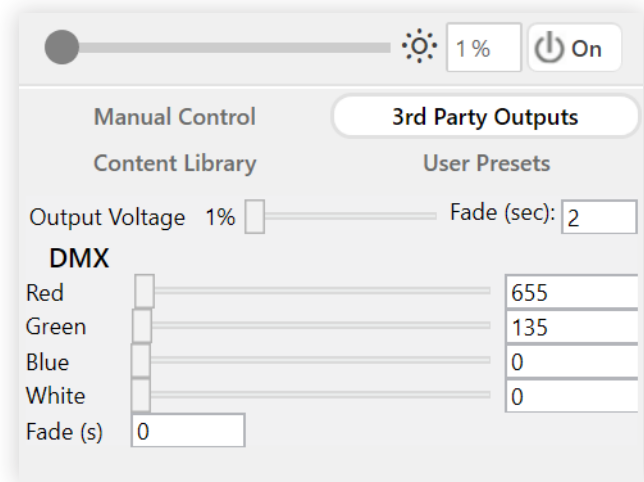


fig. 64

Even though third-party outputs are often in the same groups as Ketra lights, they can have entirely different settings in a given scene.

You cannot use Design Studio to assign default states to third-party lighting, so the **3rd Party Outputs** tab is grayed out on the **Lamps** tab.

Managing Lighting Power-Restore States

Each Ketra light has a **restore state** setting. A state is any configuration for color and intensity (e.g., 3000K at 100% intensity), and a restore state is the state that lights come on to when power-cycled. In residential and hospitality applications, we recommend modifying a small number of lights' restore states per the guidelines in this section.

What counts as a power cycle?

A **power cycle** is anything that reboots a Ketra light's onboard computer. This includes Ketra firmware updates and events that cut power to the circuit for more than 2 seconds. It does NOT include *Off* commands from keypads or contact-closure inputs, as these do not cut power to the lights' circuit.

The restore state can be a color and intensity chosen in Design Studio, or it can be whatever the light's most recent state was prior to being power-cycled.

Contents

Restore States in Ketra with HomeWorks QS Installations 60

Restore States in Ketra Only Installations 63

Modifying the Default Restore State 66

Viewing a Light's Current Restore State 67

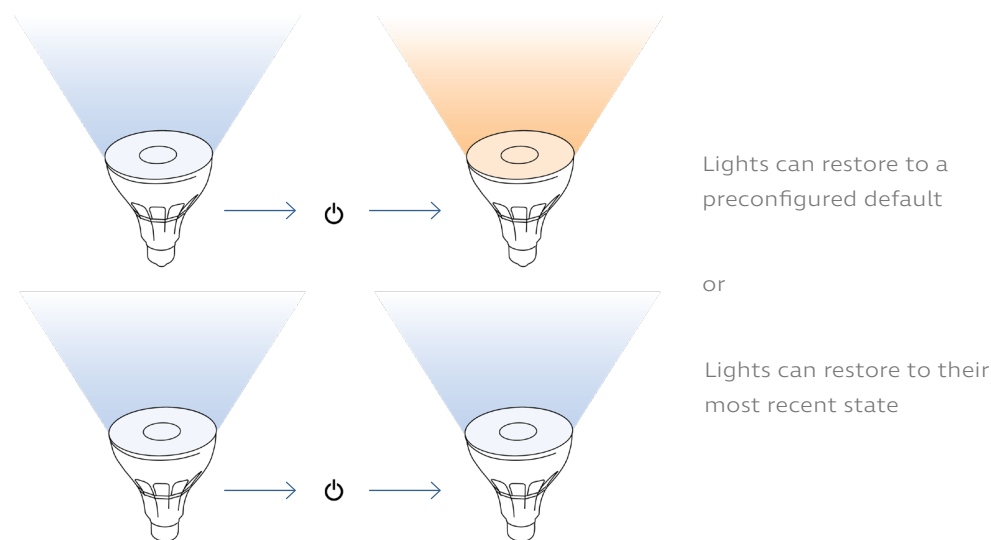


fig. 65

- We **strongly** recommend that all **Ketra with HomeWorks QS** installations include some of both. For details, see **Restore States in Ketra with HomeWorks QS Installations**, page 60.
- We recommend that residential or hospitality **Ketra Only** installations include some of both. For details, see **Restore States in Ketra Only Installations**, page 63.

Note: In **Ketra Only** installations, the default restore state is 3000K, 100% intensity. To change this default restore state, see **Modifying the Default Restore State**, page 66.

Restore States in Ketra with HomeWorks QS Installations

In **Ketra with HomeWorks QS** installations, the default restore state is whatever the light's state was prior to being power-cycled. This comes with pros and cons.

- **Pro:** If power is restored after an outage at night, bedroom lights will stay off rather than coming on at full intensity.
- **Pro:** In vacation homes, lights will stay off after an outage rather than coming on at full intensity (otherwise they could stay on for weeks until the space were occupied again).
- **Con:** If the N4s lose connection to the LAN (Local Area Network) while the lights are off, the homeowner will not be able to turn the lights on until the network is restored. (This scenario is unlikely but still possible due to third-party Ethernet switch failure or N4 failure.)

To avoid that con scenario, we strongly recommend designating some “safety” lights. Configure these safety lights to restore to a predefined color and intensity, and provide the user with an accessible means of power-cycling the lights (e.g., a regular toggle switch or a clearly-labeled breaker). This enables the user to force the safety lights on.

Caution: Explain to the user that they can power-cycle the lights once to turn them on, but recommend that they leave the safety lights on until network is restored. Lights are sometimes wired to the same circuit as other devices that should not be turned off.

- 1 **Designate safety lights.** These are the lights to which you will assign default restore states.
 - DO give default restore states to any lights in stairways or points of egress.
 - Do NOT give default restore states to any lights in sleeping areas. If you do, the lights could come on in the middle of the night following a power outage.
 - We recommend giving a default restore state to one or two lights in every room (except sleeping areas), but this can be left to the homeowner's discretion.

Note: In a vacation home or other space that will be unoccupied for long periods, we recommend following the steps below for the safety lights, then using HomeWorks QS to add a timeclock activated with vacation mode. That way, if there is a power outage while the homeowner is away, the HomeWorks QS system will turn off the safety lights soon after they come back on.

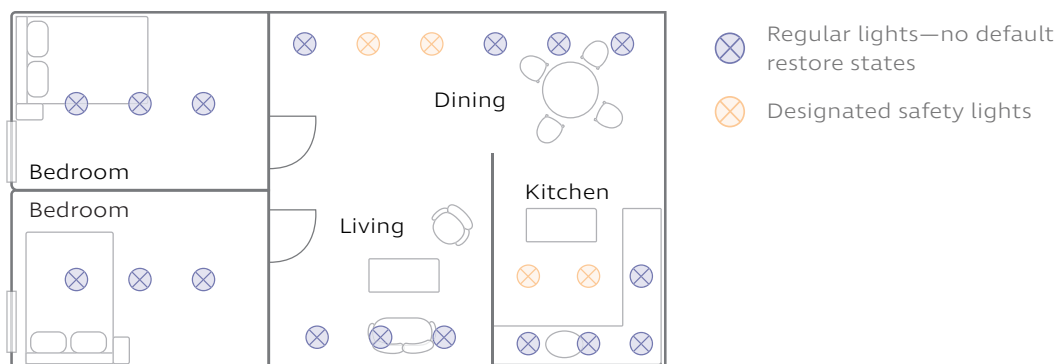


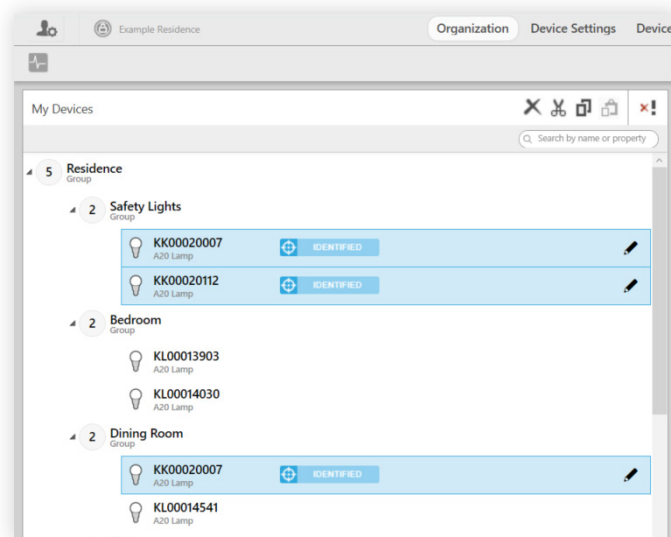
fig. 66

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2 Add the safety lights to a group.

- i On Design Studio's **Organization** tab, add a custom group to the highest level of the hierarchy.
- ii Rename the group something like "Safety Lights".
- iii Copy the lights into the group. Be sure to use **Copy** (Ctrl+C), not **Cut**.



The Safety Lights group has one light each from Kitchen and Dining Room, but no lights from Bedroom

fig. 67

3 Disable restoring to most recent state.

- i Go to Design Studio's **Device Settings** tab.
- ii If necessary, set the **Settings For** dropdown to "Lamps".
- iii Set the **Device Filter** to the "Safety Lights" group. By default, every light should say **Enabled** in the **Restore Last State on Power Cycle** column.
- iv Check the **Select All** box to highlight all devices in the group.
- v In the **Modify Lamp Settings** panel, set the **Restore Last State on Power Cycle** dropdown to "Disabled".
- vi Click **Apply To Selected**.

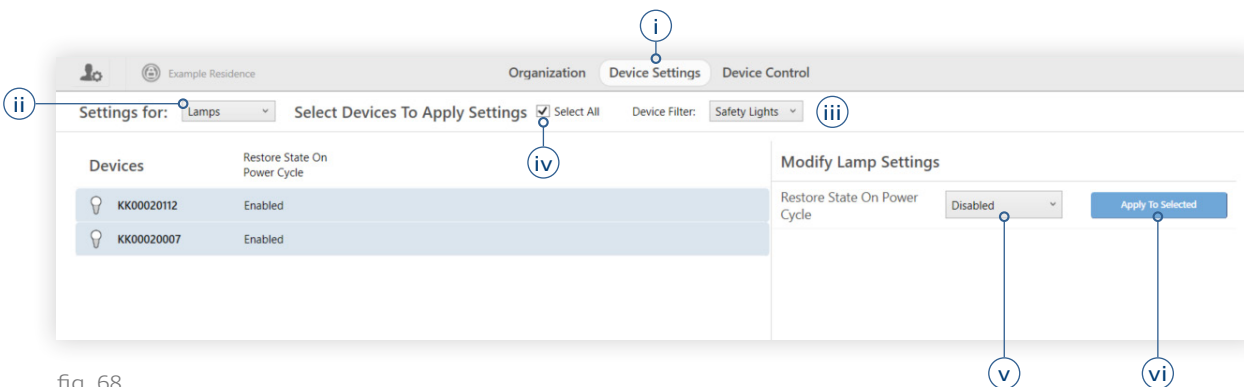


fig. 68

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- 4 Preview the installation space with only the safety lights (**Recommended**). This should be done room-by-room. Check each room to ensure that the safety lights are giving adequate illumination.
 - i Go to Device Control > Lamps.
 - ii Select the room group in the My Lamp Groups panel.
 - iii In the color picker panel on the right, click the **Power** button to the right of the intensity slider. This should turn off the room.
 - iv Select the “Safety Lights” group.
 - v Click the power button twice. This should turn on the safety lights that are in the room.

If the safety lights are not providing adequate illumination, add more safety lights to the group and disable restoring to their most recent state.

You can turn the room’s lights back on with the same button you used to turn them off.

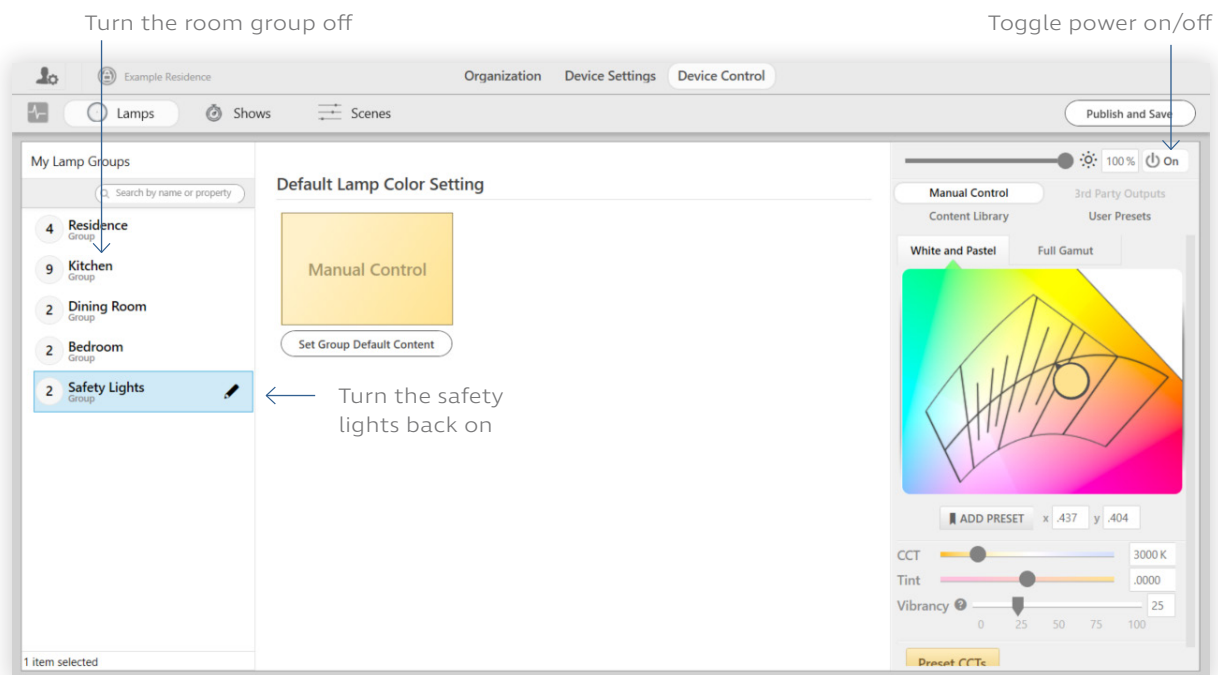


fig. 69

- 5 **Optional: Modify the default restore state.** The factory-default restore state for lights is 3000K (warm white), 100% intensity. You can change the color and intensity of the safety lights’ restore state as needed. For details, see [Modifying the Default Restore State](#), page 66.

Restore States in Ketra Only Installations

In **Ketra Only** installations, the default restore state is 3000K, 100% intensity. You can either configure lights to restore to their most recent state prior to power-cycling, or modify their default restore state (i.e., set a different color and intensity for them to always come on to). For modifying the default restore state, see page 66.

For most commercial applications, we recommend leaving lights at the factory-default restore state of 3000K, 100% intensity.

An exception is hospitality applications, where we recommend the following:

- **In sleeping areas, all lights should be set to restore to their most recent states.**
This ensures that if the occupant is asleep when a power outage occurs, the lights will not come back on when power is restored.
- **In dining areas, most lights should be set to restore to their most recent states.**
This ensures that a space's atmosphere will not abruptly change if power is cut and restored during business hours.
- **A handful of "safety" lights in dining areas should keep the default restore state.**
You could leave this at the default 3000K, 100% intensity, or you could set a new default restore state. This accounts for a situation where the network goes down for any reason while the lights are off. In that situation, the user might lose control of their lights until the network is restored. The only way to turn on your lights until then would be to power-cycle them and have the selected lights come on to their default restore states.
- **All other lights can be left to the default restore state of 3000K, 100% intensity.**
It is especially important that emergency lighting be left to restore to a default state rather than its most recent state.

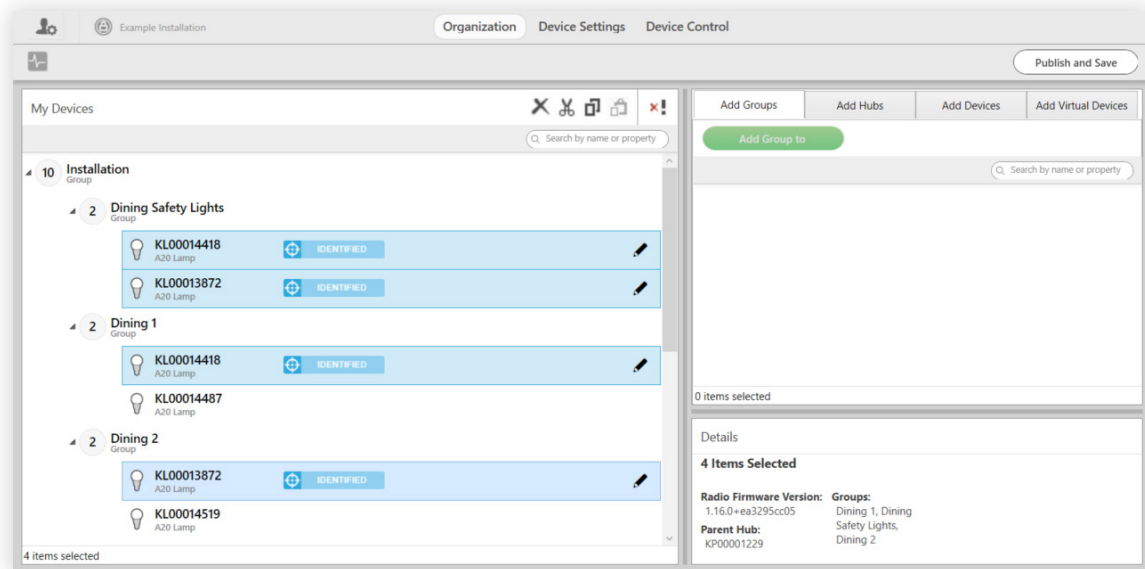
Caution: Do not enable restoring to most recent state for any emergency lighting.

To set those configurations, follow these steps.

- 1 **Configure dining areas.**
 - i **Decide which lights will serve as "safety" lights.** These lights will keep a default restore state so that the user can hard-reset the lights if necessary to ensure adequate lighting during a network failure.
 - ii In Design Studio's **Organization** tab, add a custom group to the highest level of the grouping hierarchy.
 - iii Rename the new group something like "Dining Safety Lights".
 - iv **Copy/paste each dining area's lights into the safety group.** Be sure to use **Copy** (Ctrl+C), not **Cut**. You want the safety lights to be in their original group as well as the safety group. See fig. 70, next page.

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The Dining Safety Lights group has one light from each dining space

fig. 70

- v Go to the Device Settings tab.
- vi If necessary, set the Settings For dropdown to "Lamps".
- vii Set the Device Filter to the "Dining Safety Lights" group.
- viii Check the Select All box.
- ix In the Modify Lamp Settings panel, set the Restore Last State on Power Cycle dropdown to "Enabled".
- x Click Apply To Selected.

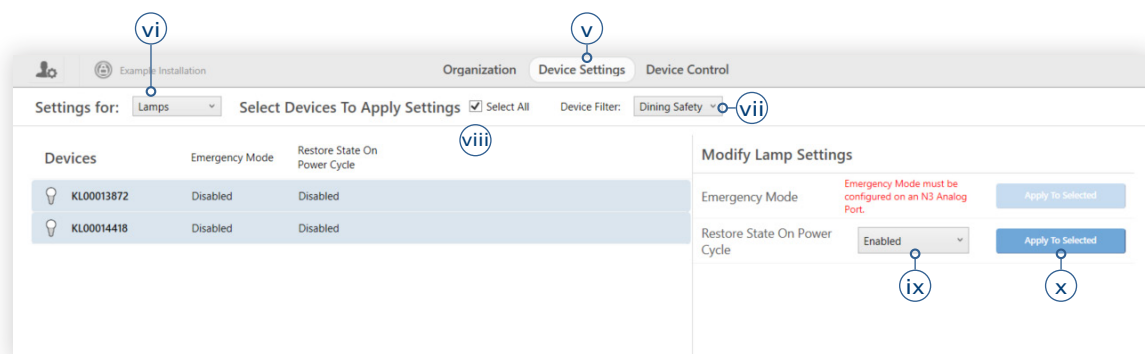


fig. 71

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- 2 Preview dining areas with only the safety lights (Recommended). This should be done room-by-room. Check each dining area to ensure that the safety lights are giving adequate illumination.

- i Go to Device Control > Lamps.
- ii Select a dining area group in the My Lamp Groups panel.
- iii In the color picker panel on the right, click the **Power** button to the right of the intensity slider. If there are multiple dining area groups in the same room, turn those ones off as well.
- iv Select the "Dining Safety Lights" group.
- v Click the power button two times. This should turn on the safety group.

If the safety lights are not providing adequate illumination, add more safety lights to the group and disable default restore on them.

You can turn the room's lights back on with the same button you used to turn them off.

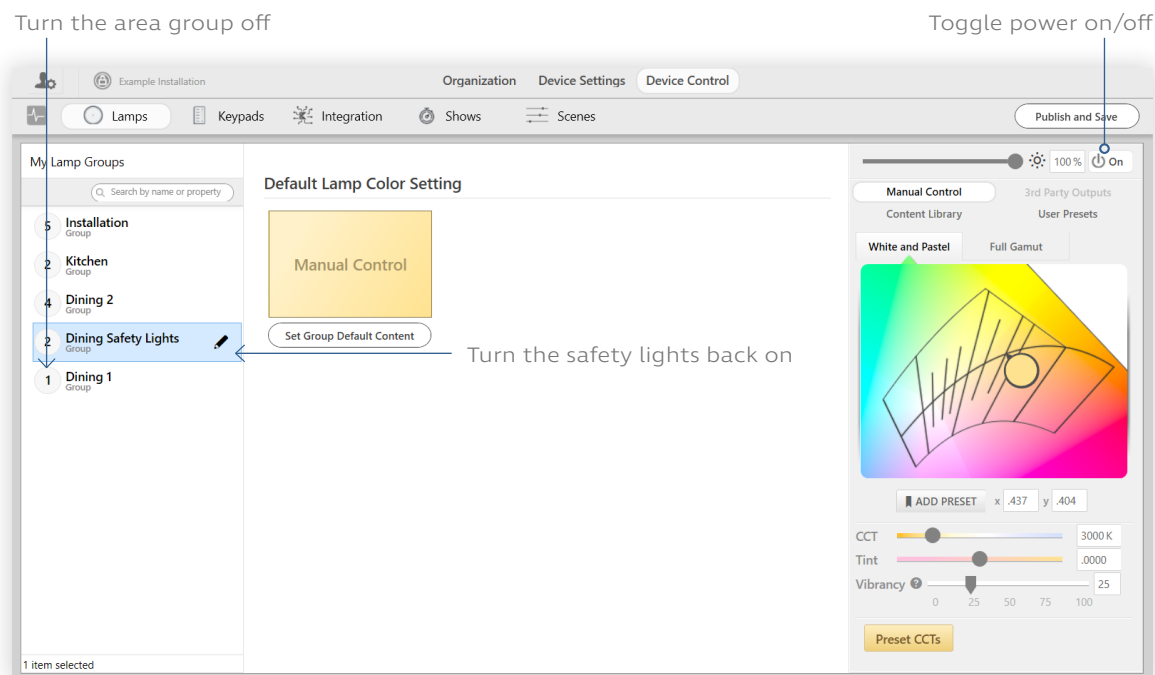


fig. 72

3 Configure sleeping areas

- i Go to Design Studio's Device Settings tab.
- ii Set the Device Filter to a sleeping area group.
- iii Check the **Select All** box.
- iv In the Modify Lamp Settings panel, set the **Restore Last State on Power Cycle** dropdown to "Enabled".
- v Click **Apply To Selected**.
- vi Repeat steps ii-v for additional sleeping area groups as needed.

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- Optional: Modify the default restore state.** For any lights that will restore to a default rather than restoring to their last state, you can modify the default. (This has to be done by the group rather than by the individual light.) If you do not modify the default, the lights will restore to 3000K (warm white), 100% intensity.

For details on modifying the default restore state, see below.

Modifying the Default Restore State

Note: In Ketra with HomeWorks QS installations, lights will restore by default to their most recent state prior to power cycling. To disable this feature so that lights restore to a single default, see [Restore States in Ketra with HomeWorks QS Installations](#), page 60.

The factory-default restore state is 3000K (warm white), 100% intensity. Design Studio enables you to modify this default restore state—i.e., set a different color and intensity—for groups of Ketra lights. (You cannot set a default restore state for non-Ketra lights using Design Studio.)

To do so, follow these steps:

- Go to **Device Control > Lamps**.
- Select a group from the **My Lamp Groups** list on the left.
- Use the color picker panel to set a new color and/or intensity. For instructions, see [Using the Color Picker](#), page 53.
- At center screen, click the **Set Group Default Content** button.
- Click **Publish and Save** in the top-right.

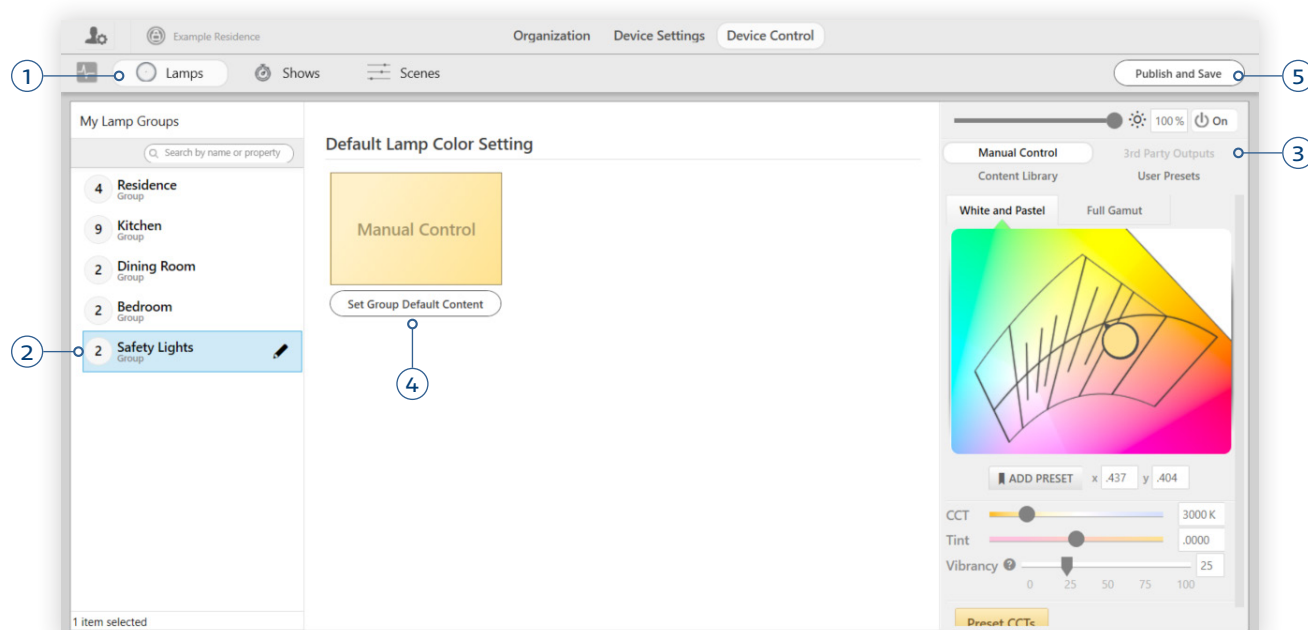


fig. 73

Viewing a Light's Current Restore State

- 1 Check whether the light is set to restore to its last state or a default.
 - i Go to the **Device Settings** tab.
 - ii If necessary, set the **Settings For** dropdown to "Lamps".
 - iii Find the light's serial number or name in the **Devices** list.
 - iv Check whether the value in the **Restore Last State On Power Cycle** column is "Enabled" or "Disabled".

If the value is "Enabled", the light will return to its most recent state when power-cycled.

If the value is "Disabled", the light will return to a default restore state.

- 2 If the light is set to restore to a default, view the default on the **Lamps** tab.
 - i Go to **Device Control > Lamps**.
 - ii Select the light's group in the **My Lamp Groups** panel.

The default restore state's color is visible at center screen, under *Default Lamp Color Setting*.
The default intensity is visible on the slider at the top of the color picker panel on the right.

Building Scenes

As discussed in Key Concepts > **Scenes**, page 9, a scene is a set of lighting configurations that applies to an installation's groups. These configurations may include color, intensity, and other parameters.

Scenes may be assigned to several kinds of triggers, including keypad buttons, contact closure inputs, and time triggers in shows. Since there are multiple potential uses for scenes, they can be built on four out of the five tabs of **Device Control**. As a general rule, however, we recommend building them on the **Scenes** tab.

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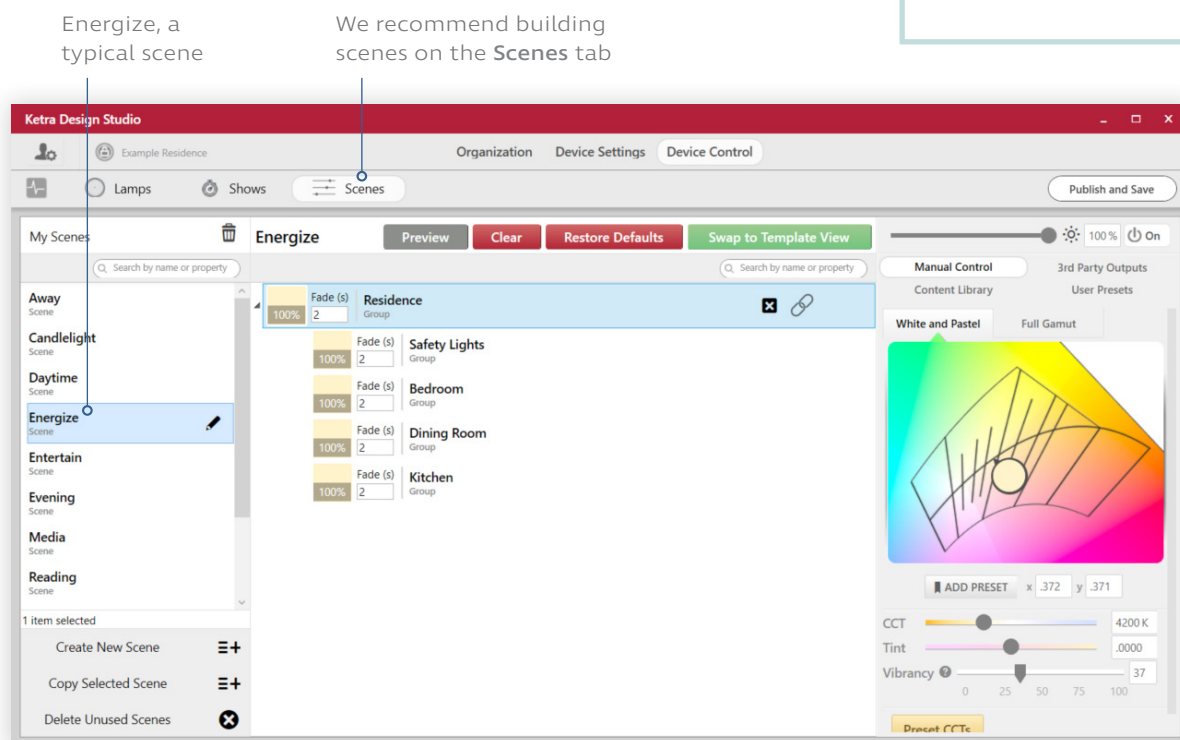


fig. 74

Note: Scenes that you build on the **Shows** or **Integration** tab will not be accessible from other locations. For example, if you build a scene on the **Shows** tab for a 5:00 PM trigger, you cannot then assign that scene to a keypad button. However, if you build the scene on the **Scenes** tab or **Keypads** tab, you will be able to use it elsewhere in the installation.

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Ketra's Pre-Curated Scenes

Design Studio curates content so that you never need to build a custom scene unless the installation calls for it. You can see our pre-made scenes in the **Scenes** tab, listed in the **My Scenes** panel. These scenes are ready to be assigned to a keypad button, contact closure input, or time trigger in a show.

When you provision a keypad to a **Ketra Only** installation, each button's name determines what default scene it gets (e.g., a button labeled *Media* would get the *Media* scene). You can always assign a different scene or show to the button by selecting the button in the **Keypads** tab and clicking **Clear Scene** or **Clear Show**.

For most commercial applications, mapping these default scenes to Ketra keypads is sufficient to meet installation requirements, saving programmers significant amounts of time. Many homeowners, however, will ask for custom scenes.

Ketra's pre-curated scenes differ in the color and intensity that they set for groups in the installation. Typically, each scene treats "Task" and "Accent" groups differently from other groups.

Ways to Build Scenes

You can create or modify scenes from multiple places in the software. We always recommend building scenes on the **Scenes** tab and then assigning them on the **Keypads**, **Integration**, and/or **Shows** tabs, but you could build them there as well.

To access Design Studio's scene-building functionality from each tab, consult the images below.

- The **Scenes** tab

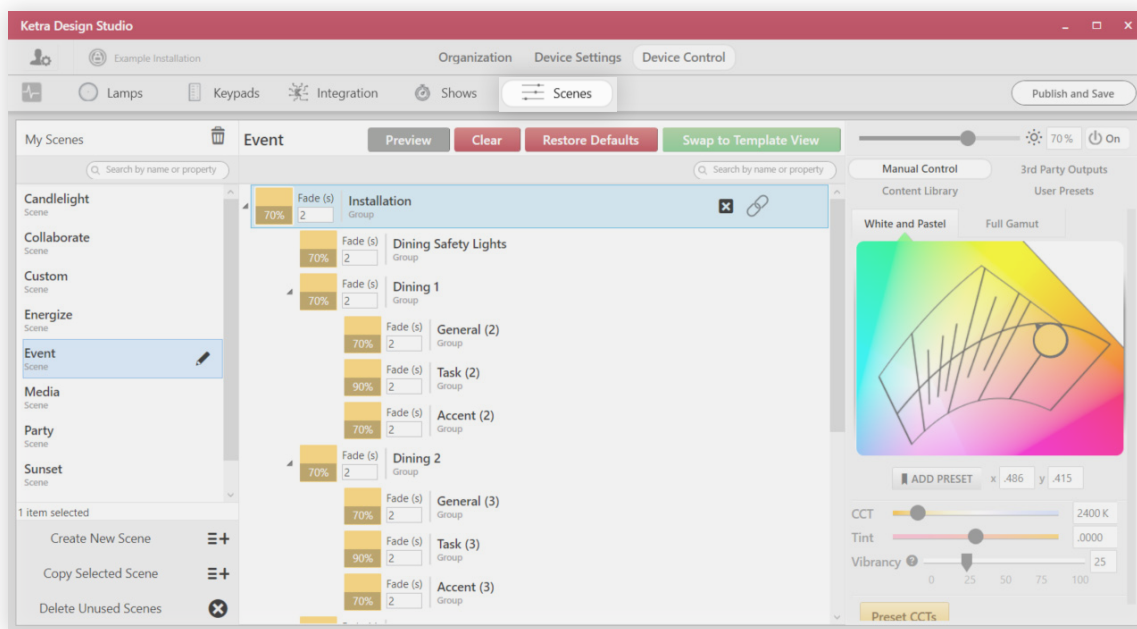


fig. 75

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- The Keypads tab: Click the green Edit button to open the Ketra Scene Builder window

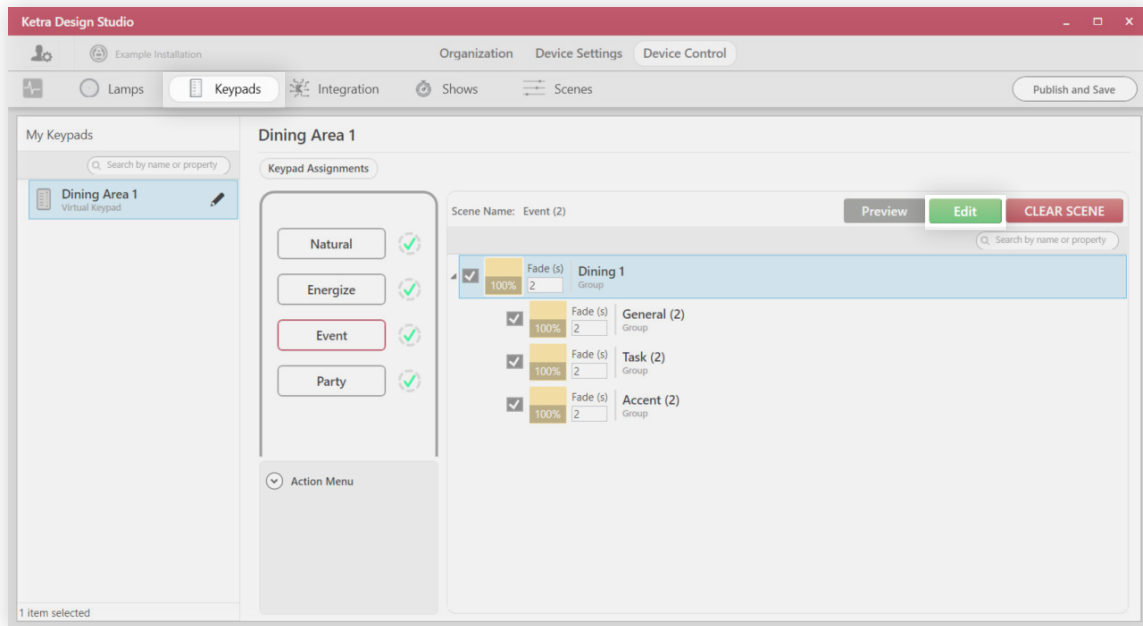


fig. 76

- The Integration tab: Click the green Edit button to open the Ketra Scene Builder window

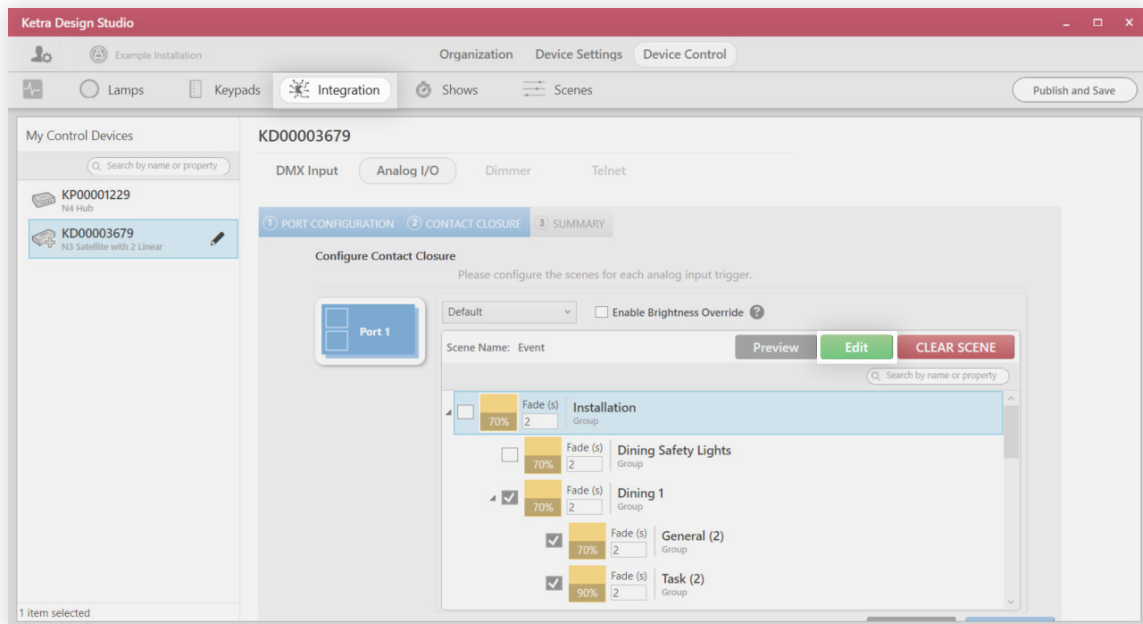


fig. 77

Note: Scenes you create on the **Integration** tab for analog inputs can be reused on the **Integration** tab by inputs. However, they will not appear on other tabs.

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- The Shows tab: Click the green Edit button to open the Ketra Scene Builder window

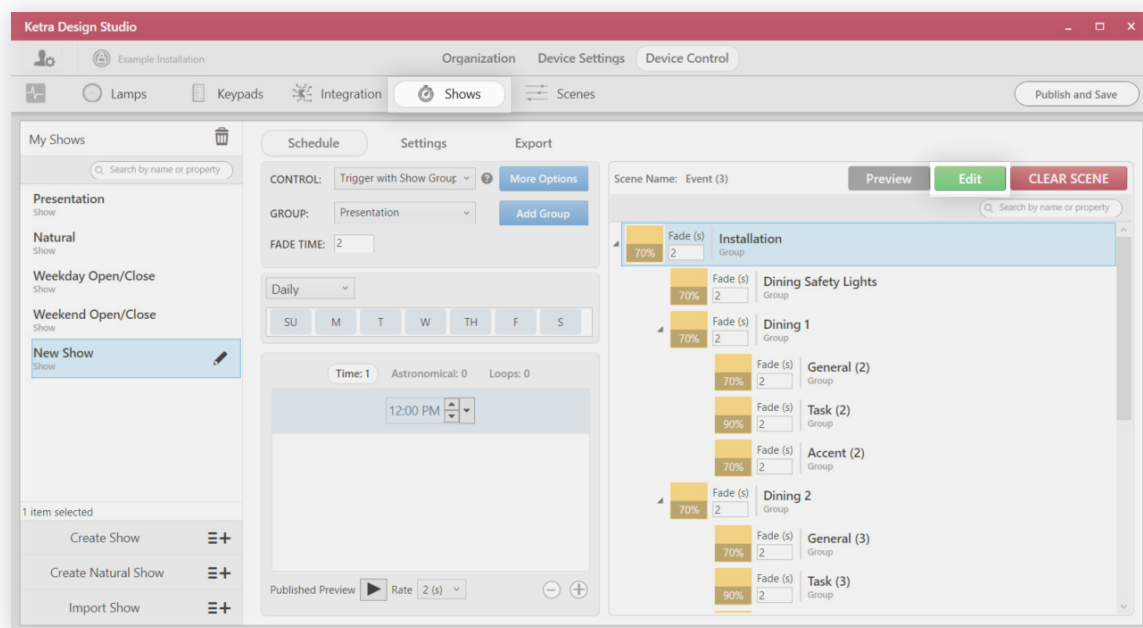


fig. 78

Note: Scenes you create on the Shows tab for time triggers can be reused on the Shows tab by other time triggers. However, they will not appear on other tabs.

Key Features of Scene Building

Users can build scenes using two methods: Tree View and Template View. Different use cases call for one method or the other.

Note: Tree View is the default method; users can access Template View by clicking Swap to Template View.

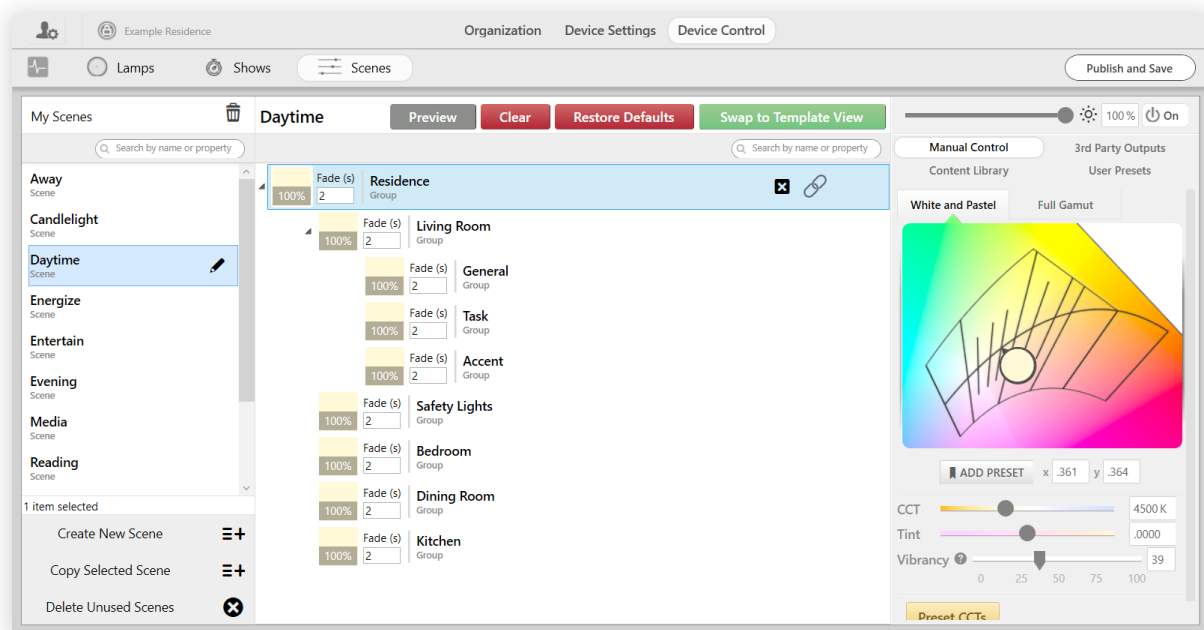
Tree View

Tree View replicates the grouping hierarchy, or tree, from the **Organization** tab. It is ideal for building scenes that apply the same content to entire branches of the tree—i.e., to groups and subgroups.

An effective use of Tree View might look like the curated *Daytime* scene. This scene has one color setting that applies to all groups. Since its content applies globally, whichever keypad it is assigned to will play that setting on its groups and subgroups.

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An ideal use of Tree View

fig. 79

To create and configure a scene using tree view, follow these steps:

- 1 Navigate to Device Control > Scenes.
- 2 Click the Create New Scene button.
- 3 Set the highest-level group in the installation to the desired color and intensity setting. This causes everything lower in the hierarchy to change as well.

Note: When you assign the scene to the keypad, it will only play on the subset of the grouping hierarchy that the keypad has access to.

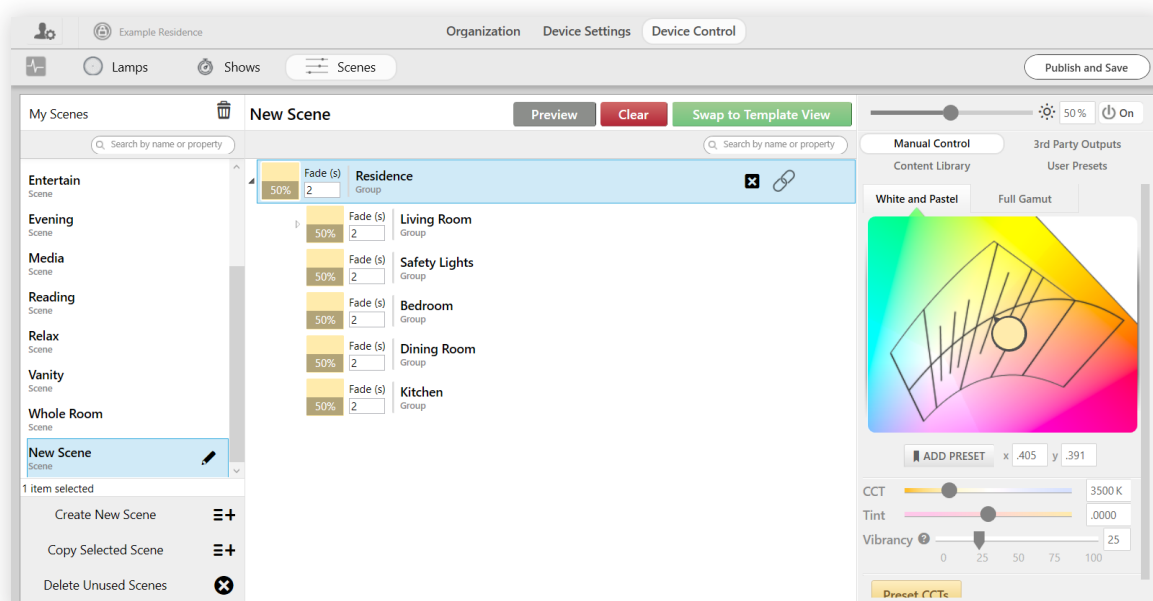


fig. 80

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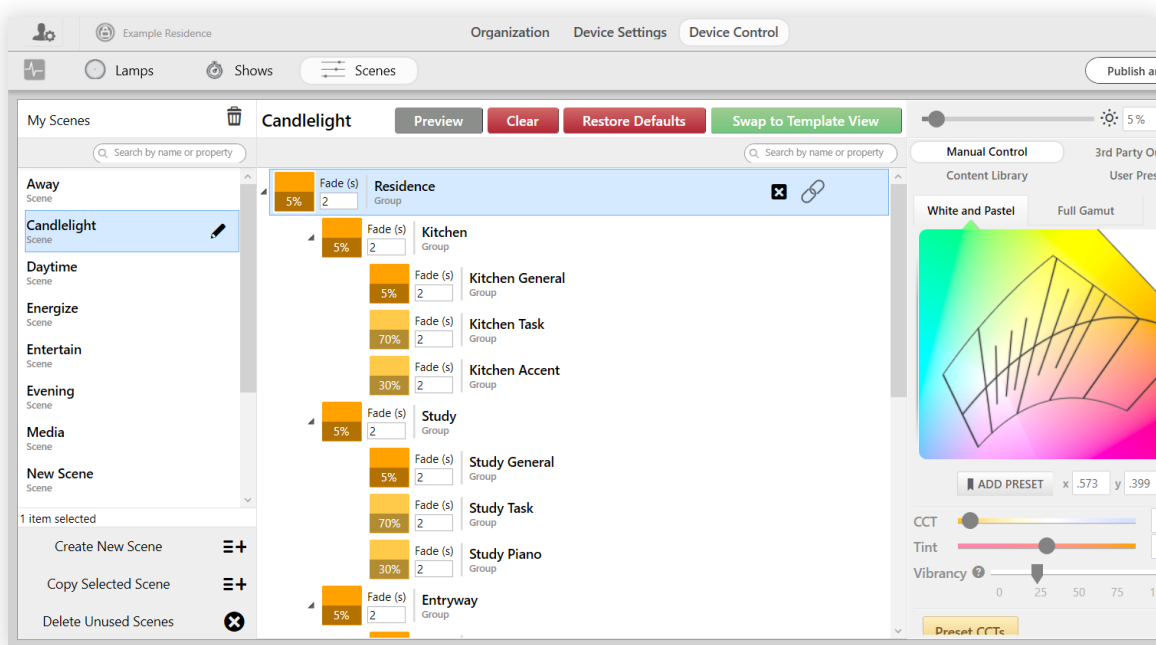


fig. 82

In Tree View, executing the *Candlelight* scene would require individual editing of every Task or Accent group. In Template View, it only requires three lines:

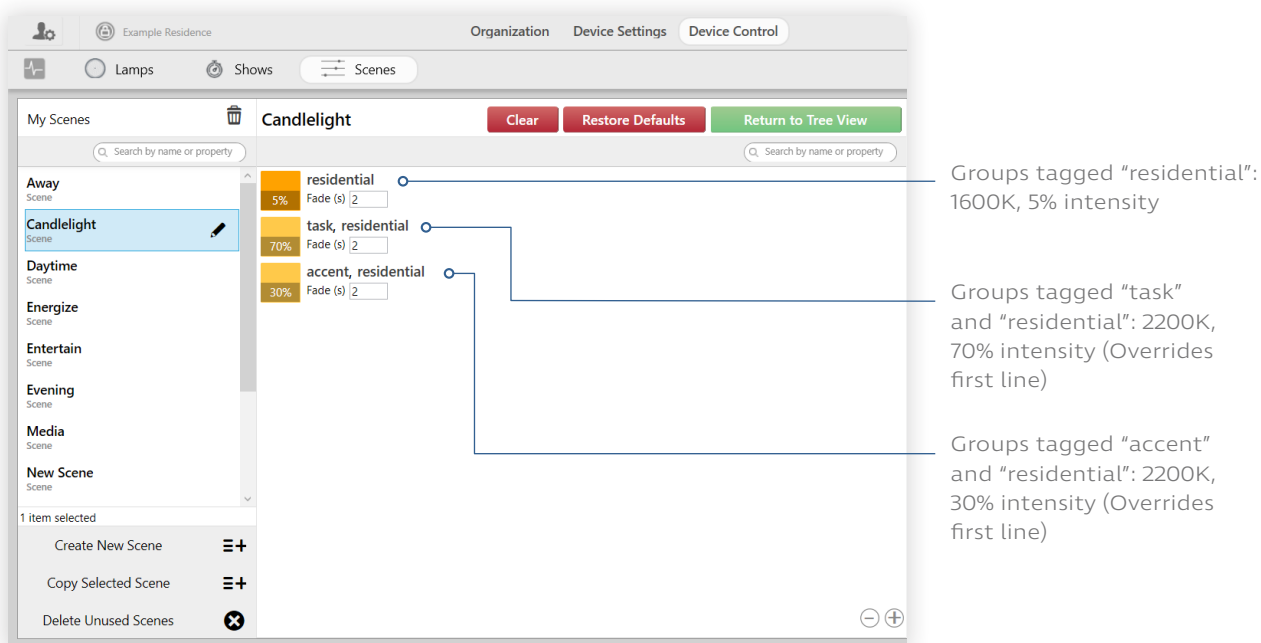


fig. 83

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Template View Example

Let's build a custom scene that can apply special content to any corner offices in an office building. Since corner offices have more natural light, imagine an energy code requires distinct content for them versus other offices.

Using Tree View would be inefficient: when building the scene, we would need to modify every corner office's zones, one at a time. Using Template View will save time, because we can simply assign a shared descriptor to every corner office and set content for the descriptor.

We'll start with this simple grouping structure already built on the **Organization** tab:

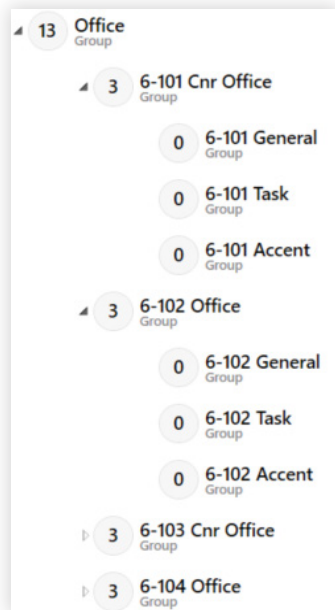


fig. 84

There are two corner offices and two regular offices. Each office has three zones: *General*, *Task*, and *Accent*. To create a scene that affects any corner office, follow these steps:

- 1 On the **Organization** tab, set a "corner office" descriptor for each corner office. To add descriptors, select the group and enter the descriptor name into the bottom-right text field.

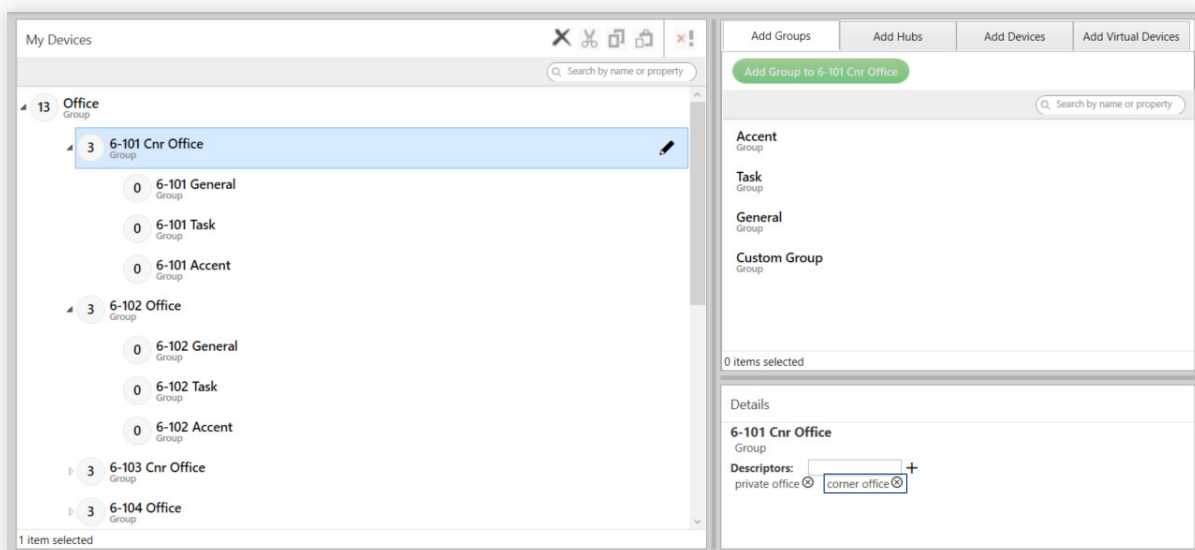


fig. 85

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- 2 In Device Control > Scenes, click the **Create New Scene** button.
- 3 Rename the scene something like *Corner Offices*.
- 4 Click the **Swap to Template View** button.

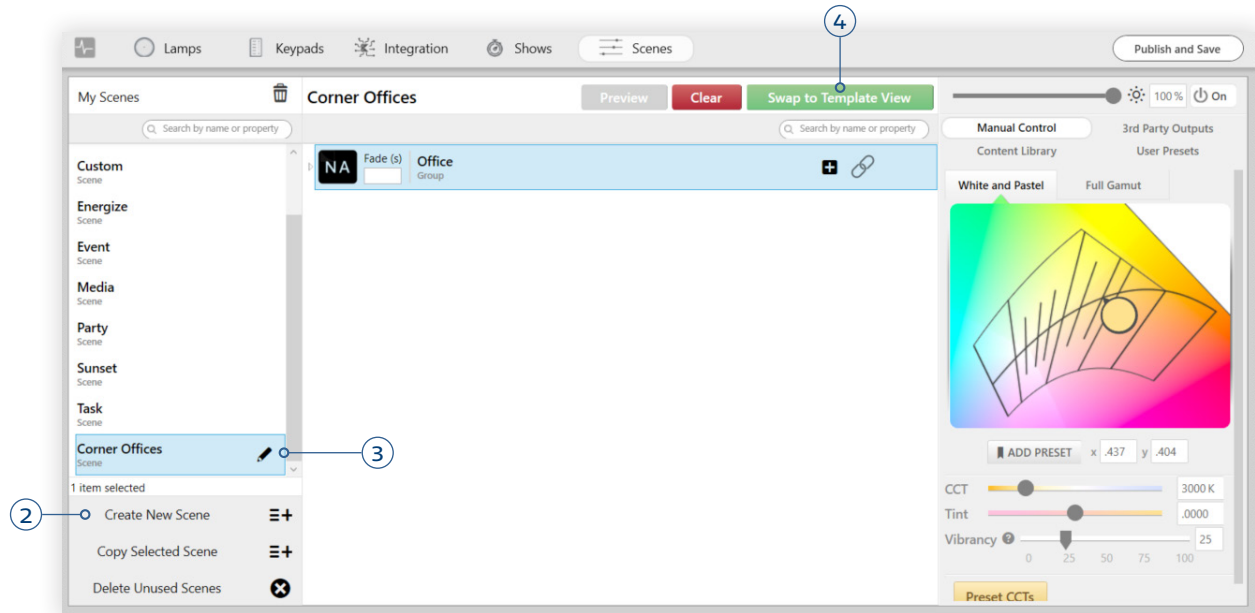


fig. 86

- 5 Click the **+** button three times—once for each corner office zone. Since our corner offices have three zones—*General*, *Task*, and *Accent*—we'll add three lines.
- 6 For each line, add the zone's descriptor and the "corner office" descriptor. You should press **Enter** after each value rather than using comma-separated values.

In our example, the first line will target any groups with both the "task" and "corner office" descriptors. This way, no other groups that have the "task" descriptor will be affected.

Note: Groups inherit descriptors from higher-level groups.

- 7 **Customize each line's color content.** Note that you can toggle **NA** on or off for each line by clicking the **X** button. A group marked **NA** will not be affected when the scene is triggered.

Note: **NA** can be toggled on or off by clicking the **X** button. **NA** groups do not change content when the scene is triggered. However, they do respond to brightness controls when the scene is active and turn off when the scene is deactivated. To truly exclude a group from a scene such that it does not respond in any way to a trigger, you need to uncheck the group when assigning the scene.

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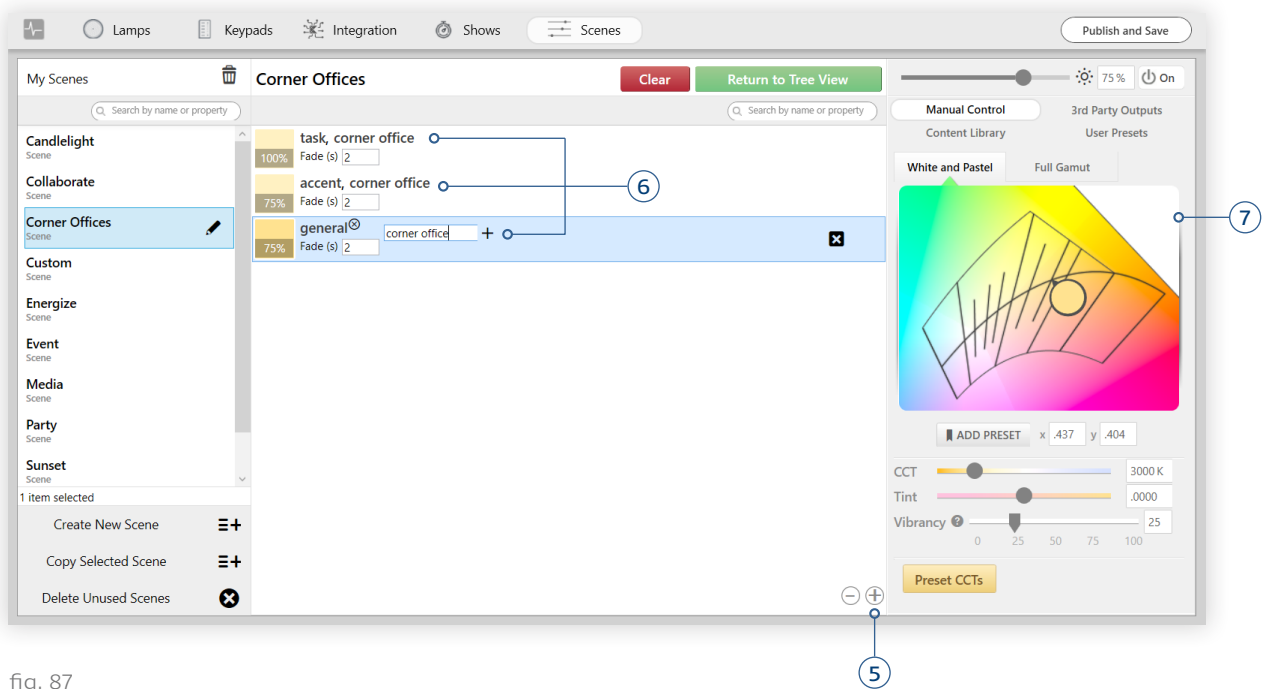


fig. 87

- 8 **Return to Tree View to confirm your settings.** In our example, the corner offices now have special content for each of their zones. When we assign the scene to each corner office's keypad, only the given office's zones will be affected.

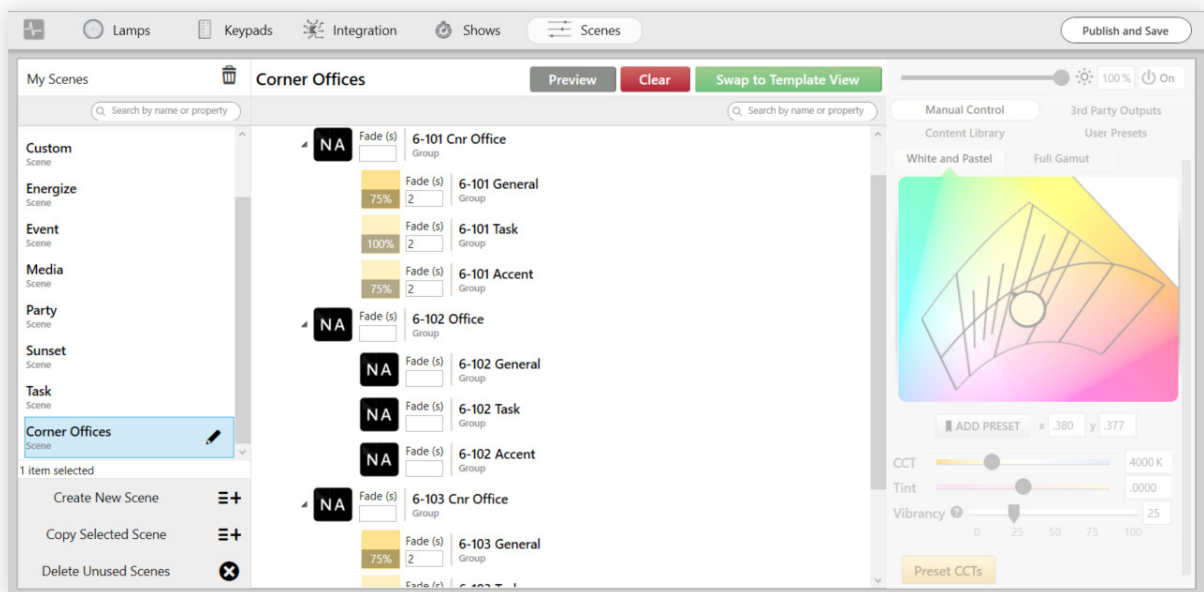


fig. 88

Building Shows

Shows enable you to link changes in your lighting to certain times of day. A show consists of at least one **time trigger**, i.e., a trigger set to occur at a given time whenever the show is active.

Example applications:

- Circadian lighting that smoothly brightens and dims over the course of the day to mimic sunlight (see **Creating a Natural Show**, page 81, or use Ketra's curated *Natural* show)
- Automating opening and closing times by turning lights on at 9 AM and off at 11 PM (see **Automated Open/Close Time**, page 97)
- Meeting Title 24's Auto-Off Timeclock requirement (see **Auto-Off Timeclock**, page 95)
- A looping holiday show that turns a group of lights red for one minute, then green for 1 minute (see **Looping Triggers**, page 86)

You can create and configure shows on the **Shows** tab of **Device Control**. You can then implement your shows in several ways:

- **Set them to run automatically:** Shows can run automatically 365 days a year, or only on certain days of the week, or only within a certain date range.
- **Assign them to Ketra keypad buttons or contact-closure inputs:** In a **Ketra Only** installation, shows can be linked to inputs in the installation. A user could press a keypad button to activate the show, or an external device could play the show via a contact-closure integration with an N3 Satellite.
- **Use them in Lutron's HomeWorks QS software:** After building shows in Design Studio, you will be able to import the installation to HomeWorks QS and access the shows from there.

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The Shows Tab

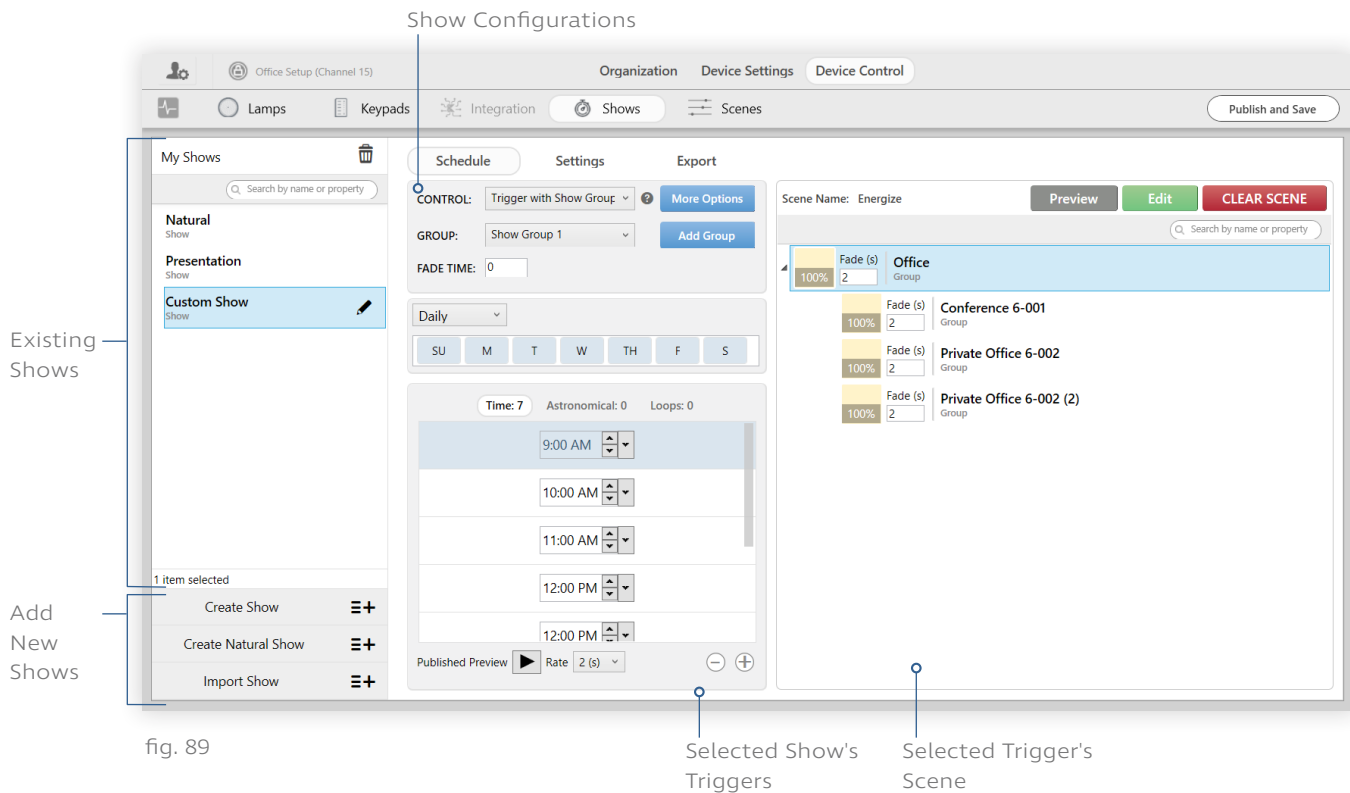


fig. 89

What you can do on the **Shows** tab of **Device Control**:

- See your existing shows
- Create new shows
- Customize shows' triggers and scene content
- Set shows to run automatically (without needing to be activated by a user or contact closure)

What you *cannot* do on the **Shows** tab:

- Assign a show to a keypad button (Use the **Keypads** tab after building the show)
- Assign a show to a contact-closure input (Use the **Integration** tab after building the show)

Creating a Show

Importing a Show

You can import Ketra shows that come packaged with Design Studio for your convenience, or shows that you have exported previously. To import a show, follow these steps:

- 1 **Click Import Show.** Clicking this button, found at the bottom of the My Shows panel, will open a setup wizard.
- 2 **Select the show file you would like to import.** Click **Choose File** to select the file from a list. This will direct you to a folder in which there are a number of shows curated by Ketra—including *Fixed Time* and *circadian* (Astronomical) shows—along with any you’ve exported in the past.
- 3 **Name your show.** You can use the same name as before or give it a new one.
- 4 **Select groups to assign the show to.**

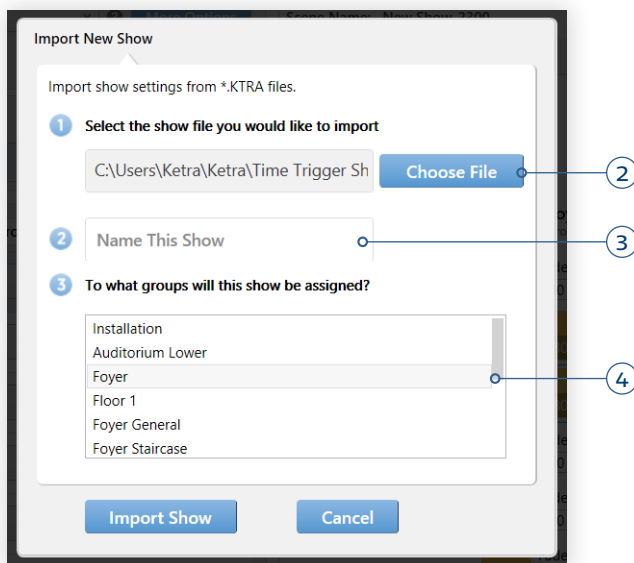


fig. 90

Note: The show will apply content to whichever groups you select, as well as all subgroups.

- If you intend to assign the show to a keypad button or analog input trigger, we recommend selecting the highest-level group. As discussed in [Global Scenes, Local Applications](#), page 10, a scene or show that applies content to all groups will not necessarily affect all groups; once you assign the scene or show, it can only affect whichever groups the keypad or input trigger controls.
- If you intend to set the show to run automatically, we recommend using this opportunity to select the groups you want the show to affect. Any group that you do not select here will be assigned **NA** in all of the show’s scenes. This effectively excludes the unselected groups from the show.

5 Click **Import Show**.

6 **Optional:** Rename the show by clicking the pencil icon next to its name in the **My Shows** panel.

Required Next Step:

- Implement the show by setting it to run automatically or assigning it to an input trigger (See **Implementing Shows in an Installation**, page 89)

Optional Next Steps:

- Add or modify time triggers (See **Setting Time Triggers**, page 84)
- Add or modify scenes for the show's triggers (See **Setting Scenes for Time Triggers**, page 87)
- Limit sunrise and sunset trigger times for installations at high latitudes (north or south) (See **Limiting Astronomical Triggers**, page 92)
- Set override permissions for the show (See **Enabling Show Control by DMX or Analog Input**, page 93, and/or **Enabling Show Override**, page 94)
- Export the show for use in other installations (See **Exporting a Show**, page 95)

Creating a Natural Show

Note: Ketra curates a default show called *Natural*, which can be found in the **My Shows** list. This show is automatically assigned to any keypad buttons with the "Natural" label. If you prefer a different natural show, you can either create your own using the steps below, or modify the existing show by selecting "Natural" in the **My Shows** list and making changes.

To create a natural show, follow these steps:

- 1 **Click Create Natural Show.** Clicking this button, found at the bottom of the **My Shows** panel on the left, will open a small dialogue box with basic configuration options. You can change any configurations you set here later on, by using the corresponding controls in the show's configuration page.
- 2 **Optional: Modify the minimum and maximum CCT and intensity.** You can think of these two sets of values as being the poles between which your lighting will transition at sunrise and sunset.
 - The minimum (**nighttime**) values correspond to triggers just before sunrise and just after sunset. **Example:** If sunrise occurs at 6 AM and sunset at 6 PM, then by default, your lights will be set to the minimum CCT and intensity from 6:30 PM to 5:35 AM.
 - The maximum (**daytime**) values correspond to triggers just after sunrise and just before sunset. **Example:** If sunrise occurs at 6 AM and sunset at 6 PM, then by default, your lights will be set to the maximum CCT and intensity from 6:30 AM to 5:30 PM.

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- 3 **Optional: Modify the morning and evening transition start times.** Use this feature to determine the times at which the “sunrise” and “sunset” transitions will begin. Each transition is a series of triggers lasting about 1 hour, gradually increasing or falling in CCT and intensity. These triggers make your lighting emulate sunrise and sunset.
 - **Astronomical:** The transition will begin at a certain offset from sunrise or sunset. The default offset is 30 minutes. You can change the offset by clicking the blue **Show Advanced Options** link, then modifying the **Offset** dropdown. **Example:** If you set **Sunrise Offset** to -1:00, then the first trigger in the show would occur 1 hour before sunrise.
 - **Fixed Time:** The transition will begin at the same time of day, every day. **Example:** If you set the **Morning Transition Start Time** to 7:00 AM, then the first trigger in the show would occur at 7:00 AM, regardless of the real time of sunrise that day.
 - 4 **Optional: Set an incandescent CCT threshold.** Click **Show Advanced Options** to reveal this option. Use a CCT threshold for shows that incorporate incandescent loads via analog outputs. Set the threshold value to the CCT of the incandescents.
- When the Ketra lights in a group are above the threshold CCT, the incandescents will turn off, ensuring no mismatch in color temperatures. When the Ketra lights in a group cross below the threshold, the incandescents will turn on. If they are integrated via 0-10V output, they will then dim as the Ketra lights go to lower CCTs.
- 5 **Name your show.**
 - 6 **Pick groups to apply the natural show to.** Select one or multiple from the list of all your groups.

Note: Any group that you do not select from this list will be assigned **NA** for every scene in the show. It is very important to note that this does not necessarily exclude the group from the show. If you intend for the show to run automatically without needing to be triggered from a keypad button, then **NA** is sufficient to exclude the group from the show. However, if you intend to assign the show to an input trigger like a keypad button, you must deselect the groups you want to exclude when assigning the show. See **Excluding Groups from Shows**, page 88.

The screenshot shows the 'Natural Show Settings' dialog box. It contains the following elements with numbered callouts:

- 1:** Instructional text: 'Select the settings you would like for your natural show.'
- 2:** A bracket grouping the 'Nighttime CCT' (2300 K), 'Daytime CCT' (4200 K), 'Nighttime Intensity' (80%), and 'Daytime Intensity' (100%) settings.
- 3:** A bracket grouping the 'Morning Transition Start Time' and 'Evening Transition Start Time' sections.
- 4:** The 'Enable Incandescent Threshold' checkbox, which is currently unchecked.
- 5:** The 'Name This Show' text input field.
- 6:** The 'Which targets should be assigned to this show?' section, which includes a list box containing 'Installation', 'Auditorium Lower', 'Foyer', 'Floor 1', 'Foyer General', and 'Foyer Staircase'.

At the bottom of the dialog are two buttons: 'Build Natural Show' and 'Cancel'.

fig. 91

7 Click **Build Natural Show**.

8 Rename the show by clicking the pencil icon next to its name in the **My Shows** panel.

You now have a natural show with pre-built time triggers and scenes. When running, the show will follow this sequence:

- i At the **Morning Transition Start Time**, the show will begin at the *Nighttime CCT* and *Nighttime Intensity*.
- ii Over the next hour, your lighting will smoothly transition to the *Daytime CCT* and *Daytime Intensity*.
- iii Your lighting will maintain the daytime CCT and intensity until the **Evening Transition Start Time**. (In the interim, other inputs—e.g., keypad buttons—can change the lighting state freely, triggering scenes, turning off power, and/or adjusting intensity and other parameters.)
- iv For an hour following the **Evening Transition Start Time**, your lighting will smoothly transition to the *Nighttime CCT* and *Nighttime Intensity*.
- v Your lighting will maintain the nighttime CCT and intensity until the **Morning Transition Start Time**. (In the interim, other inputs—e.g., keypad buttons—can change the lighting state freely, triggering scenes, turning off power, and/or adjusting intensity and other parameters.)

Required Next Step

- Implement the show by setting it to run automatically or assigning it to an input trigger (See **Implementing Shows in an Installation**, page 89)

Optional Next Steps

- Add or modify astronomical triggers (See **Astronomical Triggers**, page 85)
- Add or modify scenes for the show's triggers (See **Setting Scenes for Time Triggers**, page 87)
- Limit sunrise and sunset trigger times for installations at high latitudes (north or south) (See **Limiting Astronomical Triggers**, page 92)
- Set override permissions for the show (See **Enabling Show Control by DMX or Analog Input**, page 93, and/or **Enabling Show Override**, page 94)
- Export the show for use in other installations (See **Exporting a Show**, page 95)

Creating a Custom Show

To create a custom show, click **Create Show** at the bottom of the **My Shows** panel on the left. By default, the show will have no content, giving you full rein to customize it however you want.

Required Next Steps

- Create fixed-time, astronomical, or looping time triggers (See **Setting Time Triggers**, page 84)

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- Assign a scene to each time trigger (See [Setting Scenes for Time Triggers](#), page 87)
- Determine how and when the show should run:
 - Set the show to run automatically (See [Enabling a Show to Run Automatically](#), page 89)
 - Assign the show to a keypad button or contact-closure input (See [Enabling a Show to Run When Triggered](#), page 91)
 - Disable the show for later use (See [Disabling a Show for Later Use](#), page 92)

Optional Next Steps

- If using astronomical triggers, limit sunrise and sunset trigger times for installations at high latitudes (north or south) (See [Limiting Astronomical Triggers](#), page 92)
- Set override permissions for the show (See [Enabling Show Control by DMX or Analog Input](#), page 93, and/or [Enabling Show Override](#), page 94)
- Export the show for use in other installations (See [Exporting a Show](#), page 95)

Setting Time Triggers

In a show, a trigger is a time at which a change in lighting takes place. The triggers for any show can be found in the triggers list, near center screen. You can use the same pane to add, remove, and modify triggers.

There are three types of time trigger, and your show will function differently depending on which type you pick.

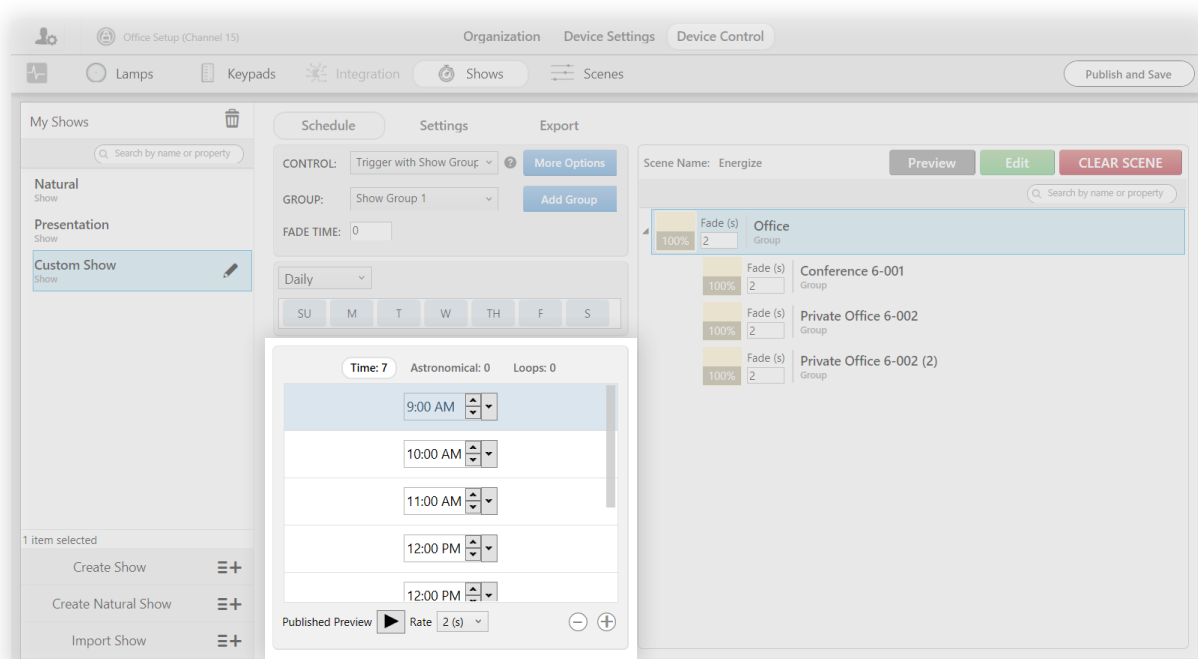


fig. 92

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Fixed Time Triggers

These take effect at specific times of day. **Example:** At 2 PM, a new scene plays; at 3 PM, another scene plays.

On the **Time** subtab of the triggers list, use the + button to add triggers. Remove triggers by highlighting one and clicking -.

You can change the time of a trigger using the dropdown, the increment/decrement buttons (^ and v), or by clicking on the time and typing a new one.

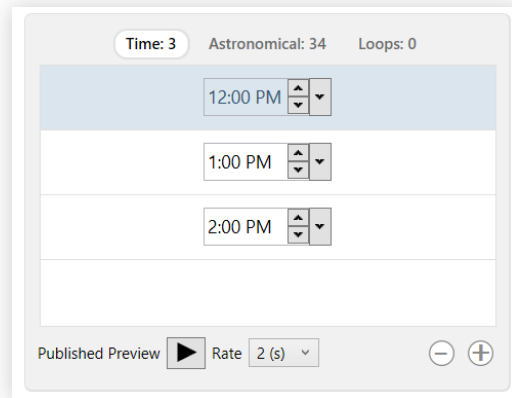


fig. 93

Astronomical Triggers

These take effect at times that are relative to sunrise and sunset. **Example:** Starting an hour before sunrise and lasting until an hour after sunrise, lighting gradually brightens to mimic sunlight.

Note: Times of sunrise and sunset are determined daily, based on the installation's location. This enables your lighting to stay in sync with natural light year-round.

On the **Astronomical** subtab of the triggers list, use the + button to add times; remove times by highlighting one and clicking -.

In this image, the show will trigger changes at sunrise and at four hours after sunrise, then again at four hours before sunset and at sunset.

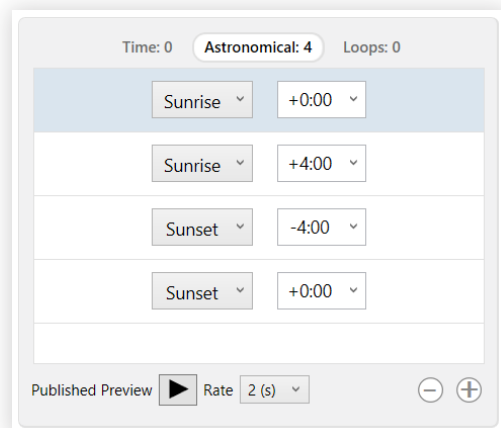


fig. 94

Note: For accelerated creation of a show with astronomical triggers, click **Create Natural Show** at the bottom of the My Shows list.

Looping Triggers

These take effect in a looping sequence. **Example:** Every 2 minutes, a new scene plays; after 6 minutes (i.e., 3 scenes), the sequence repeats.

For a step-by-step example of how loops work, see **6-Minute Looping Show**, page 100, in the **Tutorials** section. For an overview, continue reading this section.

Note: Design Studio does not support configuring loops to start from the beginning when triggered by a keypad button or contact closure. Looping goes on in the background at all times, even when the show is not active, so keypads and contact closures can only start the loop at whatever scene is currently active.

On the Loops subtab of the triggers list, use the + button to add triggers. Remove triggers by highlighting one and clicking the minus button, -.

Loops repeat after an amount of time provided by you. Each loop consists of multiple triggers. You will add individual triggers, and then determine how they fit together in a loop.

Note: The runtime must be a factor of 60 minutes. For example, your runtime can be 6 minutes, but not 7. It also cannot be less than 1 minute.

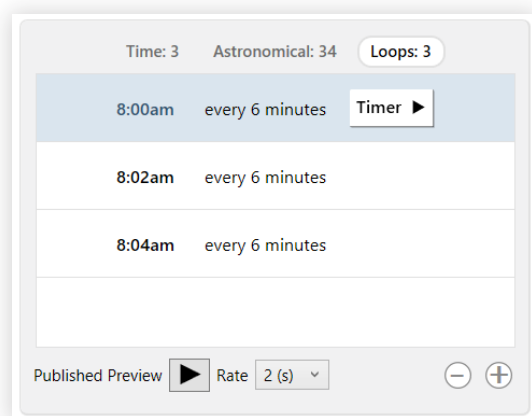


fig. 95

When you first add a trigger in a loop, it is considered undefined. To define a trigger, select it and click the **Timer** button to open the small configuration dialogue box. Each trigger needs to know the runtime of the loop it's in (**Loop every**), how long to wait before starting (**Start offset**), and the range of times to be active (**Starting at** and **Ending at**).

Setting Scenes for Time Triggers

For any trigger you select from the triggers list, you can use functionality native to the **Shows** tab to assign or modify a scene. To do so, follow these steps:

- 1 Select a trigger in the triggers list.
- 2 If assigning a scene, choose to create a new scene or copy from a previous scene.

If you are creating a new scene: Give your scene a name, and then click **Next**. Note that you cannot reuse names you have already used within one installation.

If you are copying a previous scene: Select the previous scene's name from the dropdown. Note that the dropdown only includes scenes you have used in this installation. Once you select a scene, you will have the ability to edit it or use it as it is. Any edits made to the copy will not be reflected in the original.

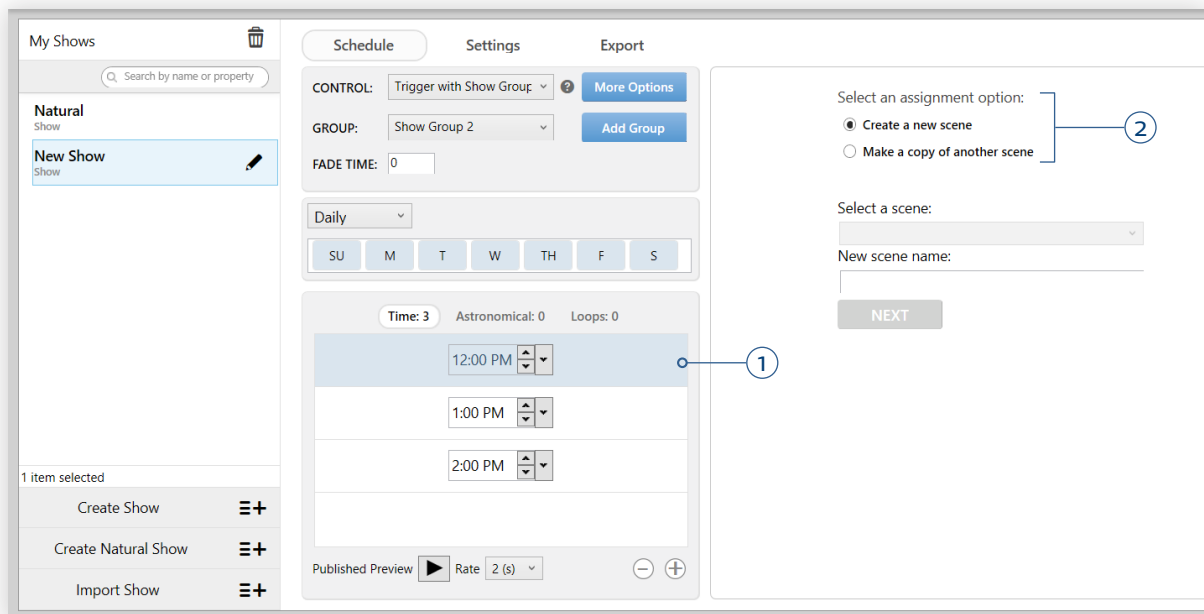
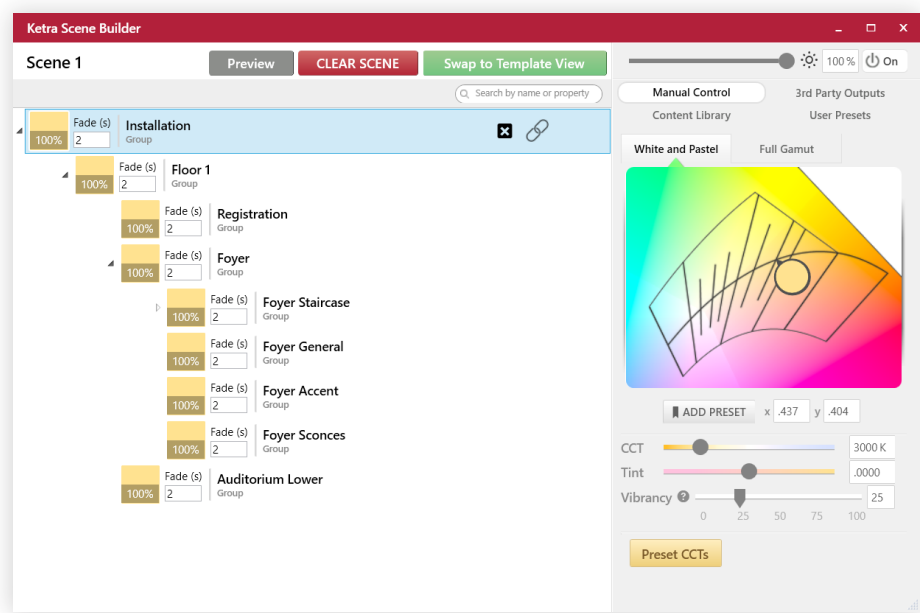


fig. 96

- 3 **Edit the scene.** Click the green **Edit** button to open the Ketra Scene Builder window. (Alternatively, if you created a new scene, the window will open automatically. See fig. 97 next page.)

For instructions on using the Ketra Scene Builder window, refer to **Building Scenes Using Scene Builder**, page 69.

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Ketra Scene Builder
fig. 97

4 Assign scenes to or modify scenes for other triggers in the triggers lists.

Note: In a custom show, you have to create a scene for any trigger you add to the list.

Excluding Groups from Shows or Triggers

Depending on the type of show (*Run Always* or *Trigger with Show Group*), you can exclude groups from shows or triggers.

	Ketra Only installation	Ketra with HomeWorks QS installation
Run Always show	<p>Exclude groups from individual triggers by setting them to NA.</p> <p>Has to be done by trigger, not for whole show</p>	<p>Do not use <i>Run Always</i> shows for Ketra with HomeWorks QS installations.</p>
Trigger with Show Group show	<p>When assigning the show to a keypad or contact-closure input, use the checkboxes to deselect groups you want to exclude.</p> <p>Has to be done for the whole show, not trigger by trigger</p>	<p>When assigning the show to a HomeWorks QS keypad, apply the show only to the groups you intend to use in the show. Any other groups will be excluded by default.</p> <p>Has to be done for the whole show, not trigger by trigger</p>

Implementing Shows in an Installation

Shows can either run automatically or run upon being triggered by a keypad button press or contact closure input.

Enabling a Show to Run Automatically

Caution: In **Ketra with HomeWorks QS** installations, you should set shows to run automatically using a timeclock in HomeWorks QS, not Ketra Design Studio. Make sure to set any of the shows you build in Design Studio to *Trigger with Show Group*, not *Run Always*, before you import the installation into HomeWorks QS.

If a show is set to run automatically, it will run on a recurring basis (you define how frequently).

Note: Automatic shows are ideal for groups that are not also being controlled by keypad. If a group is being controlled by keypad, it is more appropriate to assign the show to a keypad button, since automatic shows cannot be initiated or deactivated by a keypad button or other trigger.

To set a show to run automatically, follow these steps:

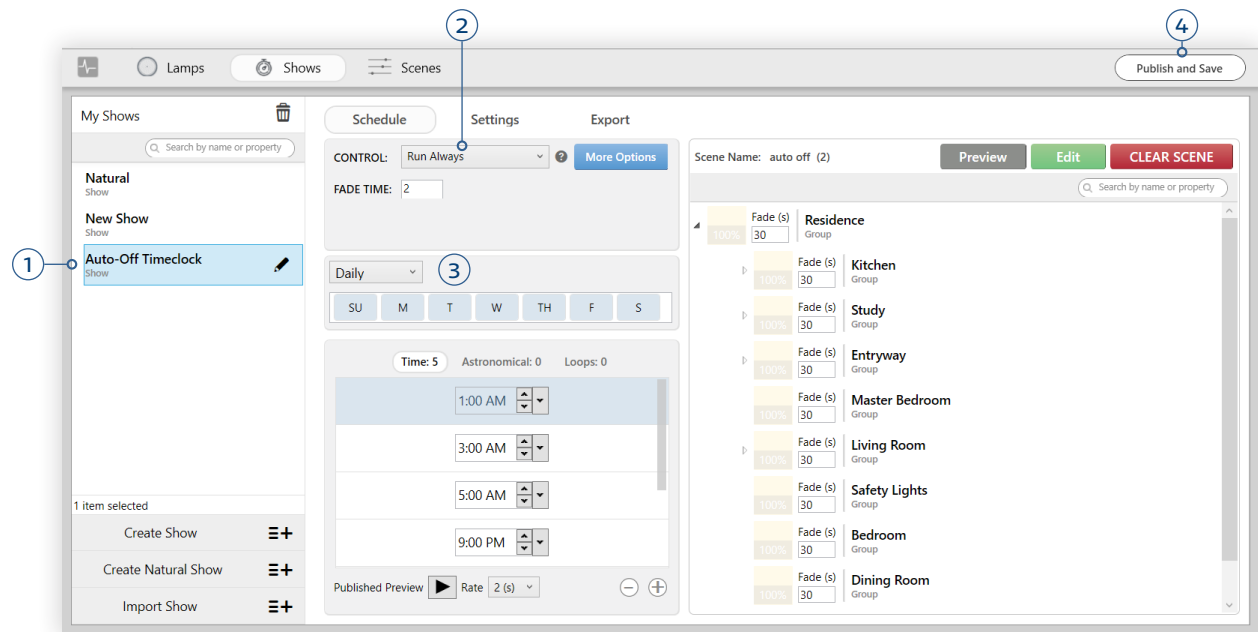


fig. 98

- 1 Select the show in the My Shows panel (left).
- 2 Set the Control dropdown.
 - In a **Ketra Only** show, choose "Run Always".
 - In a **Ketra with HomeWorks QS** show, choose "Trigger with Show Group".

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3 Optional: In a Ketra Only show, set days of the week, a date range, or a monthly schedule on which the show will run.

By default, automatic shows will run 365 days a year. However, you can use this run frequency tool to tell an automatic show to run only on, say, Monday through Friday in December.

You can configure your show's run frequency as one of the following:

- **Daily:** Determine which days of the week your show will run.



fig. 99

Note: Days of the week turn blue when they're selected, and white when they're deselected. For example, in the image above, Monday, Wednesday, and Friday are selected.

- **Date Range:** Set a range of dates for the show to run, using the two calendars. You can also choose days of the week to run. In the image below, a show is configured to run Monday through Friday in December.

You cannot set a date range that gets interrupted by a holiday or other event and then continues. To do that, you would need multiple shows.

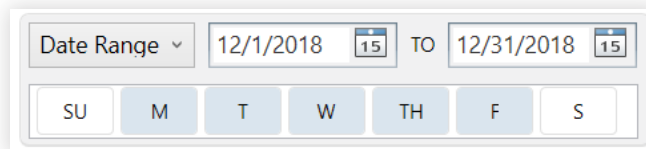


fig. 100

- **Monthly:** This option lets you repeat the show in a certain week of every month. Here, too, you can pick days of the week that you want your show to run. In the image below, the show will run every Monday, Wednesday, and Friday in the first week of every month.

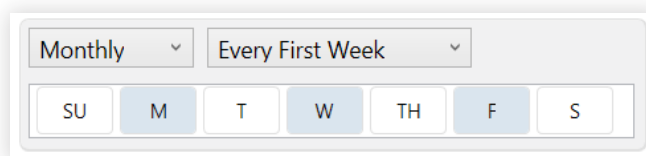


fig. 101

4 Save your settings by clicking Publish and Save in the top-right.

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Enabling a Show to Run When Triggered

Shows can be run upon being triggered by either a keypad button or a contact closure input (e.g., an occupancy sensor).

To assign a show to a keypad button or contact closure input, follow these steps:

- 1 Select the show in the **My Shows** panel (left).
- 2 Set the **Control** dropdown to "Trigger with Show Group". This tells the show you are going to assign it to a keypad or contact closure input. When the show is triggered, it will play on the keypad's or satellite's groups.

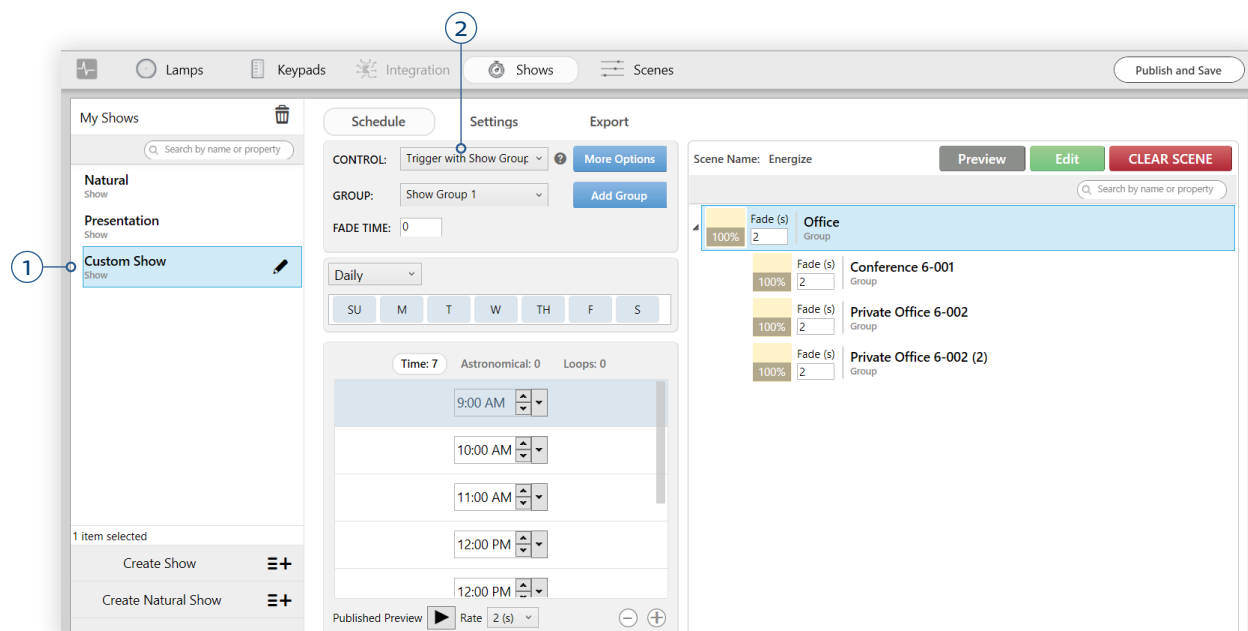


fig. 102

If you choose "Trigger with Show Group", pick a "show group" (i.e., category) for your show. You will reference the show group when you assign the show on the **Keypads** tab or **Integration** tab.

You can add a show group by clicking the **Add Group** button. To rename the show group, go to **Shows > Settings > Show Groups**. (This is covered in more detail in [Managing Show Groups](#), page 102.)

Note: You can put multiple shows into the same show group. When an analog input or keypad button press triggers the show group, all of the shows will play. You should therefore make sure that none of the shows that are grouped together will issue conflicting commands. For example, you might have one show that runs Monday through Friday and another show that runs Saturday and Sunday.

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Selecting "Trigger with Show Group" enables you to assign the show to a keypad button or analog input, but it doesn't automatically assign it for you. You still need to go to the **Keypads** or **Integration** tab and assign the show group to a trigger.

Note: When a show is triggered, it automatically retrieves the correct color and intensity configurations for the given time, even if their corresponding time trigger has already passed. So if you have a trigger for 2 PM and a trigger for 3 PM, then triggering the show at 2:30 PM will turn the lights on with the 2 PM setting.

Disabling a Show for Later Use

You can disable any show to save it for later while ensuring that it doesn't run on your lights. To do so, follow these steps:

- 1 Select the show in the **My Shows** list (left).
- 2 Set the **Control** dropdown to "Disabled".
- 3 Click **Publish and Save** in the top-right corner.

Note: If the show was part of a show group which had already been assigned to a keypad button or contact closure input, the show group will remain assigned to that input. However, the show itself will no longer be part of the show group. If that leaves the show group empty, then the input will not actually be able to trigger any changes to your lighting.

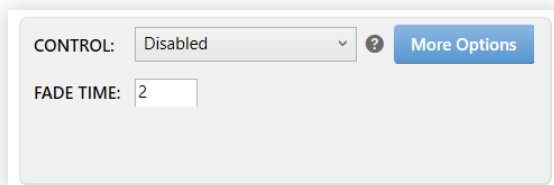


fig. 103

Other Operations

Limiting Astronomical Triggers

Whereas fixed time triggers are set to times like 2:00 PM, astronomical triggers are set to offsets from sunrise and sunset, e.g., **Sunset -2:00** rather than 4:00 PM. These triggers are typically used in natural shows.

Astronomical triggers can be problematic in high latitudes, where, for example, sunrise might come at 10:00 AM in January and 4:15 AM in June.

For greater control over the times at which a natural show runs, we recommend setting minimum and maximum times for sunrise and sunset. To do so, click **More Options** and customize the settings shown in the image below.

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Example: Say a circadian show begins with the trigger Sunrise +1:00. If you set the minimum sunrise time to 7:00 AM, the trigger will never occur earlier than 8:00 AM. Without this minimum, it would always occur an hour after sunrise, even if the sun rose at 5:00 AM.

More Options

☐ Enable master intensity override ?

☐ Enable auto-off timeclock linked to keypads

☐ SHOW OVERRIDE ?

☒ Set min/max sunrise time for astronomical triggers

Early: 7:00 AM Late: 8:00 AM

☒ Set min/max sunset time for astronomical triggers

Early: 7:00 PM Late: 8:00 PM

OK

fig. 104

Enabling Show Control by DMX or Analog Input

Check the box for "Enable Master Intensity Override" to allow a 0-10V or DMX input to control master intensity while the show controls intensity. This makes the show's intensity proportional to the input's master intensity command.

More Options

☐ Enable master intensity override ?

☐ Enable auto-off timeclock linked to keypads

☐ SHOW OVERRIDE ?

☐ Set min/max sunrise time for astronomical triggers

☐ Set min/max sunset time for astronomical triggers

OK

fig. 105

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Example:

- *Show A* has master intensity override enabled
- *Show B* has master intensity override disabled
- *Show A* and *Show B* both set lights to 50% intensity
- A photocell sends a command to dim both shows to master intensity = 60%
- *Show A* accepts photocell's master intensity command, dims lights to 50% of 60%, i.e. 30%
- *Show B* ignores photocell's master intensity command, dims lights to 50%

Note: Before they can interact with your show, third-party devices must be connected to an N3 Satellite via DMX or analog input. This is done in the **Integration** tab. See **Enabling Sensor Control > Photocells**, page 115; **0-10V and 0-24V Input Profiles**, page 132; and **DMX Input**, page 136.

Enabling Show Override

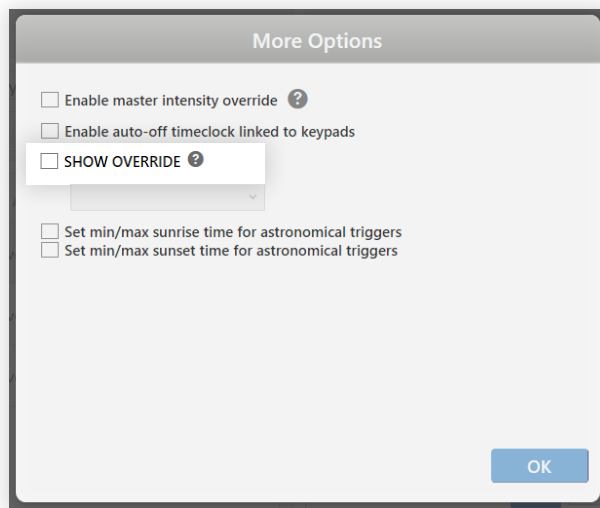


fig. 106

With **Show Override**, you can designate a show that you want the currently-selected show to override.

By default, shows don't know about each other; they just run at their given times. The result of this default can be chaos if you've got two shows controlling one group of lights at the same time, with the group trying to respond to commands from both. So if you know you want *Show A* to override *Show B* any time they're running simultaneously, then you should open *Show A* in the **Shows** tab, click **More Options**, check the "Show Override" box, and select "Show B" from the dropdown.

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Exporting a Show

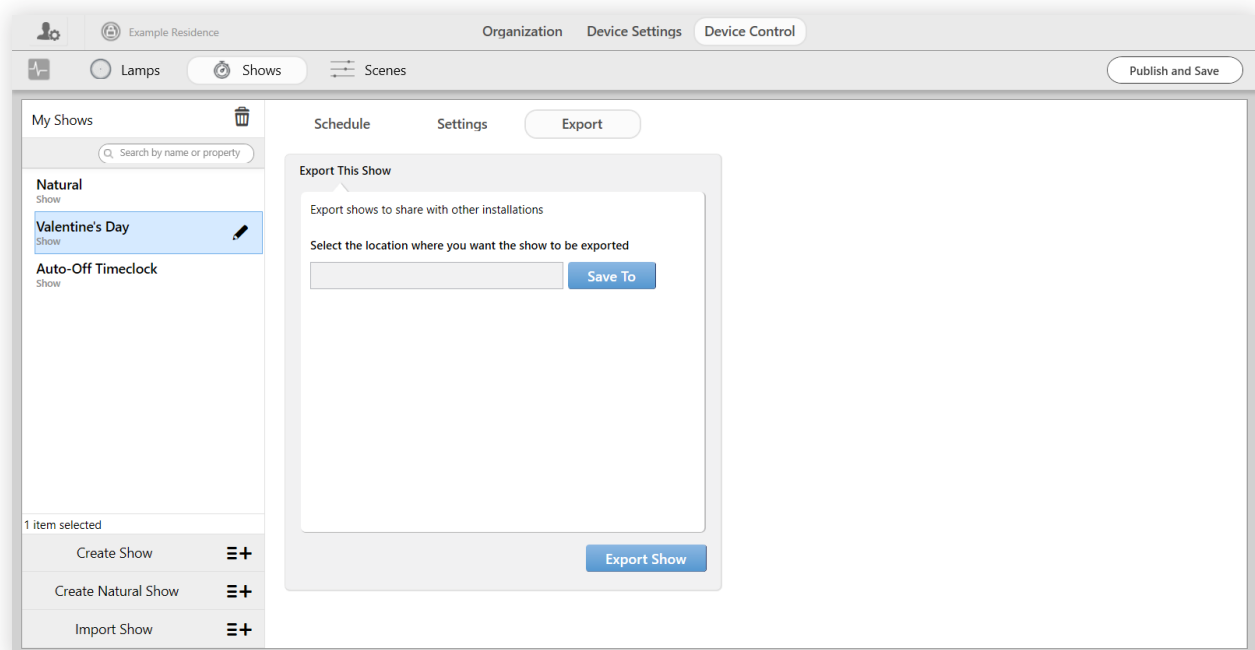


fig. 107

In the **Export** tab, Design Studio gives you the option to save a show to a local file, which you can then import into a separate Design Studio installation. The default save location is **Ketra > Time Trigger Shows**, where you will find some of Ketra's pre-made shows.

Tutorials

Auto-Off Timeclock

According to some building energy codes, commercial spaces that don't have vacancy sensors must automatically turn their lights off outside of normal business hours. You can do this by creating an auto-off timeclock show in the Shows tab.

Note: The groups you intend to turn off must be controlled by at least one keypad.

Will my keypad still respond to touch control after-hours?

Yes. Users coming in after-hours will be able to press any button on the keypad to turn on the lights. (This is referred to as a manual override; some codes require it.)

To set up an auto-off timeclock, follow these steps:

- 1 Click **Import Show** at bottom-left.
- 2 In the dialogue box, select the file **Auto Off Timeclock.KTRA**.
- 3 Name the show.

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- 4 Select the highest-level group in the installation. This group will be the first in the list and will likely be named "Installation" or "Office".
- 5 Click Import Show.

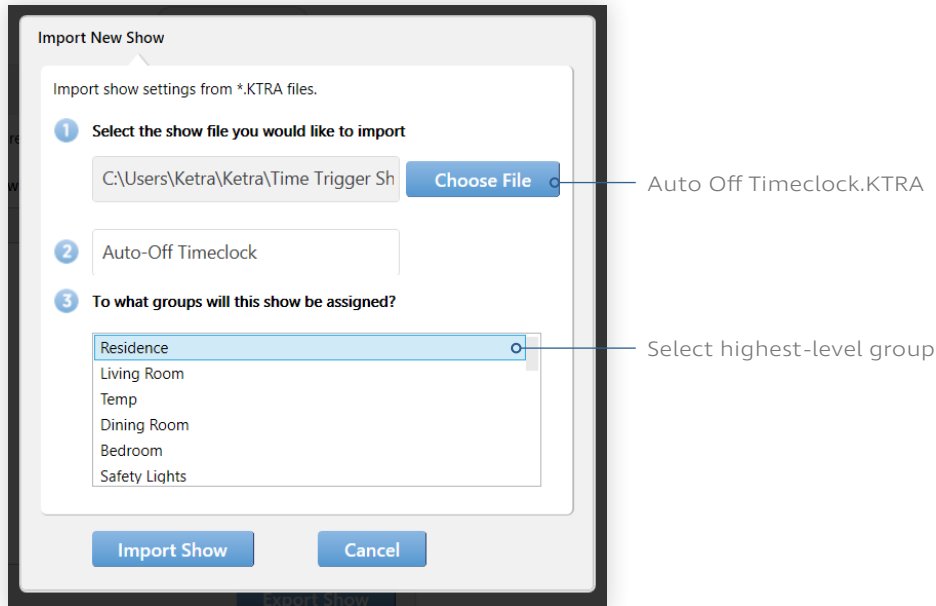


fig. 108

- 6 In the upper-right, click Publish and Save.

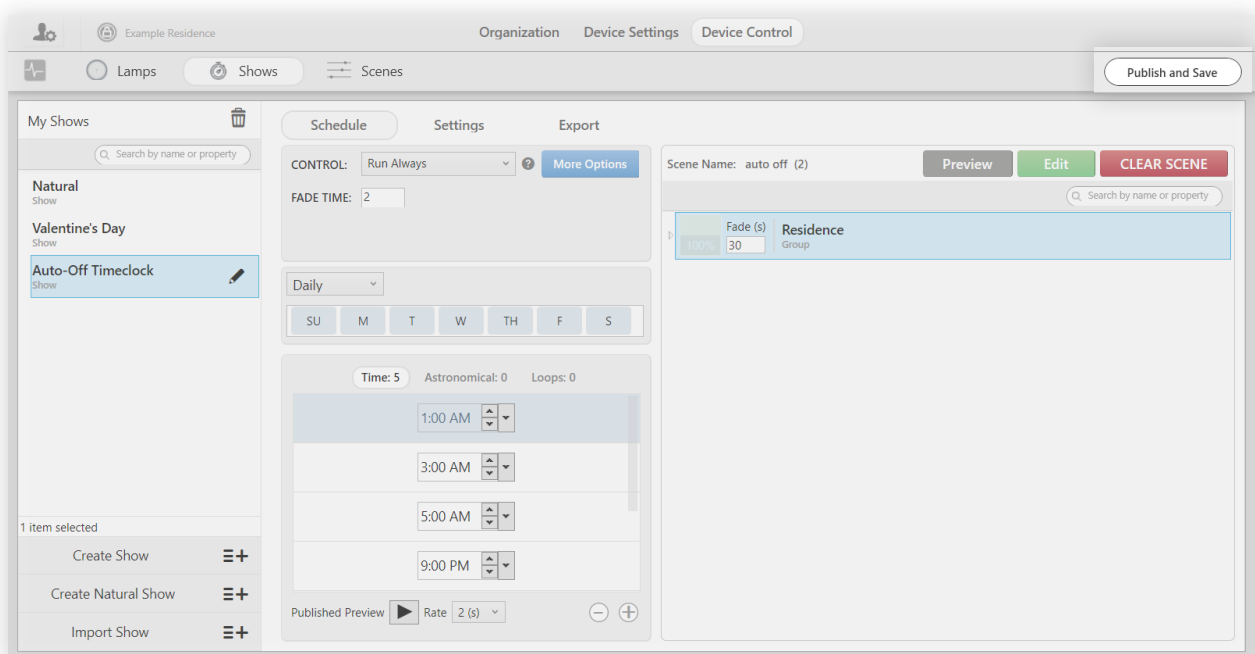


fig. 109

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You now have a working auto-off timeclock show.

- At 9 PM, the auto-off show will turn off every group in the installation.
- A user can manually override the show by pressing a button on any keypad.
- Every two hours, the auto-off show will confirm that the lights are still off. If it finds the lights on, it will turn them off.

Note: Even if a user manually overrides the show at 10:59 PM, the show will turn the lights back off at 11 PM. In that case, the user can just manually override again and the lights will stay on for two hours.

- At opening time, a user can press any button on the keypad to turn on the lights.

Automated Open/Close Time

In this tutorial, we'll imagine a business that is open 7 days a week. On weekdays, it is open from 10 AM to 9 PM. On Saturday and Sunday, it is open from 12 PM to 6 PM. To automate open and close times for this business, we will build **two** shows—one for weekdays, and one for weekends.

The weekday show will:

- Run automatically Monday through Friday
- Turn all lights on at 8:00 AM (1 hour prior to opening)
- Trigger a user-defined *Retail* scene at 8:55 AM (5 minutes prior to opening)
- Turn all lights off at 10:30 PM (1.5 hours after closing)

Note: For the purposes of this tutorial, we'll assume that the *Retail* scene has already been built on the *Scenes* tab.

The weekend show will:

- Run automatically Saturday and Sunday
- Turn all lights on at 11:00 AM (1 hour prior to opening)
- Trigger a user-defined *Retail* scene at 11:55 AM (5 minutes prior to opening)
- Turn all lights off at 7:30 PM (1.5 hours after closing)

To configure the weekday show, follow these steps:

- 1 **Create a new show.** You can do so by clicking **Create Show** at the bottom of the My Shows panel.
- 2 **Rename the show something like "Weekday Open/Close."** To rename a show, highlight it in the My Shows list and click the pencil icon.
- 3 **Set the Control dropdown to "Run Always".**

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- 4 To make sure the show only runs on weekdays, deselect Saturday and Sunday in the run frequency pane. When deselected, the S and SU buttons will turn white instead of blue.
- 5 In the triggers list, add 3 triggers on the Time tab by clicking the + button. We will program one trigger to turn all lights on, another to set lights to the *Retail* scene, and the last to turn all lights off.
- 6 Set times for the triggers. In our example, the times are 8:00 AM (1 hour before opening), 8:55 AM (5 minutes before opening), and 10:30 PM (1.5 hours after closing).
- 7 Make a copy of a generic *On* scene for the first trigger. Since this trigger will just turn all lights on, we recommend making a copy of the *Collaborate* or *Daytime* scene. This will set every light in the installation to a warm white at 100% intensity.

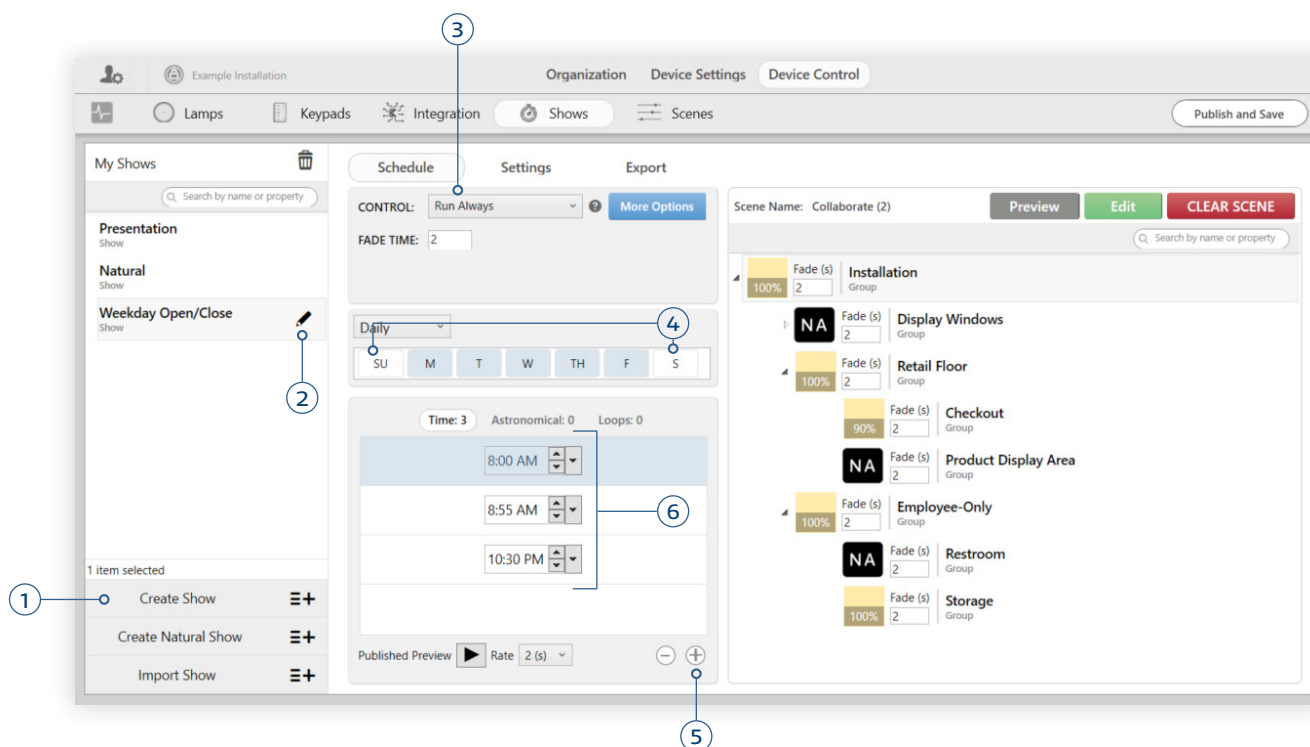


fig. 110

Note: To exclude some groups from the trigger, click the green **Edit** button to open the Ketra Scene Builder window, then set the groups to **NA** by highlighting them and clicking the **X** button. Note that this method of excluding groups from triggers only applies to shows that run automatically. If you intend to link the show to a keypad button or analog input, do not use **NA**. For more information, see [Excluding Groups from Shows](#), page 88.

- 8 Make a copy of the *Retail* scene for the second trigger.

Note: For the purposes of this tutorial, we'll assume that the *Retail* scene has already been built on the *Scenes* tab.

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- 9 Create a new scene for the third trigger. Name the scene something like "All Off."
- 10 In the Ketra Scene Builder window, set the highest-level group to Off. To do so, highlight the group and click the power button in the top-right corner of the window (next to the intensity slider).

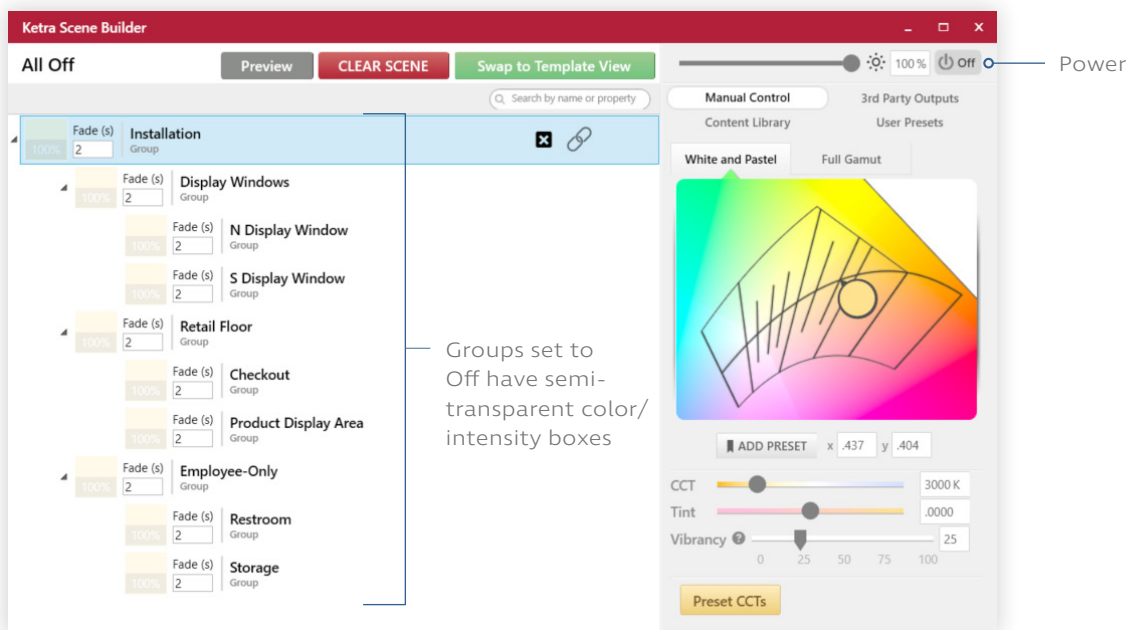


fig. 111

- 11 Close the Ketra Scene Builder window.

Repeat those steps for the weekend show, substituting configurations where appropriate. You can make a copy of the *All Off* scene this time. The finished *Weekend Open/Close* show should look like this:

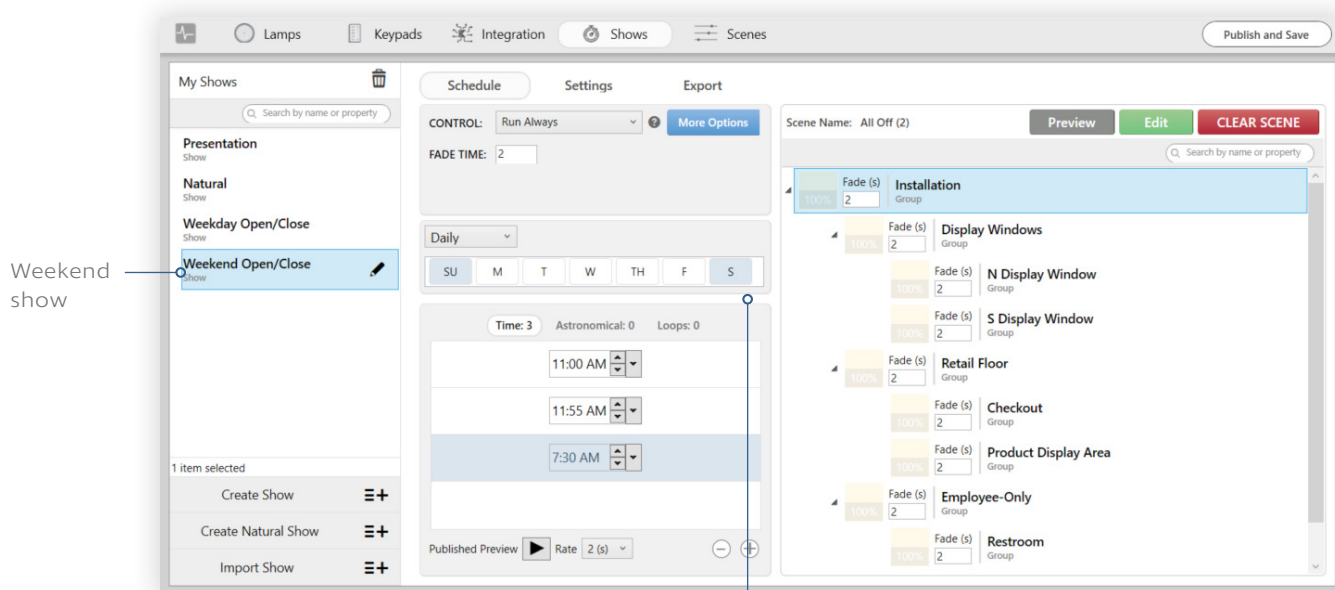


fig. 112

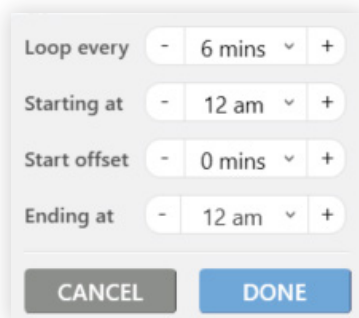
Only runs on Saturday and Sunday

After configuring both shows, click the **Publish** and **Save** buttons in the top-right corner.

6-Minute Looping Show

Let's create a six-minute loop with three triggers, where each trigger lasts two minutes. The loop will run all day, repeating every six minutes.

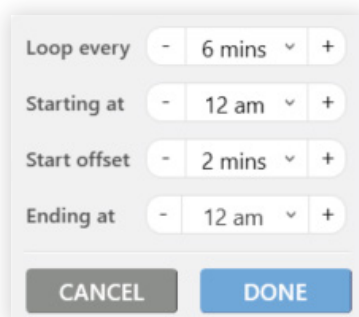
- 1 In the **Loops** subtab of the triggers list, click the **+** button three times. This creates three undefined triggers.
- 2 Highlight the first trigger and click **Timer**.
- 3 Set **Loop Every** to 6 mins.
- 4 Set **Start Offset** to 0 mins. This means that the first trigger will become active zero minutes into the loop.
- 5 Since we want the loop to run all day, leave **Starting At** and **Ending At** at their default value of 12 am.
- 6 Click **Done**.

A configuration dialog box for a trigger. It has four rows of settings, each with a label, a minus button, a value, a dropdown arrow, and a plus button. The settings are: 'Loop every' with '6 mins', 'Starting at' with '12 am', 'Start offset' with '0 mins', and 'Ending at' with '12 am'. At the bottom are two buttons: 'CANCEL' and 'DONE'.

First trigger

fig. 113

- 7 Highlight the second trigger and click **Timer**.
- 8 Repeat steps 3-5, this time setting **Start Offset** to 2 mins. Note that **Loop Every** should be the same as in the previous trigger. Setting **Start Offset** to 2 mins means that this second trigger will become active two minutes into the loop—i.e., after the first trigger gets its two minutes.
- 9 Click **Done**.

A configuration dialog box for a trigger, identical to the first one but with 'Start offset' set to '2 mins'.

Second trigger

fig. 114

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- 10 Highlight the third trigger and click **Timer**.
- 11 Repeat steps 3-5, this time setting **Start Offset** to 4 mins. Again, it is important that **Loop Every** be set to 6 mins. Setting **Start Offset** to 4 mins means that this third trigger will become active four minutes into the loop—i.e., after the first and second triggers have each had their two minutes.
- 12 Click **Done**.

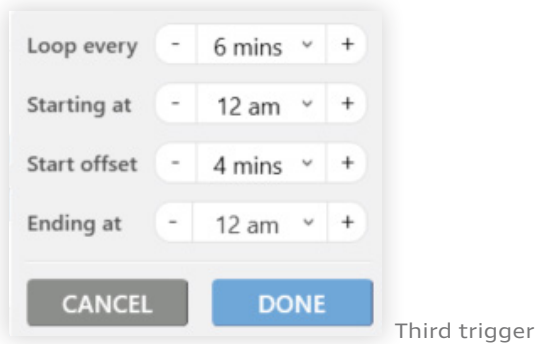
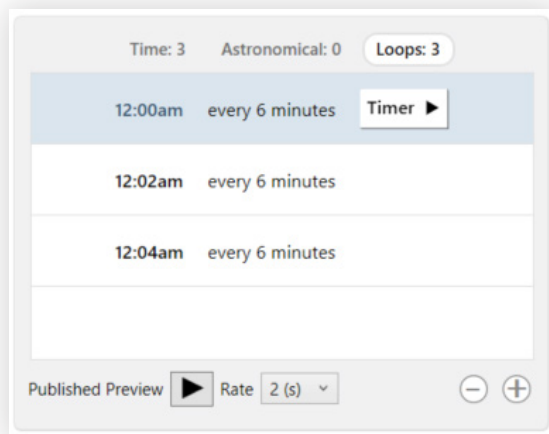


fig. 115

You now have a loop that repeats 3 triggers every 6 minutes, giving each trigger 2 minutes to run.



Finished loop

fig. 116

Note: Design Studio does not support configuring loops to start from the beginning when triggered by a keypad button or contact closure. Looping goes on in the background at all times, even when the show is not active, so keypads and contact closures can only start the loop at whatever scene is currently active.

Managing Show Groups

- To add a show to a show group, use the **Control** dropdown in the top-left corner (just right of the My Keypads panel). Afterward, you will be able to assign the show group to a Ketra keypad button, contact-closure input, or HomeWorks QS keypad.

Note: A show group can consist of one show or multiple shows. If the show group contains multiple shows and you assign it an input trigger (i.e., keypad button or contact closure), then multiple shows will play when the input is received.

- To create a show group, use the **Schedule** tab for any given show. First set the **Control** dropdown to "Trigger with Show Group", then press the **Add Group** button that appears. The generic name will be "Show Group <X>".
- To rename a show group, use the **Settings** tab for any given show. In the Show Groups list, highlight the group and click the **pencil icon** next to its name.

Note: Renaming a show group will not change its assignments.

- To delete a show group, use the **Settings** tab for any given show. In the Show Groups list, highlight the group and click the **X** button.

Note: Deleting a show group does not delete any shows that the show group contains. If you have already assigned the show group to a keypad button or contact closure, you should change the button or CC's programming before publishing.

Programming Ketra Keypads

In the **Device Control** tab, device categories are displayed near the top of the screen. The **Keypads** tab is where you assign scenes and shows to Ketra keypad buttons. We recommend building scenes on the **Scenes** tab and shows on the **Shows** tab, although you can build them on the **Keypads** tab as well.

About keypads:

- **Keypads control groups of Ketra lights, X2 dimmers, and outputs.** With a single keypad, you can control multiple groups at the touch of a button. Keypads can be programmed to give detailed instructions to groups, including color configurations and time triggers.
- **By default, keypads can control the group they belong to as well as any subgroups in the hierarchy.** For example, a Kitchen keypad might control devices in the "Kitchen" group as well as in the subgroups "Task", "General", and "Accent". This hierarchical control enables discrete zone control, since one button on the keypad might be programmed to affect "Task" while another affects "General".
- **Keypads can be independent or linked.** If you have more than one keypad controlling the same groups, Design Studio will automatically link them.

Contents

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The Keypads Tab

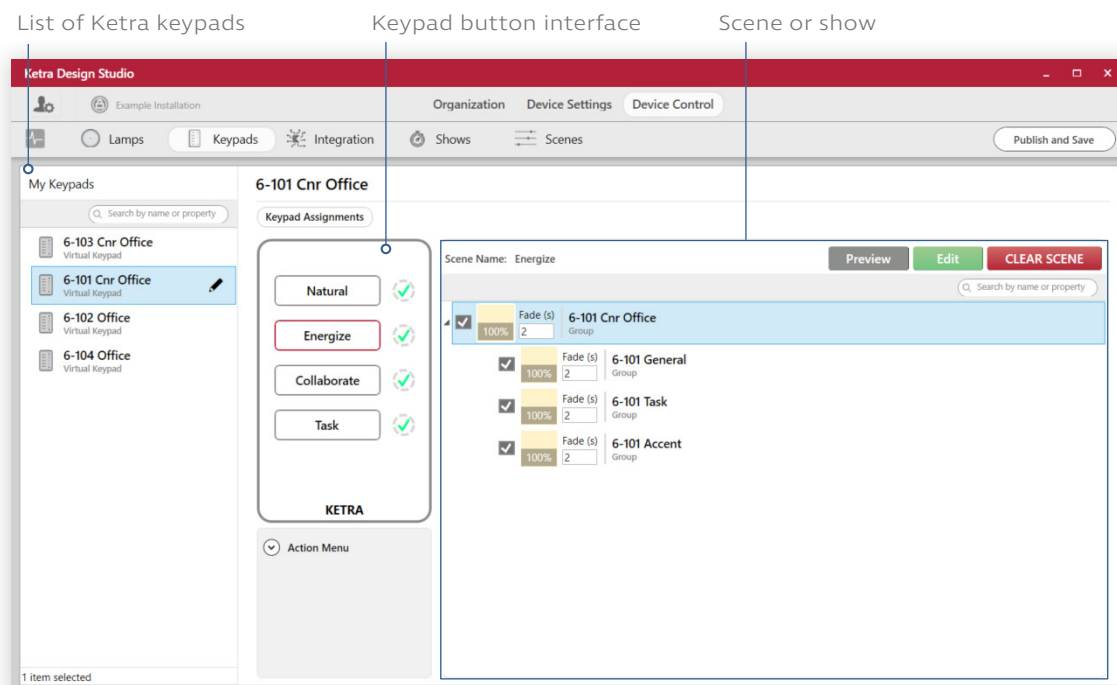


fig. 117

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When you select a keypad in the My Keypads list on the left, the center of the screen changes to display the keypad's buttons. You can assign scenes and shows to these buttons by clicking them on the screen.

You'll notice that Design Studio also displays the keypad's grouping hierarchy. The groups that appear on this screen represent the keypad's place in the overall installation hierarchy. Recall that keypads can control their own groups plus any subgroups.

Note: If the keypad should control additional groups, return to the **Organization** tab and move the keypad to its appropriate place in the hierarchy.

In the grouping hierarchy reproduced on the **Keypads** tab, you can use the checkboxes to determine which of the keypad's groups the scene or show will affect when the given button is pressed. Any checked groups will go to the scene when the user presses the button, turn off when the user presses the button again, and dim when the user presses the intensity controls.

Assigning a Scene

To assign a scene to one of your keypad buttons, follow these steps:

- 1 Select a keypad in the My Keypads panel at left, then select the button to program. If the button has default content, click **Clear Scene** or **Clear Show**.
- 2 Select "Assign a Scene" in the Content Type dropdown, then click **Next**.

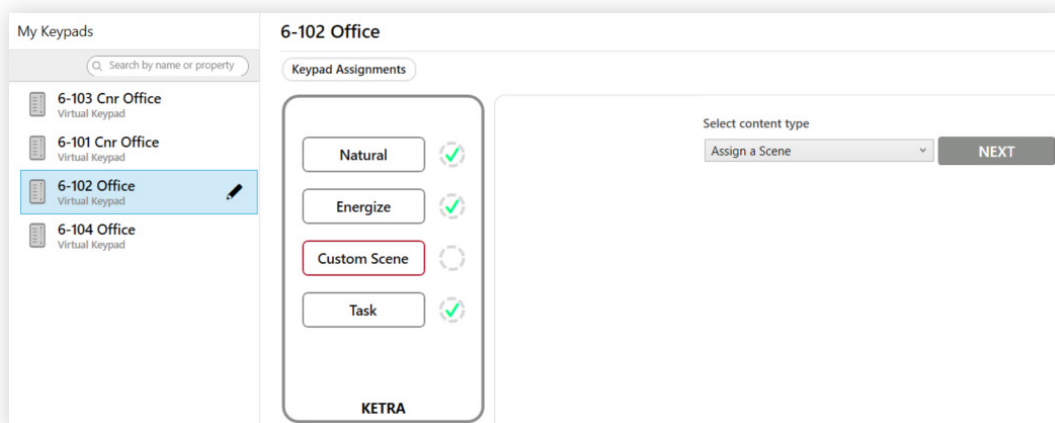


fig. 118

- 3 Select **Use an already constructed scene** for the assignment option (recommended). We recommend building scenes on the **Scenes** tab, then assigning them on the **Keypads** tab. You will be able to control the groups that will be affected when the scene is triggered.

Note: If you intend to make any modifications to the existing scene, select **Make a copy of another scene**. This will ensure that your modifications do not take effect throughout the installation wherever the original scene is applied.

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- 4 Select or name the scene and click **Next**.

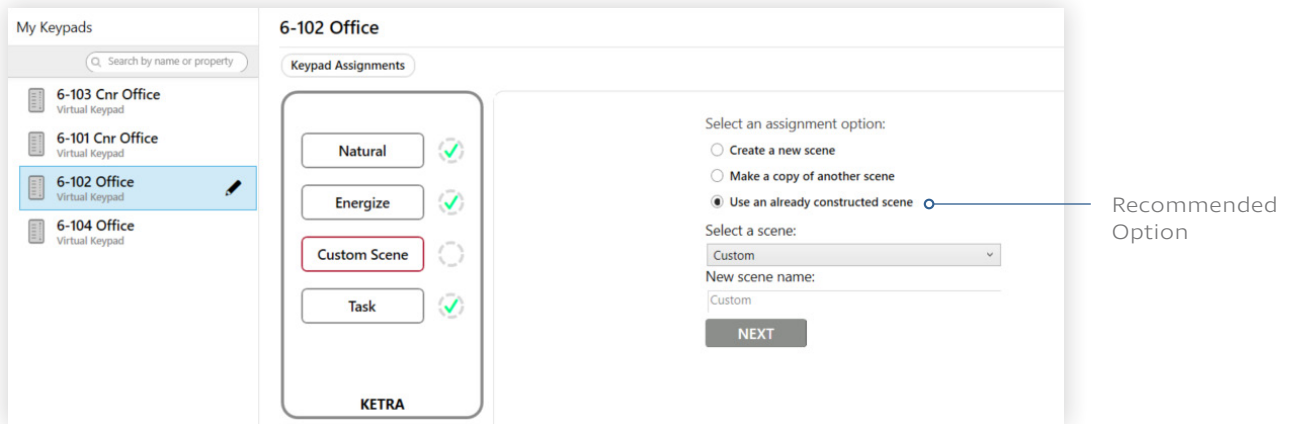


fig. 119

- 5 **Optional:** Use the checkboxes to set which groups can be controlled by the button. If a group does not have a checkmark, the keypad will not send it any commands when the scene is activated, dimmed, or deactivated. Effectively, the group is excluded from the scene.

Note: To enable discrete zone control on a keypad, use these checkboxes. For example, to ensure that a scene only affects the "Accent" group, check only the box for Accent.

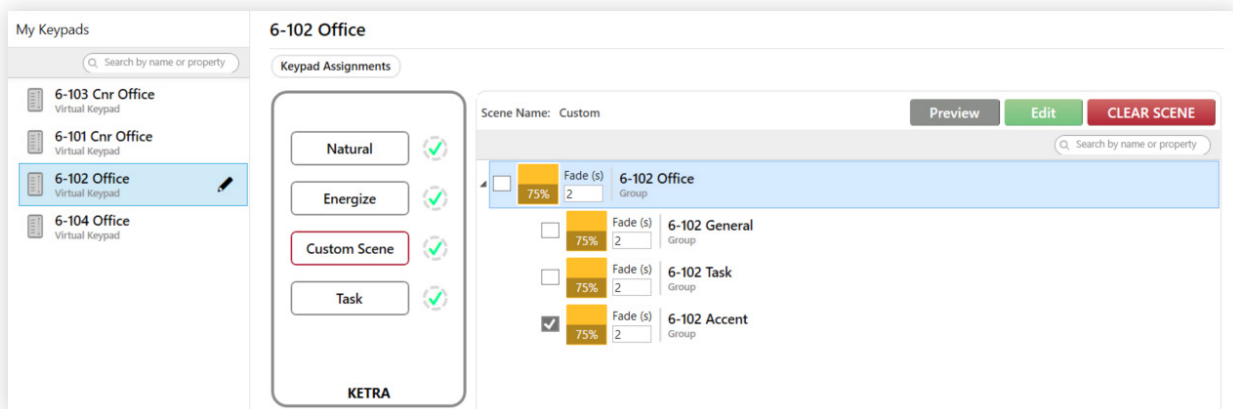


fig. 120

- 6 **Publish your settings.** This saves your configurations to your keypad. Click **Publish** and **Save** in the top-right corner of the screen. For more information on publishing, see [Publishing](#), page 152.

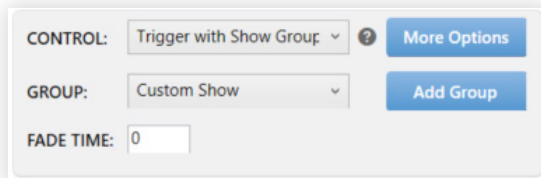
Assigning a Show

Note: Shows can be assigned to an input (e.g., a keypad button) or set to run automatically. For more information on setting shows to run automatically, see [Enabling a Show to Run Automatically](#), page 89.

To assign a show to one of your keypad buttons, follow these instructions:

- 1 Go to Device Control > Shows.
- 2 Make sure that the show has been created and assigned to a show group. To assign a show group, set the Control dropdown to "Trigger with Show Group" and pick a "show group" (i.e., category) for your show.

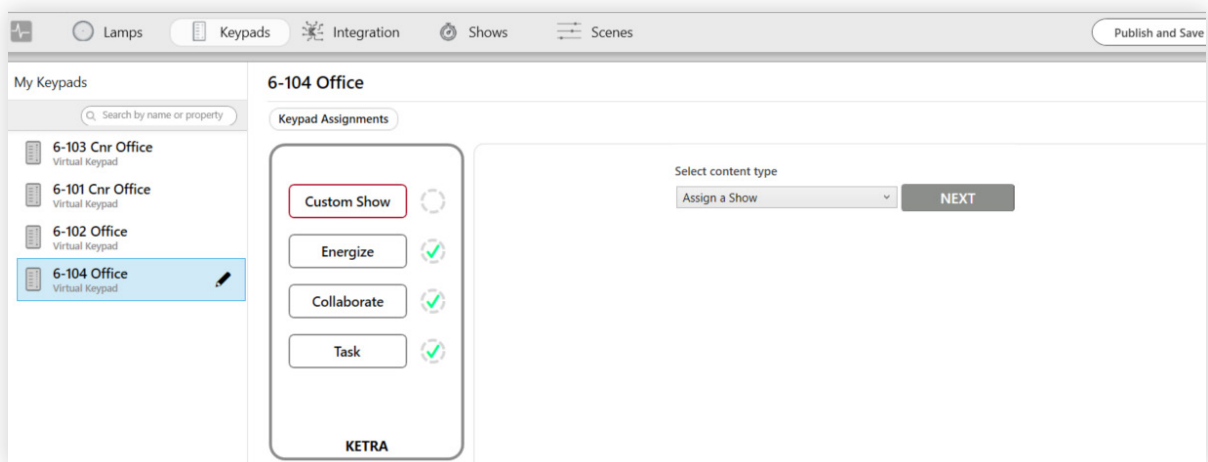
You can add a new show group by clicking the **Add Group** button. To rename the show group, go to Shows > Settings > Show Groups.



The screenshot shows a configuration panel for a show. It has three main sections: 'CONTROL' with a dropdown set to 'Trigger with Show Group' and a 'More Options' button; 'GROUP' with a dropdown set to 'Custom Show' and an 'Add Group' button; and 'FADE TIME' with a text input set to '0'.

fig. 121

- 3 Return to Device Control > Keypads.
- 4 Select a keypad in the My Keypads panel on the left, then pick the button to program. If the button has default content, click **Clear Scene** or **Clear Show**.
- 5 Select "Assign a Show" in the Content Type dropdown, then click **Next**.



The screenshot shows the '6-104 Office' keypad configuration page. On the left, a 'My Keypads' list shows four virtual keypads, with '6-104 Office' selected. The main area is titled '6-104 Office' and 'Keypad Assignments'. It displays a keypad layout with buttons: 'Custom Show' (highlighted with a red border), 'Energize', 'Collaborate', and 'Task'. Each button has a green checkmark icon to its right. Below the buttons is the 'KETRA' logo. On the right, there is a 'Select content type' dropdown menu set to 'Assign a Show' and a 'NEXT' button.

fig. 122

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- 6 Select a show group ID to assign.
- 7 **Optional:** Use the checkboxes to set which groups can be controlled by the button. If a group does not have a checkmark, the keypad will not send it any show commands, including activation, deactivation, and dimming. Effectively, the group is excluded from the show.

Note: To enable discrete zone control on a keypad, use these checkboxes. For example, to ensure that a show only affects the "Accent" group, check only the box for Accent.

- 8 **Optional:** Use the "Fade Time" text field to adjust the time it takes to fade between scenes in the show.
- 9 **Publish your settings.** This saves your configurations to your keypad. Click **Publish and Save** in the top-right corner of the screen. For more information on publishing, see [Publishing](#), page 152.

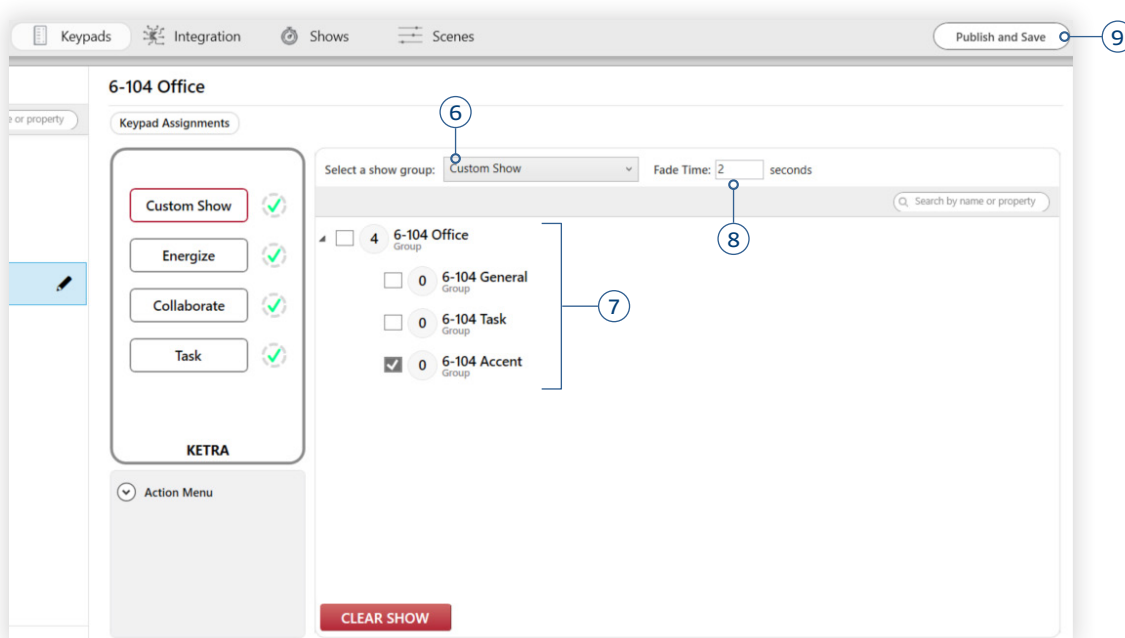


fig. 123

Automatic Button Linking

Whenever two or more keypad buttons (whether on the same or different Ketra keypads) control the same groups, Design Studio automatically links them. Pressing one button will trigger a change in the state of the other button's backlighting (illuminated, dark, or flashing). This automatic linking requires nothing of the programmer while ensuring that the user always receives accurate information about group states.

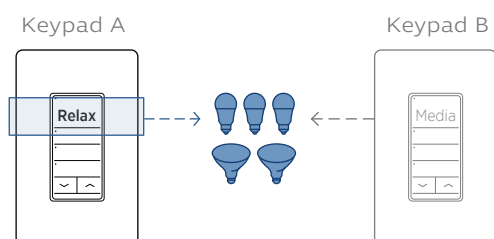
DESIGN STUDIO 3.0

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Design Studio links two buttons when it detects a) overlap in the groups they control, or b) overlap in their content settings. There are several forms of linking:

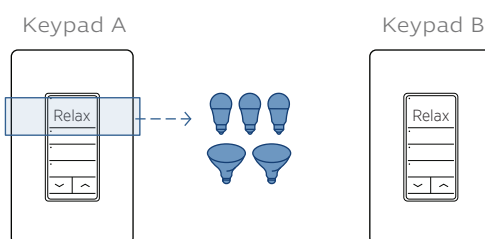
- **Cascading:** The buttons control all the same groups using different scenes. Pressing one button causes the other(s) to go dark.
- **Mirroring:** The buttons control all the same groups using the same scene. Pressing one button highlights the other(s).
- **Parent/Child:** One button controls a set of groups while the other button(s) control a subset of those groups. Pressing the parent button will cause the child button to illuminate, since its groups are on. Pressing the child button will cause the parent to go to a flashing "modified" state, since some of its groups are now playing different content.

Scenario 1: Cascading



Relax and Media control the same groups with different content. Selecting **Relax** causes the **Media** button to turn off.

Scenario 2: Mirroring



These keypad buttons control the same groups with the same content. Selecting **Relax** on Keypad A causes the **Relax** button on Keypad B to light up.

fig. 124

Design Studio will automatically determine how commands from parent keypads affect child keypads. Setting a **Whole House** keypad to *Power Off* will set all house keypads to *Power Off*. If someone then sets the **Dining Room** keypad to another setting, the top scene button of the **Whole House** keypad will flash to indicate a modified state, while all other keypads remain in the off state.

Tutorials

Adding a Global On/Off Button to a Local Keypad

Example: Adding an **All On / All Off** button to an entryway keypad

- 1 **On the Organization tab, place the keypad in the highest-level group in the installation.** The default name of this group will be either "Residence", "Office", or "Installation", depending on the type of installation.

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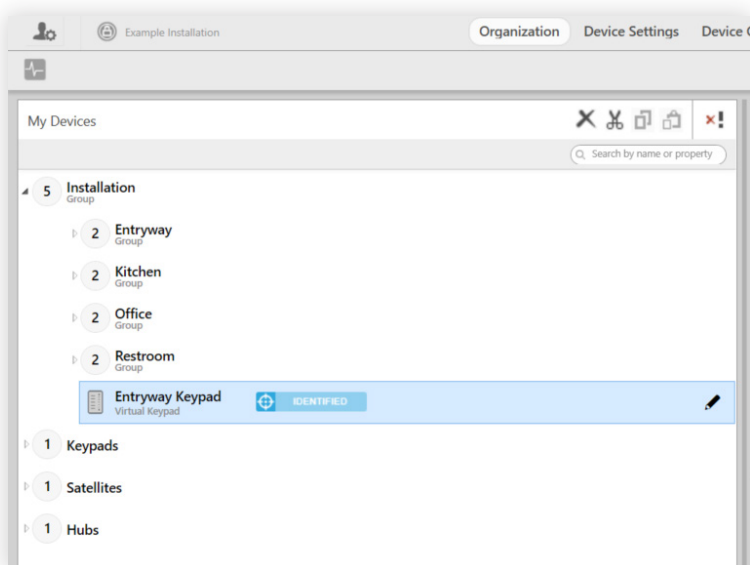
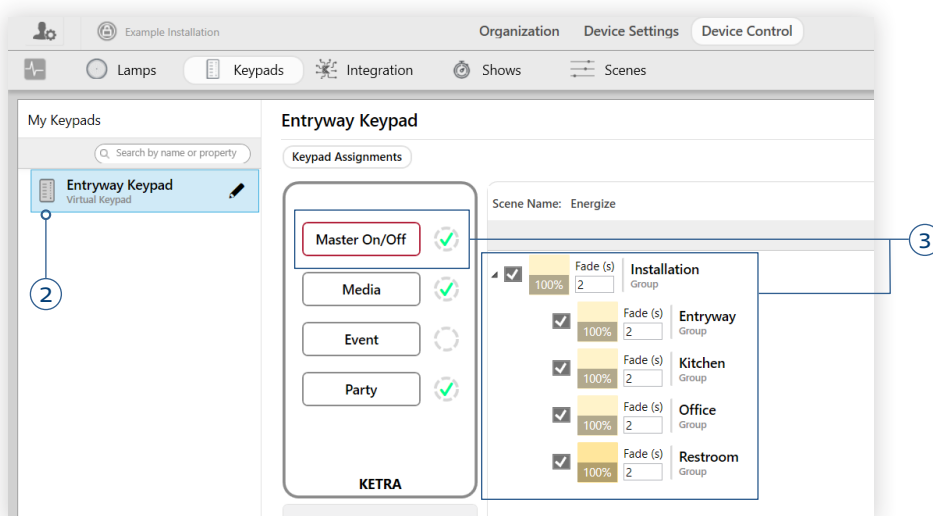


fig. 125

- 2 Go to Device Control > Keypads and select the keypad at left.
- 3 Make a Master On/Off button and program it as desired.
 - If you want the button to turn on and off every group in the installation, make sure every group is checked. (Pictured)
 - If you want the button to only turn on and off some groups, make sure those groups are checked and the others are unchecked.
 - If you want the button to turn on a subset of groups but turn off all groups, use the **NA** feature. First, make sure all groups are checked. Then edit the scene such that the groups you do not want the button to turn on are marked **NA**, while those you do want it to turn on are set. When the user taps the **Master** button to turn it on, only the groups that are not marked **NA** will power on. When the user taps the **Master** button to turn it off, all checked groups will turn off.



When the button is pressed, all groups will turn off or on

fig. 126

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Note: To exclude a group from a scene, select the scene button in the **Keypads** tab and uncheck the group. A common error is to try to exclude groups from scenes using the NA feature on the **Scenes** tab rather than unchecking the group on the **Keypads** tab. NA groups do not respond to the activation of a scene, but they do turn off when the scene is deactivated, and they are also affected by the keypad's dimming controls.

- 4 For the other keypad buttons, uncheck all groups except the "Entryway" group and/or subgroups. This ensures that those buttons only control the lighting in the entryway or entryway zones.

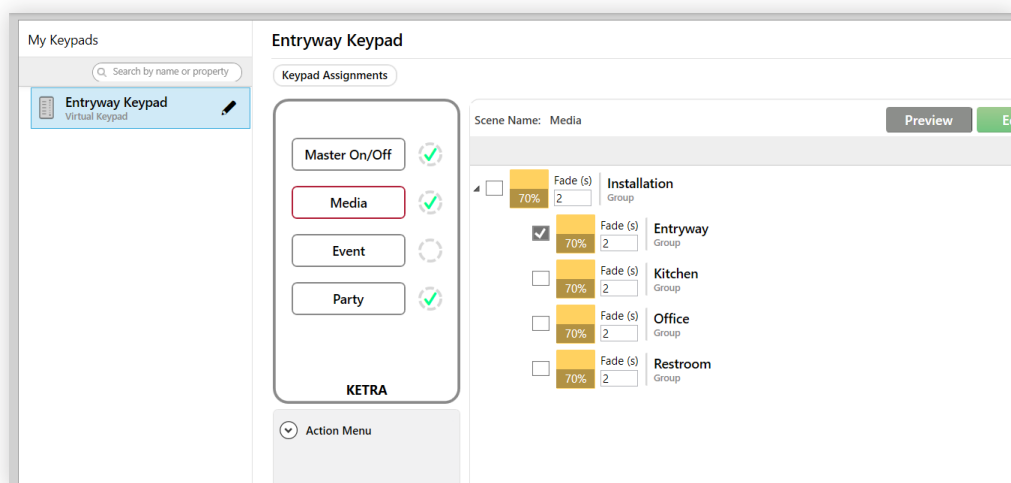


fig. 127

Configuring Discrete Zones on One Keypad

Example: Programming a Kitchen keypad with General, Task, and Accent zones

- 1 On the **Organization** tab, place the keypad in the room-level group. In our example, the keypad goes in the Kitchen group. It will then be able to control any devices in the "General", "Task", and "Accent" groups.

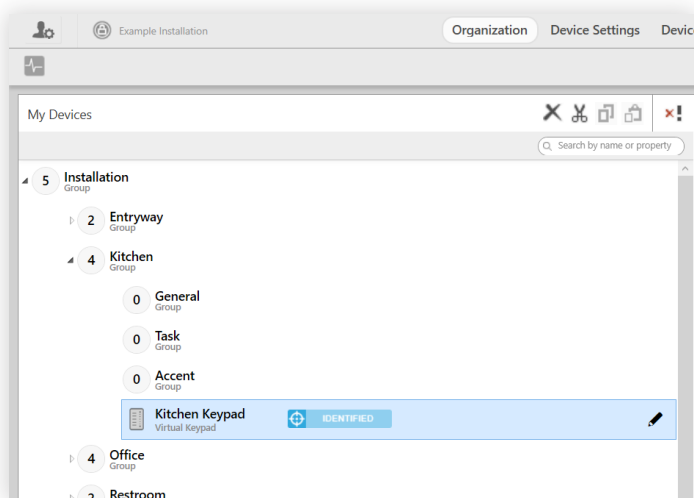


fig. 128

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- 2 Go to **Device Control > Keypads** and select the keypad on the left.
- 3 For each button, ensure that only the corresponding zone (group) is checked. If assigning a different scene created on the **Scenes** tab, it is okay if the scene would normally control other groups as well. As long as only the desired zone is checked for this button, only that zone will be affected by the button.

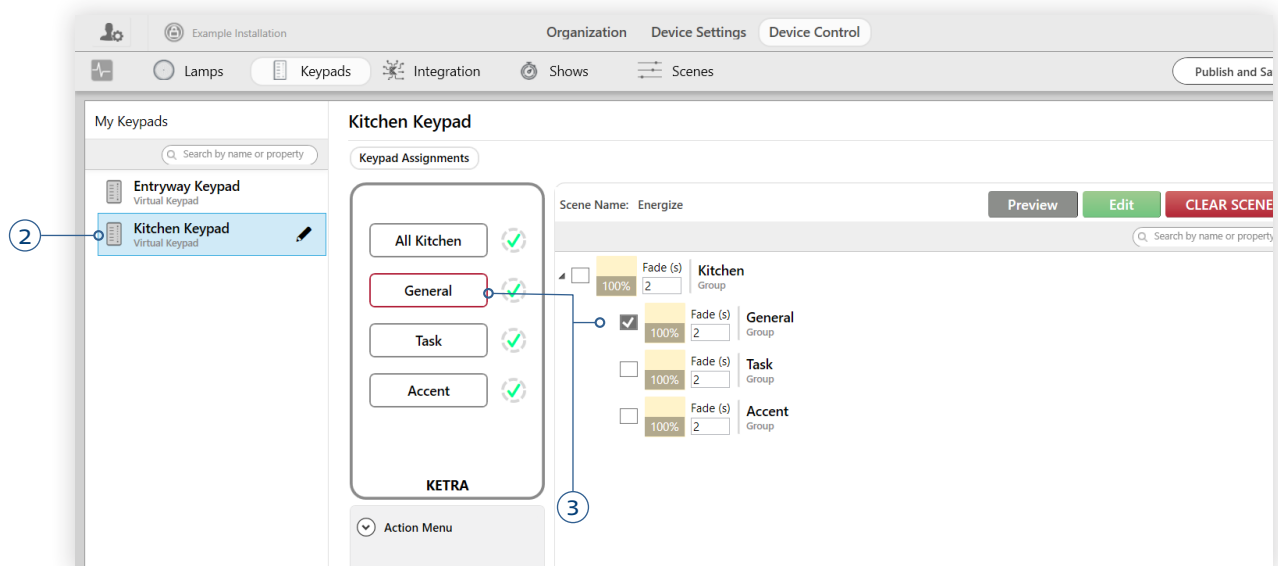


fig. 129

Note: To exclude a group from a scene, select the scene button in the **Keypads** tab and uncheck the group. A common error is to try to exclude groups from scenes using the **NA** feature on the **Scenes** tab rather than unchecking the group on the **Keypads** tab. **NA** groups do not respond to the activation of a scene, but they do turn off when the scene is deactivated, and they are also be affected by the keypad's dimming controls.

- 4 **Optional: Customize the zone's scene or show.** To customize, click the green **Edit** button.

Note: Changing an existing scene affects other instances of the scene in the installation.

Keypad User Interface

On Ketra X2 keypads and in the Ketra mobile app, multiple zones can be turned on at once. To support discrete zone control, each keypad has an active zone—the last zone the user interacted with. By default, the keypad's brightness controls will only affect the active zone; when there is no active zone, the brightness controls affect all groups.

On an X2 keypad, the active zone's button will shine brighter than the other buttons to help the user identify it. In the mobile app, the active zone has an asterisk next to its name.

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Example Usage: Dimming two zones that are in different states

- 1 Press *Zone 1* button to set the first zone to its state.
Effect: *Zone 1* is triggered and becomes active zone.
- 2 Press *Zone 2* to set the second zone to its state.
Effect: *Zone 2* is triggered and becomes active zone. *Zone 1* stays on in its state.
- 3 Press and hold *Zone 2* for three seconds.
Effect: The keypad unsets the active zone, but both zones stay on in their respective states.
(To confirm, make sure that the *Zone 2* button has the same illumination intensity as the *Zone 1* button.)
- 4 Press the keypad's raise/lower buttons.
Effect: Raises/lowers intensity for both zones.

For a complete guide to button interactions and behaviors, see the table below.

Keypad Button Interactions in 3.0

Interaction	Effect
Single press on button	Toggle scene on or off. When turning on, sets active zone
Press and hold button for one second	Sets active zone
Press and hold active zone button for three seconds	Unsets active zone so brightness controls affect all scenes

Keypad Button Feedback in 3.0

Behavior	Meaning
Unlit button	Scene is not turned on
Backlit button, steady light	Scene is turned on and playing on the corresponding groups
Brightly backlit button, steady light	Scene is turned on and playing on the corresponding groups. The button is the active zone
Flashing button	Scene is in a modified state: at least one subgroup has changed state

Enabling Sensor Control

In a **Ketra Only** installation, the Ketra system can take input from sensors via wired connection to an N3 Satellite's Analog I/O ports. Wiring should be completed by a licensed electrician prior to commissioning.

After wiring has been completed, you still need to configure the N3 Satellite in Design Studio. This section discusses configuration of occupancy sensors, vacancy sensors, and photocells.

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Occupancy/Vacancy Sensors	113
Photocells	115

Occupancy/Vacancy Sensors

Most occupancy sensors can also be programmed for vacancy mode.

- In **occupancy mode**, the sensor turns lights off when no one is present and turns them back on when an occupant enters the room.
- In **vacancy mode**, the sensor turns lights off when no one is present. An occupant entering the room would need to use a keypad to turn the lights back on.

You should determine which mode to use according to energy codes. You will be able to manually adjust the hypersonic and/or infrared sensitivity values on the units themselves.

Note: Sustained contact closures only.

To enable an occupancy/vacancy sensor to control certain groups in the installation, follow these steps:

- 1 Go to **Device Control > Integration**.
- 2 Select the appropriate N3 Satellite from the **My Control Devices** list on the left.
- 3 Go to the **Analog I/O** tab.

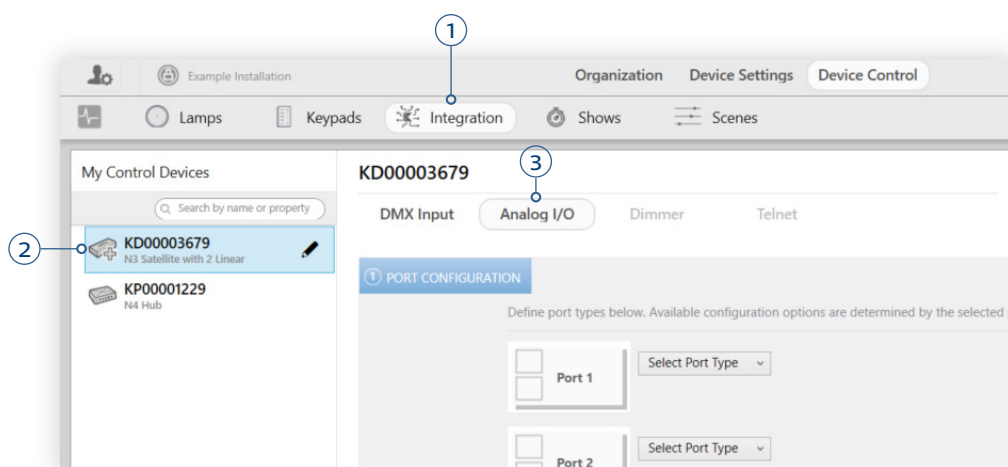


fig. 130

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- Consult the Ketra submittal to see which port the sensor is wired to. There are 4 Analog I/O ports on the N3 Satellite. In the Ketra submittal, "COM1" corresponds to Port 1, "COM2" to Port 2, etc.

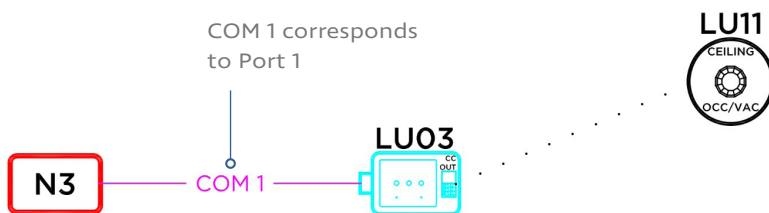


fig. 131

- Set the Port Type dropdown to "Contact Closure".
- Set whether the port is normally open or normally closed. Each contact-closure port has two states—open and closed—depending on its input. Some sensors consider an occupied port to be open; others consider it to be closed.
- Use the dropdown on the right to set the profile of the input.

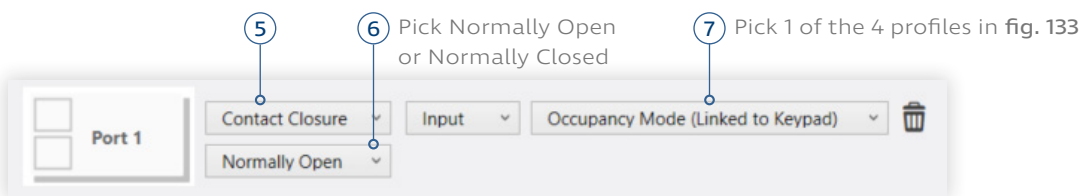


fig. 132

	Use profile if...	Effect
Vacancy Mode (linked to keypad)	Every group controlled by the vacancy sensor will also be controllable from a keypad.	When vacancy is detected, the group(s) will turn off. The keypad will unhighlight any buttons except the power button. The keypad will remain responsive to touch-based control.
Vacancy Mode (Configure 1 scene)	The group(s) to be controlled by the vacancy sensor will not be controllable from a keypad.	You will be able to customize one scene that will play when vacancy is detected. Customizing this scene will let you determine whether all lights should go off or some should stay on, for example as a night light or for passage illumination.
Occupancy Mode (Linked to Keypad)	The group(s) to be controlled by the occupancy sensor will also be controlled by a keypad.	Syncs the port to a particular scene button on a keypad. The button must already have an associated scene or show. When occupancy is detected, that button will highlight and the associated groups will go to that scene or show; when vacancy is detected, the lights will turn off and the keypad button will unhighlight.
Occupancy Mode (Configure 2 Scenes)	The group(s) to be controlled by the occupancy sensor will not be controlled by a keypad.	Allows customization of two scenes: one for when occupancy is detected and one for when it is not.

fig. 133

8 Click Next.

9 Set additional configurations for the contact-closure input. Your options on this screen vary depending on the profile you chose.

- **Vacancy Mode (Linked to Keypad):** Select the keypad that controls the sensor's groups. If the groups are controlled by multiple keypads, just select one of the keypads; the others will be accounted for under the hood.
- **Vacancy Mode (Configure 1 scene):** Assign a scene or show to play when vacancy is detected. Check the Off Trigger Delay box to enable the N3 to delay sending a wireless command after the sensor has reported unoccupied.
- **Occupancy Mode (Linked to Keypad):** Select the keypad that controls the sensor's groups. Select that button that you want to turn on when occupancy is detected. Set the intensity level at which the scene or show should come on when occupancy is detected. The default is 50% intensity, but unless energy codes dictate otherwise, we recommend adjusting this to 100% to ensure full visibility for users entering the space.
- **Occupancy Mode (Configure 2 scenes):** Program a scene or show for occupancy and vacancy. Use the Occupancy On/Off dropdown to determine which setting you are assigning content for. Check the Off Trigger Delay box to enable the N3 to delay sending a wireless command after the sensor has reported unoccupied.

10 Click Next.

The port is now configured to receive and process contact-closure input from the occupancy or vacancy sensor.

Troubleshooting Unexpected Behavior

- Manually adjust the ultrasonic and/or infrared sensitivity settings on the sensor itself.
- Confirm that the sensor has been wired to the correct port on the N3 Satellite.
- Double-check your configurations in Design Studio.

Photocells

To enable a photocell to control certain groups in the installation, follow these steps:

- 1 Go to **Device Control > Integration**.
- 2 Select the appropriate N3 Satellite from the **My Control Devices** list on the left.
- 3 Go to the **Analog I/O** tab.
- 4 Consult the Ketra submittal to see which port the photocell is wired to. There are 4 Analog I/O ports on the N3 Satellite. In the Ketra submittal, "COM1" corresponds to Port 1, "COM2" to Port 2, etc. (See fig. 133, next page.)

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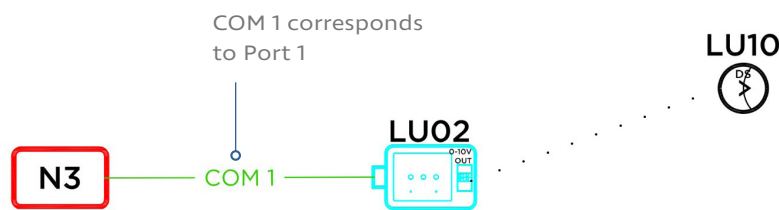


fig. 133

Note: If the submittal shows the photocell connecting to two ports, only configure the first port. The second will be automatically included once you select a profile in step 7.

- 5 Set the Port Type dropdown to 0-10V.
- 6 Set the lower dropdown to "Current Source".
- 7 Use the dropdown on the right to set the profile of the input.

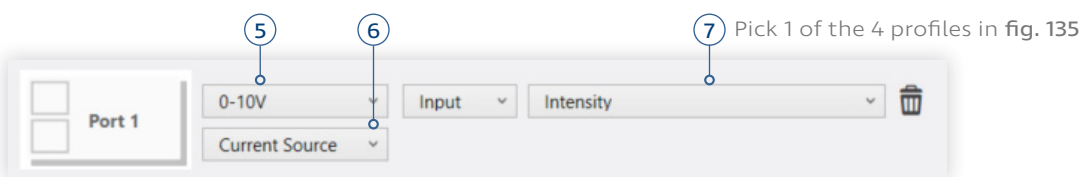


fig. 134

	Use profile if...	Effect
Ketra Dimming Photocell	<ol style="list-style-type: none"> 1. The photocell is Leviton brand AND 2. Every group controlled by the photocell will also be controllable from a keypad 	The groups' intensity will be controlled by the photocell, but it can be overridden by the keypad (e.g., to avoid 100% intensity at night)
Ketra Dimming Photocell (Master Intensity)	<ol style="list-style-type: none"> 1. The photocell is Leviton brand AND 2. The group(s) to be controlled by the photocell will not be controllable from a keypad 	The groups' master intensity will be directly controlled by the photocell
Intensity	<ol style="list-style-type: none"> 1. The photocell is any brand other than Leviton AND 2. Every group controlled by the photocell will also be controllable from a keypad 	The groups' intensity will be controlled by the photocell, but it can be overridden by the keypad (e.g., to avoid 100% intensity at night)
Master Intensity	<ol style="list-style-type: none"> 1. The photocell is Leviton brand AND 2. The group(s) to be controlled by the photocell will not be controllable from a keypad 	The groups' master intensity will be directly controlled by the photocell

fig. 135

8 Click Next.

9 Use the checkboxes to determine which groups should be dimmed by the sensor.

Note: The Master Brightness Override and Analog IO Refresh checkboxes should be left unchecked for photocells.

10 Click Next.

The port is now configured to receive and process contact-closure input from the occupancy or vacancy sensor.

Troubleshooting Unexpected Behavior

- Adjust the ultrasonic and infrared configurations on the device.
- Confirm that the sensor has been wired to the correct port on the N3 Satellite.
- Double-check your configurations in Design Studio.

Enabling Emergency Mode Lighting

Note: This section applies to **Ketra Only** installations. In **Ketra with HomeWorks QS** installations, any emergency power relays should be linked to the Lutron HomeWorks QS processor and configured using HomeWorks QS, not Ketra Design Studio.

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In the event of an emergency, any Ketra lights configured for Emergency Mode will do the following:

- 1 **Go to their restore states** (Restore states are covered in detail in **Managing Lighting Power-Restore States**, page 59)
- 2 **Ignore any and all commands from user input, timeclock events, etc.**
- 3 **Remain in their restore states until they receive confirmation that they are no longer in an emergency setting.**

Requirements

Before configuring lights for Emergency Mode, ensure that the following system-level requirements are met:

- Spacing, quantity, and restore state (color and intensity) of the Ketra emergency light sources must meet requirements for emergency light levels.
- The backup AC power source must produce a sinusoidal (sine) wave. Some inverters produce a square wave; this will not work for Ketra products.
- To use KetraNet Mesh lamps and fixtures (i.e., anything that does not connect to an N3 Satellite) as emergency lighting, ensure that the products have a means of losing power for 2 seconds before restoring in Emergency Mode.
 - By requiring a power-cycle event to enter Emergency Mode, the KetraNet Mesh system can respond to an emergency without relying on wireless communication.
 - If the backup system switches to emergency power in under 2 seconds, a shunt relay can be used to enforce a 2-second delay. (Typically this is not necessary in systems relying on generators.)

Instructions

1 Configure an Emergency Mode contact closure.

- i Go to Device Control > Integration.
- ii Select the appropriate N3 Satellite from the My Control Devices list on the left.
- iii Go to the Analog I/O tab.
- iv Consult the Ketra submittal to see which port the relay or inverter is wired to. There are 4 Analog I/O ports on the N3 Satellite. In the Ketra submittal, "COM1" corresponds to Port 1, "COM2" to Port 2, etc.

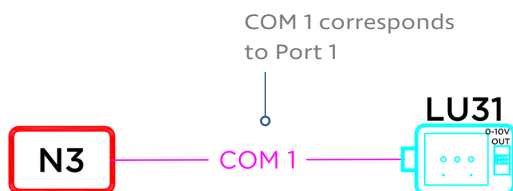


fig. 136

- v Set the Port Type dropdown to "Contact Closure".
- vi Set whether the port is normally open or normally closed. Each contact-closure port has two states—open and closed—depending on its input. Whether the port is normally open or normally closed depends on the emergency relay/inverter.
- vii In the dropdown on the right, select the Emergency Mode profile.
- viii Click Next.

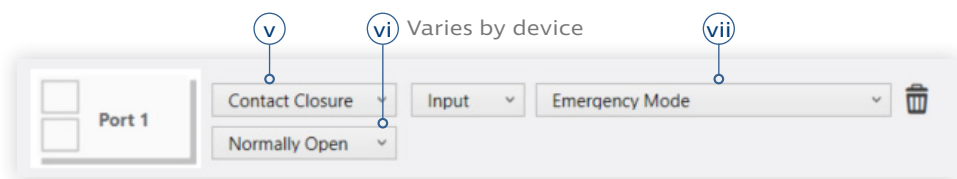


fig. 137

- ix Publish your configurations by clicking Publish and Save in the top-right corner.

2 Create a group for the emergency lights.

- i Go to the Organization tab.
- ii Add a custom group to the highest-level group in the hierarchy.
- iii Rename the group something like "EM Lighting."
- iv Select the lights you intend to use for emergency lighting, then copy/paste them into the new group.

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Note: You can copy and paste using **Ctrl+C** and **Ctrl+V**. Make sure to use the copy function, not cut.

Caution: Do not put any lights into the EM Lighting group that also belong to groups with unusual default power-restore states. The usual default is 3000K, 100% intensity. For example, if you have configured KA00110101's group to restore to a dim blue, you should not use KA00110101 as an emergency light.

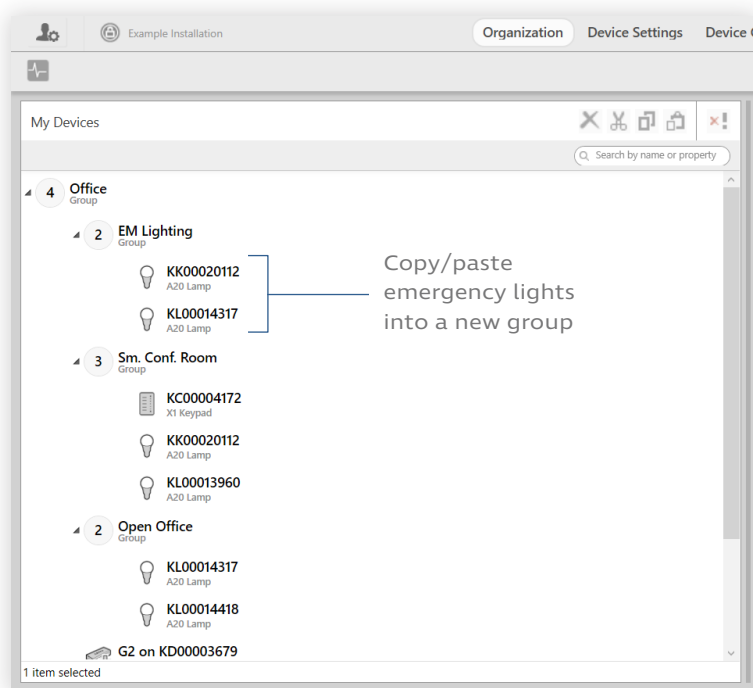


fig. 138

3 Enable Emergency Mode on KetraNet Mesh fixtures. (See fig. 139)

- i Go to the Device Settings tab.
- ii If necessary, set the Settings For dropdown to "Lamps".
- iii Use the Device Filter dropdown to select the EM Lighting group you just created.
- iv Check the Select All box to highlight all devices in the group.
- v In the Modify Lamp Settings pane, set the Emergency Mode dropdown to "Enabled".
- vi Click Apply to Selected.

Caution: Check to make sure that none of the lighting devices in the EM Lighting group shows "Enabled" in the Restore State on Power Cycle column. If any do, we strongly recommend disabling that feature on those devices.

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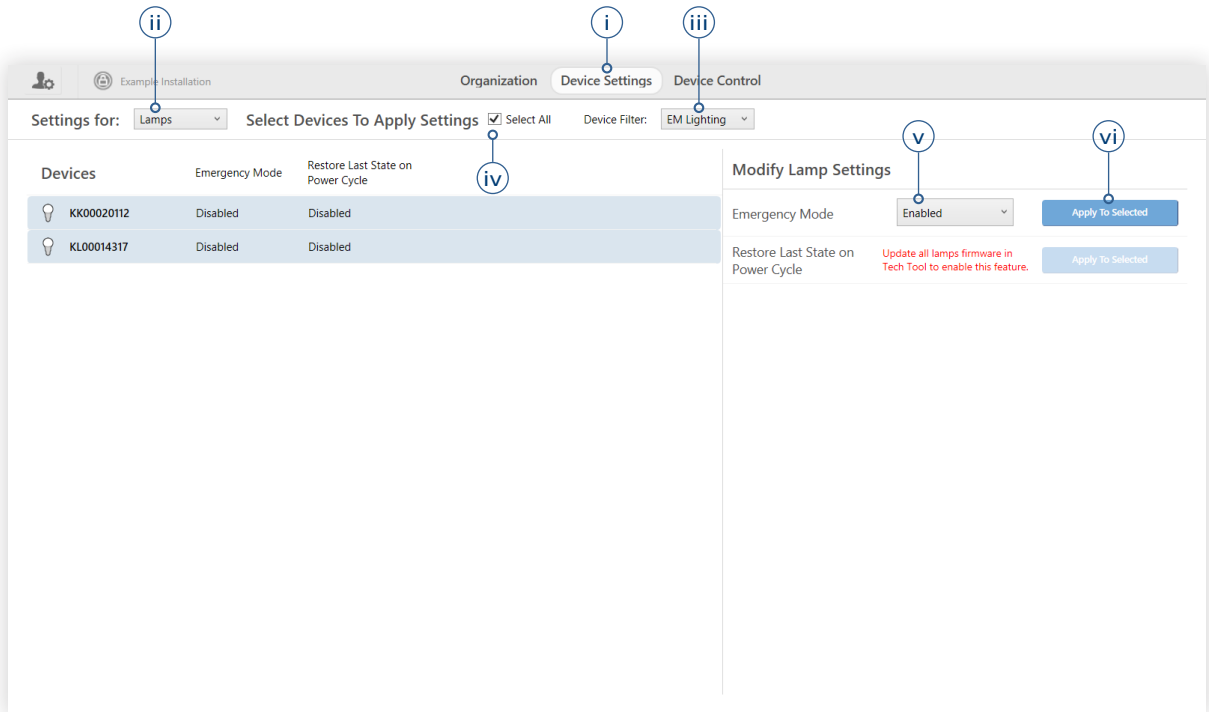


fig. 139

4 Step 4: Publish configurations

- i Go to the **Device Control** tab.
- ii Click **Publish and Save** in the top-right corner.

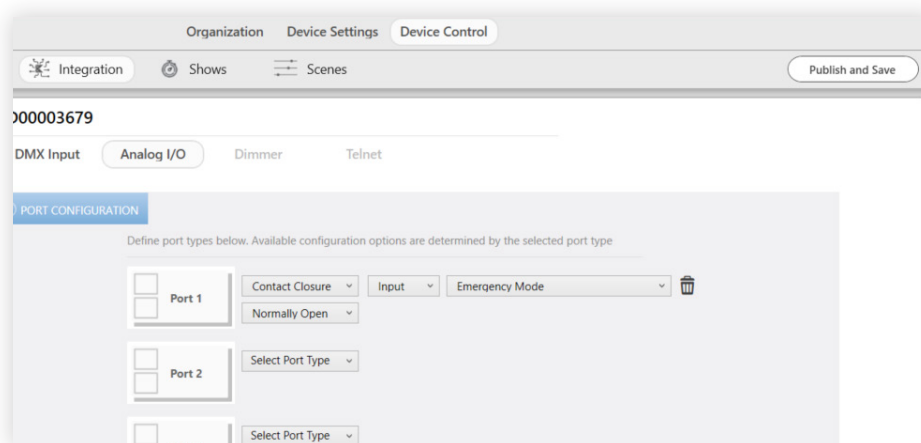


fig. 140

Integrating Third-Party Lighting

In both **Ketra Only** and **Ketra with HomeWorks QS** installations, Design Studio supports the integration of third-party lighting loads into the Ketra system.

In **Ketra with HomeWorks QS** installations, we recommend integrating third-party lighting to the Ketra system rather than HomeWorks QS; you can do so via DMX output from an N3 Satellite. See [DMX Output](#), page 141.

After integrating (in either kind of installation), you will be able to include the third-party fixtures in scenes just like Ketra lights. For each scene, you can configure the lights' intensity, color settings, and/or other parameters depending on the fixture and the integration method. In **Ketra with HomeWorks QS** installations, you can then import those scenes into HomeWorks QS. In **Ketra Only** installations, you can assign them directly to Ketra keypad buttons, contact-closure inputs, and shows.

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Configuring Contact-Closure Output for Lighting	125
Configuring DMX Output for Lighting	127
Configuring an X2 Dimmer	127
Using Third-Party Lighting in Scenes	128

Lighting Integration Workflow

In a **Ketra with HomeWorks QS** installation, integration of third-party lighting loads follows this sequence:

- 1 Wire the fixture(s) to the appropriate N3 Satellite or Satellites' DMX out ports (Wiring not covered in this manual)
- 2 In Tech Tool, configure the N3 Satellite(s) for DMX Output (See [DMX Output](#), page 141)
- 3 In Design Studio, add the output(s) into groups on the Organization tab, then incorporate those groups into scenes (See [Using Third-Party Lighting in Scenes](#), page 128)

In a **Ketra Only** installation, integration of third-party lighting loads follows this sequence:

- 1 Wire the fixture(s) to the appropriate Ketra control—either N3 Satellite or X2 Dimmer (Wiring not covered in this manual)
- 2 Configure one of the following:
 - i 0-10V output from an N3 Satellite (See [Configuring 0-10V Output for Lighting](#), page 123)

Note: If the Ketra submittal indicates that a fixture should be integrated using a "0-10V+CC" protocol, consult [Configuring 0-10V Output for Lighting](#), page 123.

- ii Contact-closure output from an N3 Satellite (See [Configuring Contact-Closure Output for Lighting](#), page 125)

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- iii DMX output from an N3 Satellite (See [DMX Output](#), page 141)
 - iv Line-voltage dimming from an X2 Keypad (See [Configuring an X2 Dimmer](#), page 127)
- 3 In Design Studio, add the output(s) to groups on the **Organization** tab, then incorporate those groups into scenes (See [Using Third-Party Lighting in Scenes](#), page 128)

Configuring 0-10V Output for Lighting

Note: 0-10V control of third-party fixtures is only supported in **Ketra Only** installations.

Integrating third-party lighting via 0-10V output allows you to set intensity for the loads in any scenes they appear in.

To enable an N3 Satellite to control third-party fixtures via 0-10V output, follow the steps below.

- 1 In Design Studio, go to **Device Control > Integration**.
- 2 Select the appropriate N3 Satellite from the **My Control Devices** list on the left. At this step, satellites will not identify themselves by flashing indicator lights when selected.
- 3 Go to the **Analog I/O** tab.

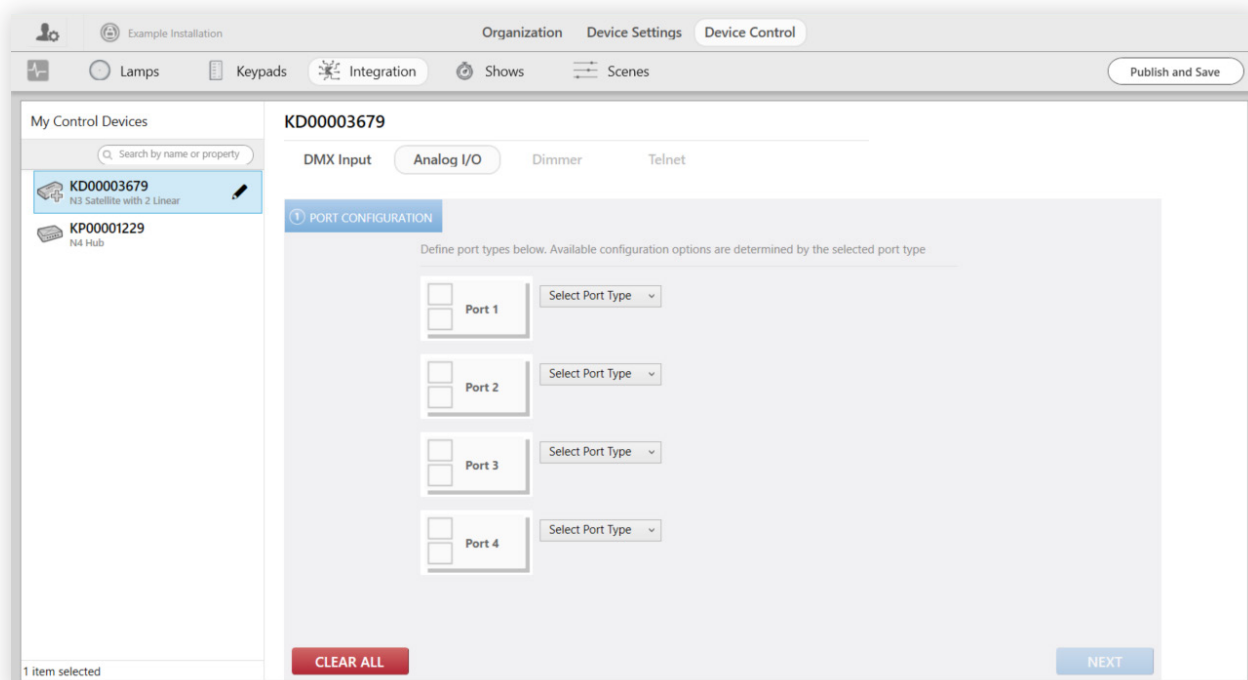


fig. 141

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- 4 Consult the Ketra submittal to see which port the fixture is wired to. There are 4 Analog I/O ports on the N3 Satellite. In the Ketra submittal, "COM1" corresponds to Port 1, "COM2" to Port 2, etc.

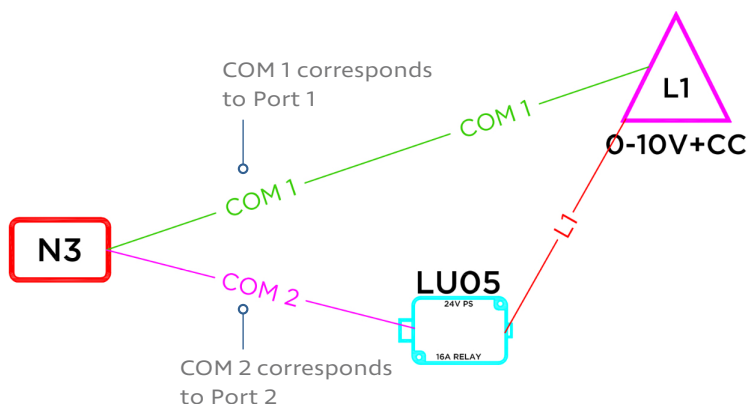


fig. 142

If the third-party fixture requires 2 ports (as in fig. 142), only configure the first port. The second will be included automatically once you pick a profile in step 8.

- 5 For the appropriate port, set the Port Type dropdown to "0-10V".
- 6 Change the second dropdown to "Output".
- 7 Set whether the output is Current Sink or Current Source. Consult the spec sheet for the device that you are interfacing with.
- 8 Use the dropdown on the right to set the profile of the output.
 - If the next port is connected to a Ketra power pack (KL14), select "Intensity + Ketra Power Pack".
 - If the next port is connected to any power pack other than the KL14, select "Intensity + CC".
 - If the next port is not connected to a power pack, select "Intensity".

Note: For the Lutron LU05 power pack (shown in fig. 142), use "Intensity + CC".

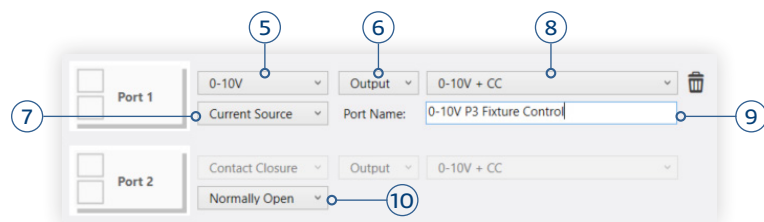


fig. 143

- 9 Give the output a distinctive name so you know which fixtures it controls. Unlike with Ketra lights, you will not be able to select the output in Design Studio and have it identify in the space. Therefore it is very important to give it a descriptive name.
- 10 If you selected a profile with a power pack, set whether the second port is normally open or normally closed.
- 11 Click Next.
- 12 **Optional:** If you selected a profile that uses a power pack, adjust the voltage thresholds at which the contact closure should turn on and off. For example, if a third-party light starts flickering at 3V, its CC Off Voltage should be set to 3.

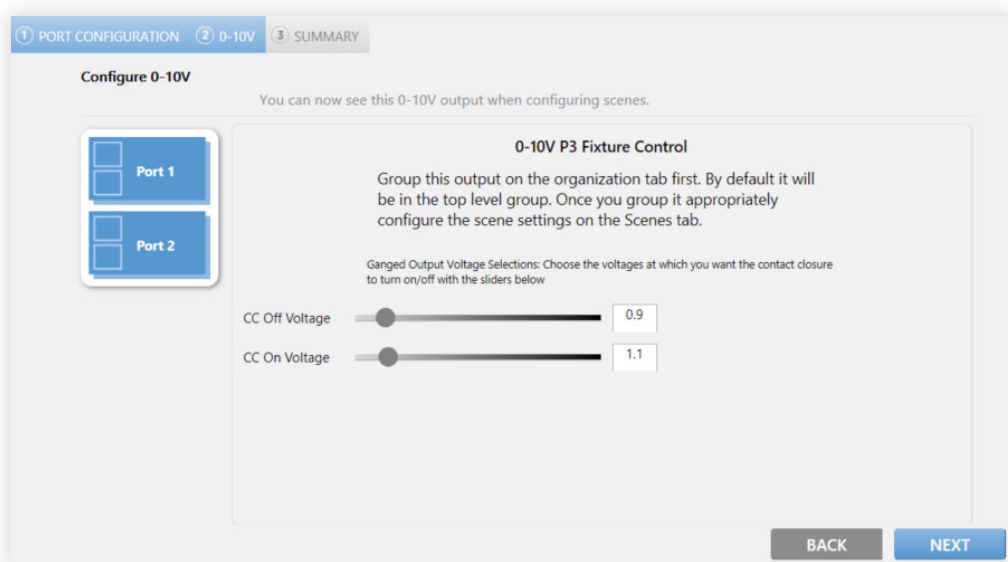


fig. 144

After performing those configurations, you are ready to add the output to a group on the Organization tab, then integrate it into scenes on the Scenes tab. See [Using Third-Party Lighting in Scenes](#), page 128.

Configuring Contact-Closure Output for Lighting

Note: Contact-closure control of third-party fixtures is only supported in Ketra Only installations.

Integrating third-party lighting via contact-closure output allows you to toggle the loads on and off for any scene that they appear in.

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To enable an N3 Satellite to control third-party fixtures via contact-closure output, follow the steps below.

- 1 In Design Studio, go to **Device Control > Integration**.
- 2 Select the appropriate N3 Satellite from the **My Control Devices** list on the left. At this step, satellites will not identify themselves by flashing indicator lights when selected.
- 3 Go to the **Analog I/O** tab.

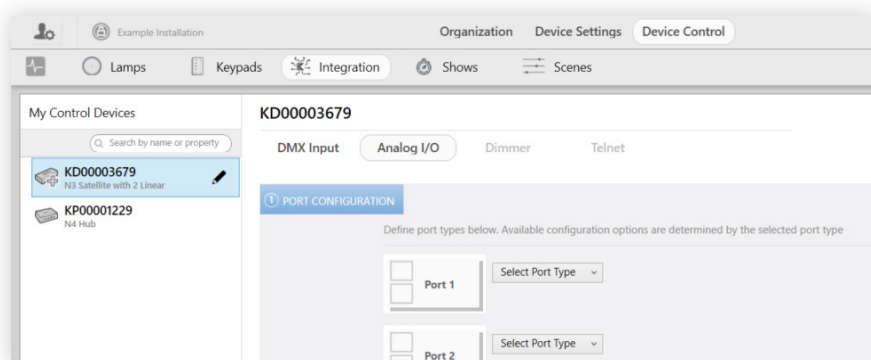


fig. 145

- 4 Consult the **Ketra submittal** to see which port the fixture is wired to. There are 4 Analog I/O ports on the N3 Satellite. In the Ketra submittal, "COM1" corresponds to Port 1, "COM2" to Port 2, etc.
- 5 For the appropriate port, set the **Port Type** dropdown to "Contact Closure".
- 6 Change the second dropdown to **Output**.
- 7 Set whether the output is **Normally Open** or **Normally Closed**. Each contact-closure port has two states—open and closed—depending on its input. Some sensors consider an occupied port to be open; others consider it to be closed.
- 8 In the dropdown on the right, select **"1:1 Mode"**.
- 9 Give the output a distinctive name so you know which fixtures it controls. Unlike with Ketra lights, you will not be able to select the output in Design Studio and have it identify in the space. Therefore it is very important to give it a descriptive name.

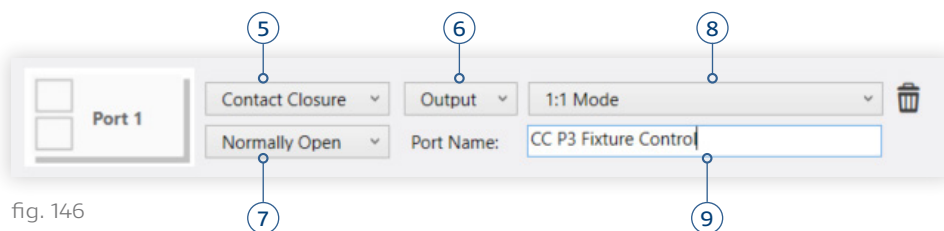


fig. 146

- 10 Click **Next**.

After performing those configurations, you are ready to add the output to a group on the **Organization** tab, then integrate it into scenes on the **Scenes** tab. See [Using Third-Party Lighting in Scenes](#), page 128.

Configuring DMX Output for Lighting

For instructions on configuring DMX output, see [DMX Output](#), page 141.

Configuring an X2 Dimmer

Note: Line-voltage dimming via X2 Dimmer is only supported in Ketra Only installations.



An X2 Dimmer connected to a third-party fixture in the Ketra submittal packet

fig. 147

Ketra X2 Keypads equipped with onboard dimmers can modulate power to incandescent loads. As soon as the dimmer is wired to the incandescents' circuit, it is ready to use. Optional additional configurations described in this section include:

- Renaming the dimmer (The name change applies only within Design Studio and Tech Tool)
- Setting a dim curve
- Setting custom trims for maximum and minimum light output

To access these features, follow these steps:

- 1 In Design Studio, go to **Device Control > Integration**.
- 2 Select the X2 Keypad from the **My Control Devices** panel on the left.

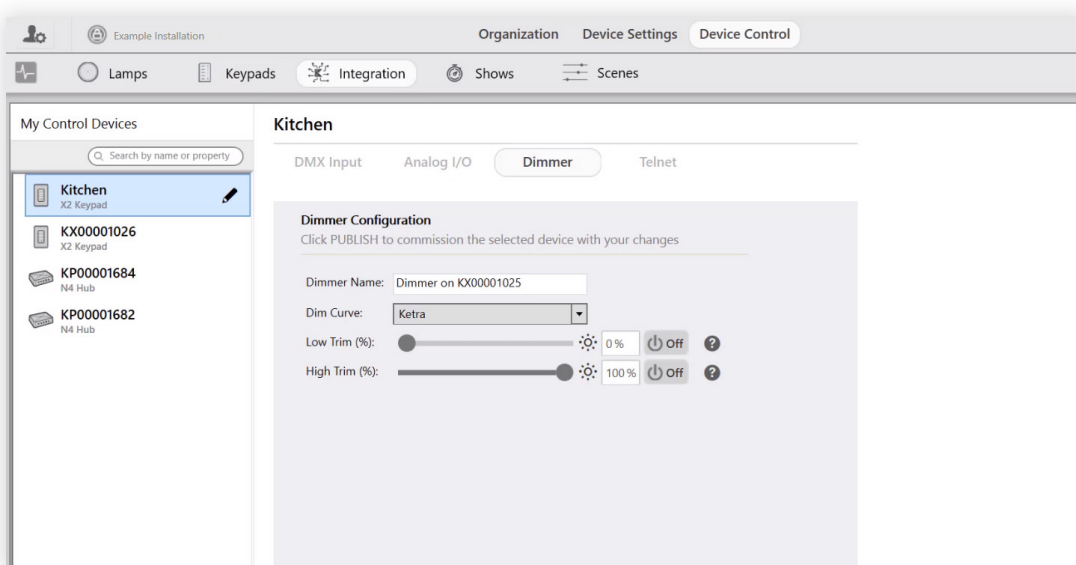


fig. 148

About Dim Curves

Three curve options are available: *Ketra*, *Linear*, and *Square Law*. Certain load types look better with certain curves.

- Use the **Square Law** curve for incandescents (recommended). Square Law dim curves enhance the visibility of intensity adjustments at low levels.
- Use the **Ketra** curve to match third-party lighting's dim curve to that of Ketra lights. Ketra uses an exponential dim curve.
- Use the **Linear** curve whenever it is not a high priority to match third-party lighting's dim curve to that of Ketra lights. Linear dim curves match input with voltage so that a 10% increase from the keypad leads to a 10% increase in voltage. Since Ketra lights use an exponential dim curve, a linear curve will not match precisely.

Note: Recall that any dim curve selected here will apply only to your non-Ketra lights.

About Trims

You can set non-default trims to limit the maximum or minimum output of your lights.

Note: Setting non-default trims will affect the fade curve of non-Ketra lights. Dim curves are adjusted to start or end at the trim value rather than simply cutting off at the trim value. This ensures that fades have the same duration, but it also means that trimmed loads will not match the fade curve of Ketra lights.

Setting a high trim limits the maximum output of a light, and can therefore extend the light's lifespan. Low trims are recommended when the third-party light cannot dim as low as a Ketra light. To find the proper low trim value for a light, start at 50% and edge **down** in increments of 5%. You will see the load dim as the X2 restricts its power, and at some point the lights may turn off or start to flicker. Your low trim should be the value right above where they turned off or started to flicker. If you get all the way to 1% and the lights have not turned off or started to flicker, the load does not need a low trim.

Don't forget to save your configurations by clicking Publish and Save. Your changes will not take effect until published.

Using Third-Party Lighting in Scenes

The Ketra system treats each output (whether from an N3 or X2) as a device in the installation.

This enables you to include these outputs in groups and scenes, just like Ketra lights. For each scene, you can configure the third-party lights' intensity, color settings, and/or other parameters (depending on the fixture and the integration method). You will be able to trigger these scenes from inputs in the installation.

- In a **Ketra with HomeWorks QS** installation, you can import the scenes into HomeWorks QS and assign them to Lutron keypads.
- In a **Ketra Only** installation, you can assign the scenes to Ketra keypad buttons, contact-closure inputs, and shows.

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To utilize your configured outputs, follow these steps:

- 1 On Design Studio's **Organization** tab, move the outputs to their appropriate places in the groups hierarchy. Use the **Cut**, **Copy**, and **Paste** buttons to move the outputs between groups.

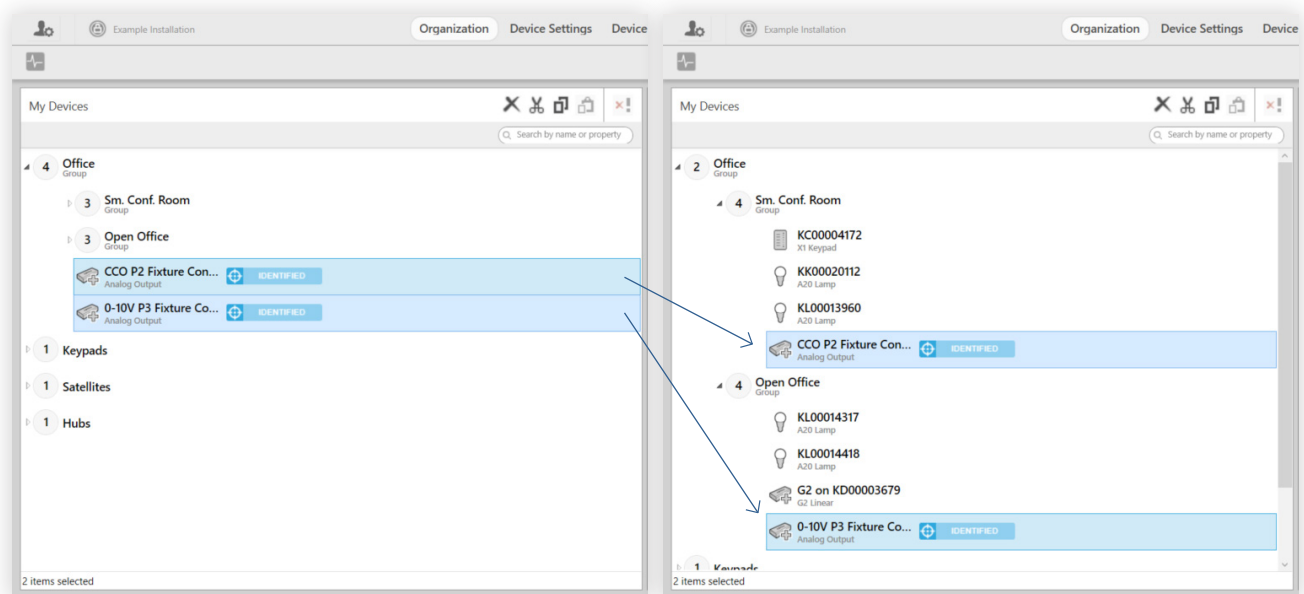


fig. 149

- 2 Navigate to **Device Control > Scenes**.

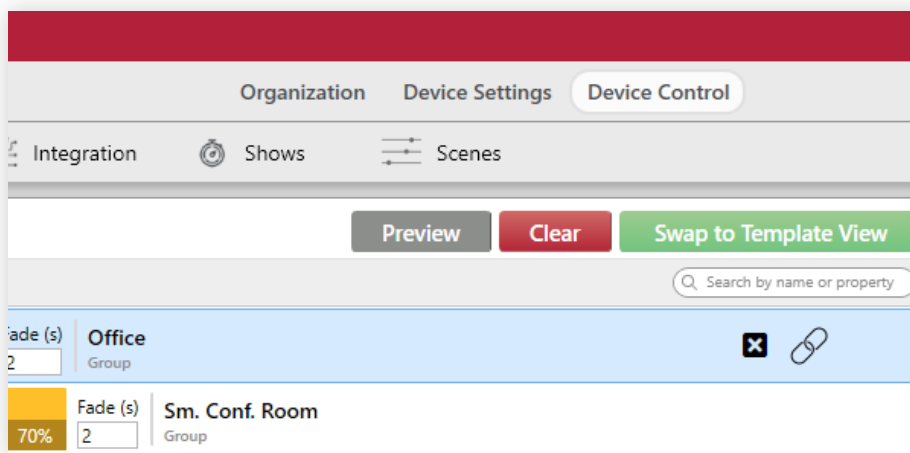


fig. 150

- 3 Select a scene from the **My Scenes** panel (left).
- 4 In the scene's grouping tree, highlight a group containing third-party lighting outputs.
- 5 In the color picker (right), select the **3rd Party Outputs** tab.

6 Customize the scene as needed.

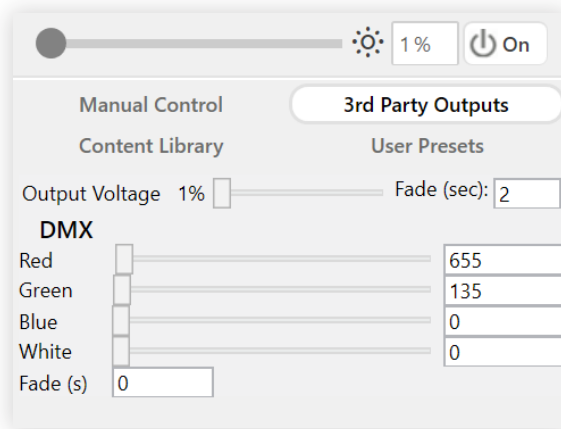


fig. 151

For information on deploying the scene in a **Ketra Only** installation, see:

- **Programming Ketra Keypads > Assigning a Scene**, page 104
- **Building Shows > Setting Scenes for Time Triggers**, page 87
- Any section dealing with contact-closure inputs. Although you can assign the scene to any kind of CCI, not just sensors, the **Occupancy/Vacancy Sensors** section of this manual, page 113, gives a good generic overview on assigning scenes to CCIs.

To deploy the scene in a **Ketra with HomeWorks QS** installation, just click **Publish and Save**, then import the Design Studio installation into HomeWorks QS. In that software, you will be able to assign the scene to a Lutron keypad.

All Analog Integration Profiles

The N3 Satellite enables the Ketra system to integrate with a significant number of sensors, relays, building management systems, and third-party lighting devices. Some of these integrations are covered in more detail in [Enabling Sensor Control](#), page 113, [Enabling Emergency Mode Lighting](#), page 118, and [Integrating Third-Party Lighting](#), page 122.

For other uses of the N3's analog integration profiles, reference the table below as a guide to which profile to select.

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Contact-Closure Output Profiles	134
0-10V Output Profiles	135

Contact-Closure Input Profiles

Profile	Use Profile for...	Effect	Ports
Occupancy Mode (Configure 2 scenes)	Occupancy sensor whose groups are NOT also controlled by a Ketra keypad	When vacancy detected, sets groups to one scene or show; when occupancy detected, sets groups to another scene or show	1
Occupancy Mode (Linked to Keypad)	Occupancy sensor whose groups ARE also controlled by a Ketra keypad	When vacancy detected, sets groups to off and modifies keypad state; when occupancy detected, sets groups to designated scene or show and modifies keypad state	1
Vacancy Mode (Configure 1 scene)	Vacancy sensor whose groups are NOT also controlled by a Ketra keypad	When vacancy detected, sets groups to scene or show	1
Vacancy Mode (Linked to Keypad)	Vacancy sensor whose groups ARE also controlled by a Ketra keypad	When vacancy detected, sets groups to off and modifies keypad state	1
Emergency Mode	Emergency inverter	When switched, sets enabled Ketra lights to Emergency Mode	1
Automated Demand Response	Automated Demand Response management system	When ADR signal received, dims lights by a designated scale factor	1
Master Intensity Off Trigger	Device that sets a single intensity level for groups (including but not necessarily 0%)	When switched, sets groups to desired intensity	1

Contact-Closure Input Profiles (Cont'd)

Profile	Use Profile for...	Effect	Ports
Master Intensity On/Off Triggers	Device that sets one of two intensity levels for groups at a time (including but not necessarily 0% and 100%)	When switched, sets groups to one intensity level or the other	1
1:1 Mode (Recall 2 scenes)	Device that triggers 1-2 scenes/shows	Two scene/show triggers: one for the normal state, and one for the switched state	1
2 Port Linked Mode (Recall 4 scenes)	Device that triggers 1-4 scenes/shows	Four scene/show triggers: one for Normal-Normal, one for Switched-Normal, etc.	2
3 Port Linked Mode (Recall 8 scenes)	Device that triggers 1-8 scenes/shows	Eight scene/show triggers: one for N-N-N, one for S-N-N, etc.	3
4 Port Linked Mode (Recall 16 scenes)	Device that triggers 1-16 scenes/shows	Sixteen scene/show triggers: one for N-N-N-N, one for S-N-N-N, etc.	4

0-10V and 0-24V Input Profiles

Profile	Use Profile for...	Effect	Ports
Occupancy Mode (Configure 2 scenes)	Occupancy sensor outputting 0-10/0-24V whose groups are NOT also controlled by a Ketra keypad	Mimics contact closure. When vacancy detected, sets groups to one scene or show; when occupancy detected, sets groups to another scene or show	1
Occupancy Mode (Linked to Keypad)	Occupancy sensor outputting 0-10/0-24V whose groups ARE also controlled by a Ketra keypad	Mimics contact closure. When vacancy detected, sets groups to off and modifies keypad state; when occupancy detected, sets groups to designated scene or show and modifies keypad state	1
Vacancy Mode (Configure 1 scene)	Vacancy sensor outputting 0-10/0-24V whose groups are NOT also controlled by a Ketra keypad	Mimics contact closure. When vacancy detected, sets groups to scene or show	1
Vacancy Mode (Linked to Keypad)	Vacancy sensor outputting 0-10/0-24V whose groups ARE also controlled by a Ketra keypad	Mimics contact closure. When vacancy detected, sets groups to off and modifies keypad state	1

0-10V and 0-24V Input Profiles (Cont'd)

Profile	Use Profile for...	Effect	Ports
Ketra Dimming Photocell (Master Intensity) <i>0-10V Input Only</i>	Ketra photocell whose groups are NOT controlled by a Ketra keypad	Makes intensity of groups proportional to input voltage	2
Ketra Dimming Photocell <i>0-10V Input Only</i>	Ketra photocell whose groups ARE controlled by a Ketra keypad	Makes master intensity of groups proportional to input voltage	2
Intensity	Non-Ketra photocell or other intensity control whose groups are NOT controlled by a Ketra keypad	Makes groups' intensity proportional to input voltage	1
Master Intensity	Non-Ketra photocell or other intensity control whose groups are NOT controlled by a Ketra keypad	Makes groups' intensity proportional to input voltage	1
Master Intensity Off Trigger	Device outputting 0-10V/0-24V that sets a single intensity level for groups (including but not necessarily 0%)	Mimics contact closure. Sets groups to desired intensity when 0V received from input	1
Master Intensity On/Off Triggers	Device outputting 0-10V/0-24V that sets one of two intensity levels for groups at a time (including but not necessarily 0% and 100%)	Mimics contact closure. Sets groups to a min intensity level at a low-voltage threshold, high intensity level at a high-voltage threshold	1
1:1 Mode (Recall 2 scenes)	Device outputting 0-10V/0-24V that triggers 1-2 scenes/shows	Mimics contact closure. When 0V, sets groups to one scene/show; when 10V, sets groups to another scene/show.	1
2 Port Linked Mode (Recall 4 scenes)	Device outputting 0-10V/0-24V that triggers 1-4 scenes/shows	Mimics contact closure. One scene/show for 0V-0V, one for 10V-0V, etc.	2
3 Port Linked Mode (Recall 8 scenes)	Device outputting 0-10V/0-24V that triggers 1-8 scenes/shows	Mimics contact closure. One scene/show for 0V-0V-0V, one for 10V-0V-0V, etc.	3
4 Port Linked Mode (Recall 16 scenes)	Device outputting 0-10V/0-24V that triggers 1-16 scenes/shows	Mimics contact closure. One scene/show for 0V-0V-0V-0V, one for 10V-0V-0V-0V, etc.	4

0-10V and 0-24V Input Profiles (Cont'd)

Profile	Use Profile for...	Effect	Ports
Master Intensity Off Trigger	Device outputting 0-10V/0-24V that sets a single intensity level for groups (including but not necessarily 0%)	Mimics contact closure. Sets groups to desired intensity when 0V received from input	1
Master Intensity On/Off Triggers	Device outputting 0-10V/0-24V that sets one of two intensity levels for groups at a time (including but not necessarily 0% and 100%)	Mimics contact closure. Sets groups to a min intensity level at a low-voltage threshold, high intensity level at a high-voltage threshold	1
RGB - Red, Green, Blue	Device that controls color (RGB)	Syncs Red, Green, Blue values to voltage at each port	3
RGBI - Red, Green, Blue, Intensity	Device that controls color (RGB) and intensity	Syncs Red, Green, Blue, Intensity values to voltage at each port	4
RGBW - Red, Green, Blue, White	Device that controls color (RGB) and vibrancy	Syncs Red, Green, Blue, Vibrancy values to voltage at each port	4
CCT (2000K-10000K)	Device that controls color (CCT)	Syncs CCT value to voltage	1
CCTI (2000K-10000K, Intensity)	Device that controls color (CCT) and intensity	Syncs CCT, Intensity values to voltage at each port	2
CCTDuvl (2000K-10000K, Tint, Intensity)	Device that controls color (CCT), tint, and intensity	Syncs CCT, Tint, Intensity values to voltage at each port	3

Contact-Closure Output Profiles

Profile	Use Profile for...	Effect	Ports
1:1 Mode	Any device that requires a contact closure connection	Can be added to groups, configured in scenes, and then added to input triggers (including keypad buttons, contact-closure inputs, and shows)	1
Ketra Power Pack Mode	Devices controlled through on/off with a Ketra Power Pack (KL14)	Can be added to groups, configured in scenes, and then added to input triggers (including keypad buttons, contact-closure inputs, and shows)	1

0-10V Output Profiles

Profile	Use Profile for...	Effect	Ports
Intensity	Device or fixture that turns off on its own at 0V, not requiring an additional port to turn off power at 0V	Can be added to groups, configured in scenes, and then added to input triggers (including keypad buttons, contact-closure inputs, and shows)	1
0-10V + CC	Device or fixture that uses a non-Ketra power pack to turn on/off.	Requires 2 ports: 1 for 0-10V out, 1 for CCO	2
0-10V + Ketra Power Pack	Device or fixture that uses a Ketra Power Pack (KL14) to turn on/off.	Requires 2 ports: 1 for 0-10V out, 1 for CCO	2

DMX Integration

The Ketra N3 Satellite bridges external DMX systems and Ketra. The N3 can be configured as DMX master or slave, and receive or output a full universe of DMX512-A.

This section covers necessary configurations in Design Studio and Tech Tool before the N3 can receive or deliver DMX data. For guidelines on wiring a DMX network external to the Ketra system, refer to our [DMX Control Support with Ketra](#) app note.

- [Web link](#) (Requires Internet access)
- [Appendix B](#), page 199

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DMX Input

Some configurations in Design Studio are required before a DMX source can begin controlling the Ketra system. DMX sources interface with the Ketra system via the N3 Satellite. The N3 can take a full universe of DMX-512A, and Ketra provides a high number of profiles to account for a variety of situations.

Before making any configurations, make sure you know what parameters the DMX source is outputting and also what channels it will be using to talk to the Ketra system.

The N3 Satellite will listen to whichever channels you specify in Design Studio, then convert the input data to color and intensity configurations to propagate ("patch") to Ketra groups. You can set up multiple profiles and map their configurations to as many groups as needed.

Example:

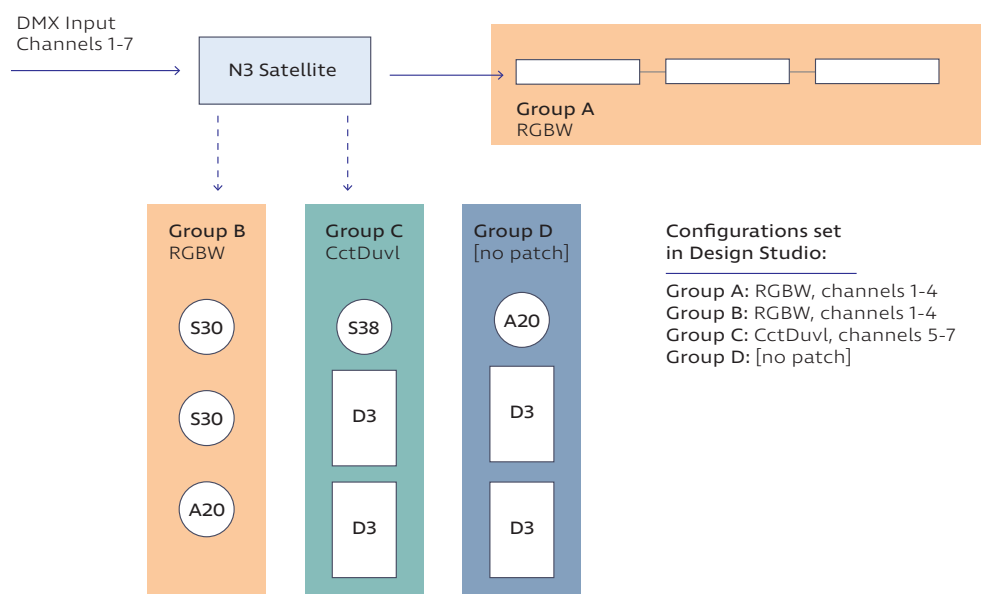


fig. 152

Important Notes:

- If any of the groups to which the N3 will patch DMX contain wireless devices (Ketra lamps, downlights, or other N3 Satellites), you will experience time delays and you may also encounter restrictions on which groups you can patch. These are covered in **Wireless Patching Limitations**, below.
- If you intend to use the DMX source to fade Ketra lights, set the source's fade time to 0. Fade needs to be configured as a parameter taking up a channel, such that the N3 (rather than the DMX controller) can execute the fade.

If the N3 Satellite will only be patching DMX to directly-attached luminaires or onboard analog outputs, skip to **Enabling DMX Input**, page 139.

Wireless Patching Limitations

If the N3 Satellite will be relaying DMX input wirelessly (even if it will also be relaying DMX commands by wire), all of the following limitations apply.

Wireless broadcasting incurs a time delay.

The N3 relays DMX input over KetraNet Mesh in 55-channel data frames, one frame at a time. In most cases, the first frame broadcasts immediately. After the first frame, each additional frame requires up to 1.5 seconds to broadcast. Once all frames have been broadcast, a final "go" command is issued and all of the affected lighting products change state in unison.

Note: The 1.5-second delay occurs between all broadcasts. Therefore, the first 55-channel frame will only experience a delay if the N3 Satellite broadcast a frame from another command less than 1.5 seconds previously.

To calculate the maximum delay possible (in seconds), use the following four-step calculation:

- 1 Divide the number of DMX channels the N3 is listening to by 55.
- 2 Round up to nearest whole number.
- 3 Multiply the result by 1.5.
- 4 Subtract 1.5 to represent the first frame, assuming no other frame was broadcast within 1.5 seconds previously.

$$T = 1.5 \times \text{ceil} \left(\frac{n}{55} \right) - 1.5$$

where n is the number of DMX channels the N3 is listening to

fig. 153

Example: In the diagram pictured in fig. 152 (previous page), an N3 patches channels 1-4 (RGBW) to Groups A and B, and it patches channels 5-7 (CctDuvI) to Group C. The number of channels to which the N3 is listening is 7. Since $1.5 \times \text{ceil} \left(\frac{7}{55} \right) - 1.5 = 0$, there will be no detectable delay between the start of transmission and the time when the lights change color.

Note: If the N3 patches DMX input by wire and KetraneT Mesh, the wired communication speed will downgrade to match the KetraneT Mesh speed. This ensures that all devices change in sync.

Fade rates must be sent as a parameter.

Due to the wireless latency discussed above, initiating a fade up or fade down from a DMX console may result in the wireless KetraneT lights making large steps in intensity rather than smoothly transitioning.

To ensure a smooth transition, KetraneT offers profiles that include a fade rate parameter (e.g., RGBIF). When the N3 Satellite receives the DMX input, it will relay the fade value to KetraneT groups; when the "go" command is given, the groups will transition to the desired color and intensity over the period of time set by the fade rate parameter.

This enables you to calculate the expected wireless latency using the formula in fig. 153, then send the DMX values that far in advance of when a transition should occur. Most DMX controllers include timeline editing and can support this use case.

Example: A DMX512 theatrical console outputs 60 bytes of data on 60 channels, including several that control fade rates for various groups. The N3 will broadcast the input over KetraneT Mesh with a wireless latency of 2.7 seconds. You can set a trigger on the theatrical console to output information to the KetraneT system 2.7 seconds before the desired transition. All KetraneT lights will change in unison at the expected time.

Only 1 N3 Satellite can wirelessly patch input per KNet.

There are restrictions on the number of N3 Satellites that can patch DMX input wirelessly to unattached groups or other N3s.

Restrictions (for the number of N3s wirelessly relaying DMX commands)

Installation with a single N4 Hub	Installation with multiple N4 Hubs
<ul style="list-style-type: none">• No more than one N3 can wirelessly relay DMX commands.	<ul style="list-style-type: none">• Each KNet can include no more than one N3 Satellite wirelessly relaying DMX commands.• Also, each KNet can support wirelessly-relayed DMX commands from no more than one N3 Satellite. (That is, no KNet can have some devices receiving wireless DMX from one N3 as well as other devices receiving wireless DMX from a different N3.)

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COMMISSIONING AN INSTALLATION

Fig. 154 illustrates a **valid** DMX setup in an installation with multiple N4 Hubs. An N3 Satellite in KNet 1 wirelessly relays DMX commands to groups in both KNet 1 and KNet 2. Fig. 155 shows the same setup slightly altered to be **invalid**.

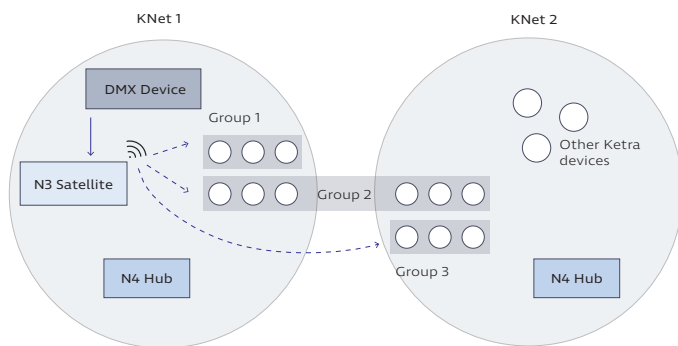


fig. 154

Fig. 154's DMX wireless setup is valid: it meets both rules for installations with multiple N4 Hubs.

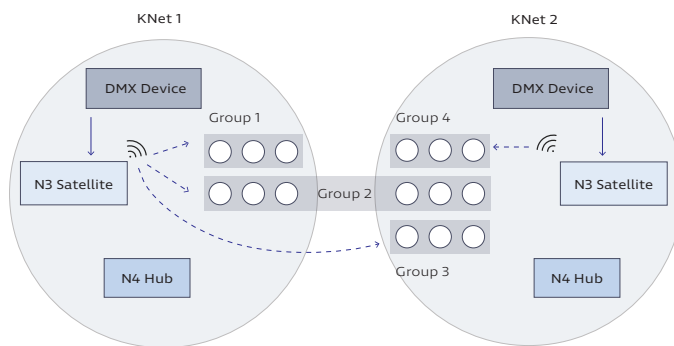


fig. 155

Fig. 155's DMX wireless setup is invalid: KNet 2 violates the second rule, because some of its devices receive wireless DMX from one N3 Satellite while others receive them from a different N3 Satellite.

DMX Input Instructions

To configure an N3 Satellite to accept DMX input, follow these steps (see fig. 156, next page):

- 1 **Go to Device Control > Integration.**
- 2 **Select the N3 Satellite.** At this step, satellites will not identify themselves by flashing indicator lights when selected.
- 3 **Select a group to patch with DMX input.** Design Studio removes groups from the Available Groups list if they violate the rule that each KNet can only receive wireless DMX patches from 1 N3 Satellite.

Notes:

- When patching additional groups, you will be able to reuse these input channels. However, avoid patching DMX to multiple groups that overlap, e.g., parent and child groups.
- Groups that contain analog outputs or dimmers, or whose subgroups contain analog outputs or dimmers, can only be controlled by intensity profiles.

- 4 **Select a DMX profile for the group.**

Note: To perform fades on wireless Ketra devices, pick a profile with the 'F' (Fade) parameter. The DMX source should be configured to output fade rates as a parameter rather than executing the fades itself. For more details, see [Wireless Patching Limitations](#), page 137.

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- 5 Set the profile's starting channel. Based on the profile you chose, Design Studio will automatically determine the number of additional channels to listen to for input data.

Example: The DMX source outputs 8-bit red, blue, green, and white values on channels 14-17. In Design Studio, the profile and starting channel should be RGBW, channel 14.

- 6 **Optional:** Set Brightness Override or DMX Refresh.

- **Enable Brightness Override:** This grants the DMX source full control of the group's intensity. The source's intensity commands will override those of any Ketra devices like keypads or shows.
- **Enable DMX Refresh:** This ensures that the group will return to its current DMX values within 10 seconds if changed from another control source. Do not use this if a keypad also controls the group. The primary use case for this feature is to enable you to test lighting content from Design Studio, knowing that the lights will revert back to their DMX values within 10 seconds.

- 7 Click **Set**. A checkmark should appear next to the group.

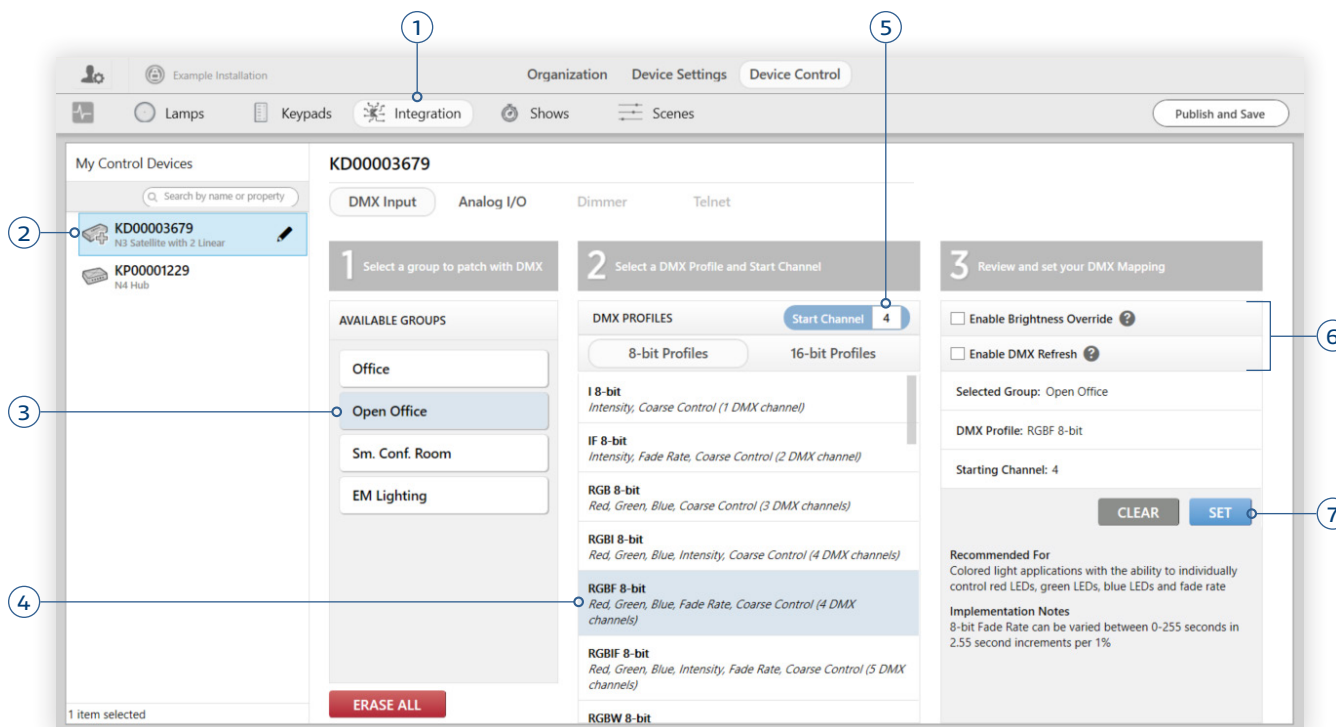


fig. 156

- 8 Repeat steps 3-7 for other groups as needed. You can reuse channels for separate profiles. For example, Group A might be patched an RGBI profile (red, green, blue, intensity) for channels 4-7, while Group B is patched an IF (intensity, fade) profile for channels 7-8. Both profiles use channel 7 for intensity.

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This ability to overlap profiles can reduce wireless latency delay by lowering the number of channels the N3 has to broadcast. However, it can also cause problems if you accidentally overlap profiles that shouldn't overlap. In the example above, **Group B** would behave unexpectedly if it were patched CctDuvl for channels 7-9. We recommend keeping track of the profiles you use and the channels they correspond to.

- 9 Click **Publish and Save** in the top-right corner. Your configurations will take effect as soon as you publish. However, if you've selected a profile with Fade Rate and the fade channel is set to a very long fade, you may not see the devices respond immediately.

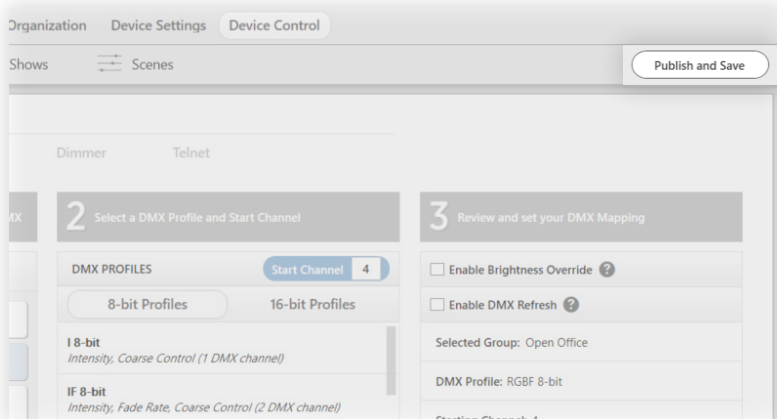


fig. 157

DMX Output

Note: The N3 Satellite can be configured for DMX output in both **Ketra Only** and **Ketra with HomeWorks QS** installations.

An N3 Satellite properly configured for DMX output enables the Ketra system to control third-party lighting and other devices. The N3 can output a full universe of DMX-512A using a variety of profiles. It will refresh the receivers' settings at a rate of 44 Hz (i.e., 44 times per second) to ensure quick correction of any transmission errors.

For every scene in the installation, you can define specific output settings for each DMX profile range. An example application would be that when a user presses Scene 2 on a Ketra or HomeWorks QS keypad, the N3 Satellite sends out 0, 119, and 255 for an RGB profile on channels 1-3; this would cause any RGB-enabled receivers listening to those channels to go to an aqua color.

Not including wiring, the workflow is as follows:

- 1 Configure profile ranges for DMX output in Ketra Tech Tool.
- 2 Sort each profile into a Ketra group in Design Studio.
- 3 Customize each group as part of a scene in Design Studio.
- 4 Assign the scene to an input source, i.e., a HomeWorks QS keypad button, Ketra keypad button, contact-closure input, or time trigger in a show.

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1 Configure profile ranges in Tech Tool

- i Open the installation in Ketra Tech Tool.
- ii On the DMX Output tab, select an N3 Satellite to configure.
- iii Click Add New Profile.

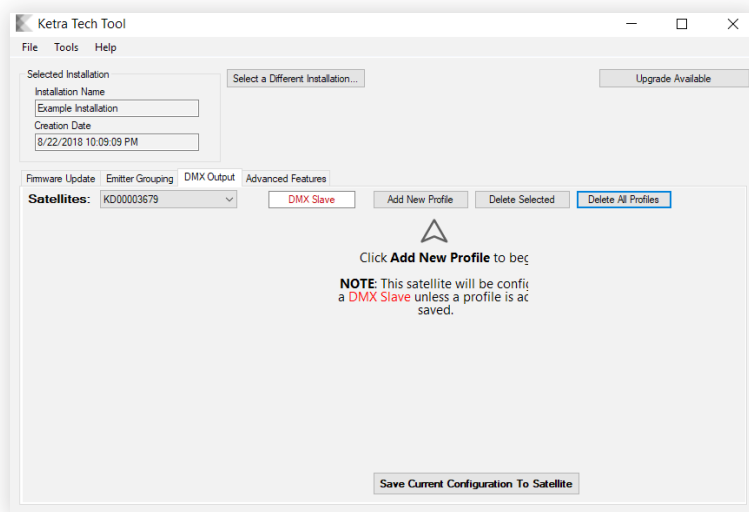


fig. 158

- iv Set the profile and channel range, then give the profile a descriptive name. The name will help you identify the profile later on when adding it to groups.

When selecting a profile, reference the table below as a key to the profile parameters.
(Step 1 continued after table)

DMX Profile Parameters

Symbol	Parameter Name	Range (Min = 0, Max = 255 8-bit or 65535 16-bit)	Implementation Notes
Color Parameters			
R	Red	Min: Off, Max: Red LED to full intensity	
G	Green	Min: Off, Max: Green LED to full intensity	
B	Blue	Min: Off, Max: Blue LED to full intensity	
W	White	Min: Off, Max: White LED to full intensity	
A	Amber	Min: Off, Max: Amber LED to full intensity	

DMX Profile Parameters Cont'd

X	CIE 1931 x coordinate	Min: 0.0, Max: 1.0	
Y	CIE 1931 y coordinate	Min: 0.0, Max: 1.0	
Cct	Color temperature	Min: 2000K, Max: 9970K or 10000K (8-bit vs. 16-bit)	
Duv	Tint (distance from the black body locus)	Min: -0.05, Max: +0.0496	At 50% (127 for 8-bit, 32768 for 16-bit), the tint is +0.00, meaning the color temperature is on the black body locus
Intensity Parameters			
I	Intensity	Min: 0%, Max: 100%	Use if at least one scene will set the receivers' intensity to a <100% value
Masteri	Master Intensity	Min: 0%, Max: 100%	Use if all scenes will leave the receivers' intensity at 100% unless dimmed from a keypad or other input
Symbol	Parameter Name	Range (Min = 0, Max = 255 8-bit or 65535 16-bit)	Implementation Notes
Other Parameters			
V	Vibrancy	Min: 0%, Max: 100%	At 0%, the current color point is powered more by the W emitter. At 100%, the color point is powered more by the RGB emitters. Objects illuminated at higher vibrancy typically appear more saturated
F	Fade	Min: 0 seconds, Max: 255 seconds or 6553.5 seconds (8-bit vs. 16-bit)	Generally unnecessary when N3 is DMX master. Only use if the receiving devices require that fade times be sent as a parameter

Note: You will only be able to dim third-party lighting controlled by DMX if you choose an RGB/RGBA profile or any profile with an intensity parameter ('I' or "Masteri"). In RGB/RGBA profiles, the minimum value for each channel will turn the corresponding LED off, meaning that if all those channels are at 50%, the light will be at 50% intensity. By contrast, a CCT parameter's minimum value does not equate to Off but rather to 2000K, so without an accompanying intensity parameter, it will be stuck at 100% intensity.

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- v Repeat steps 1.iii-1.iv for additional profiles, one at a time.
- vi Click **Save Current Configuration To Satellite**. This assigns your DMX Output configurations to the N3. Note that this step will fail if the N3 is not powered on.

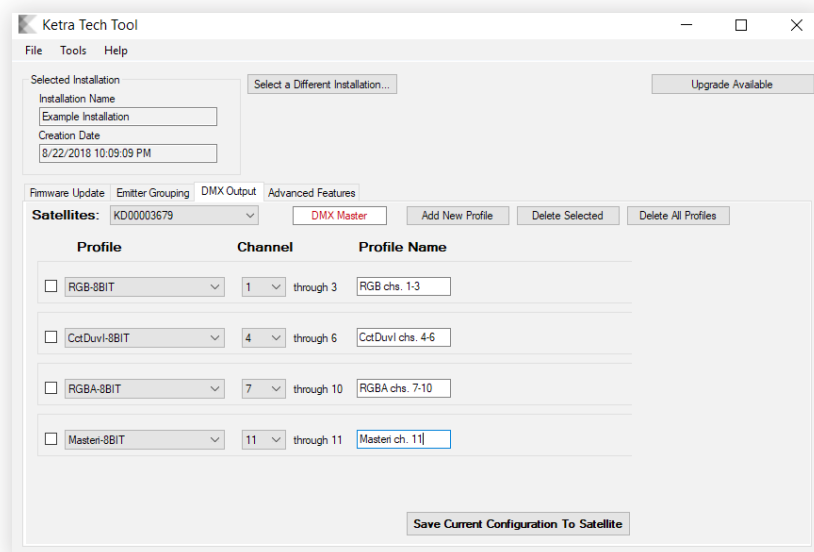


fig. 159

2 Sort profiles into groups in Design Studio

- i Open the installation in Design Studio. On the **Organization** tab, you should see your DMX outputs in the My Devices list, as shown in fig. 160.

You can think of each of these outputs as representing the DMX receivers listening to the channel range. For example, the "RGBA chs. 7-10" output in fig. 160 might represent several third-party LEDs with addresses of 7 that are listening for RGBA input. It might be more intuitive to imagine sorting those into a group rather than sorting the profile into a group.

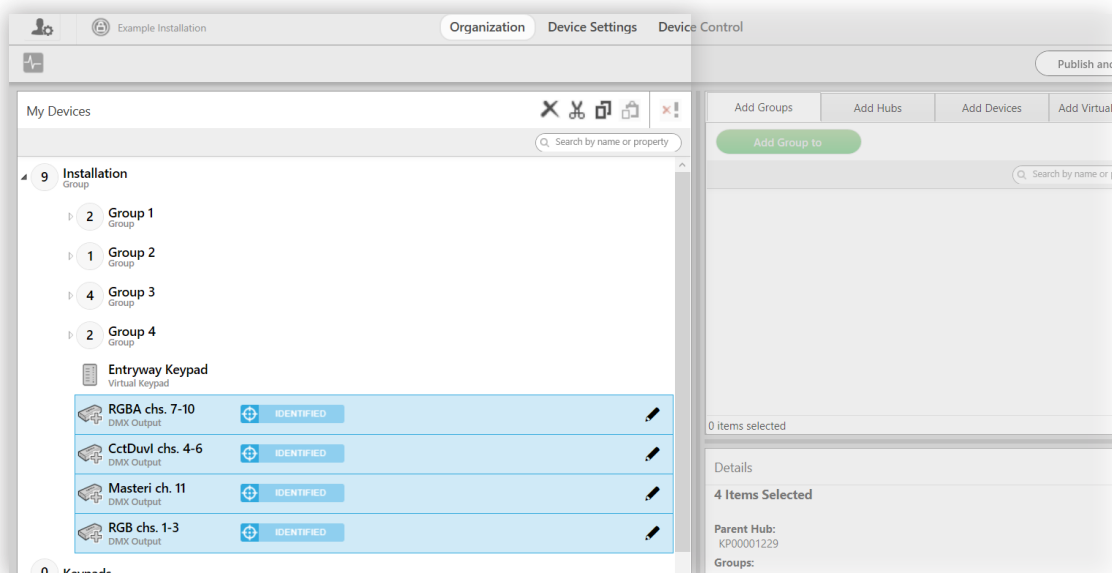


fig. 160

DESIGN STUDIO 3.0

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- ii Sort the profiles into groups using the **Cut/Copy/Paste** buttons or shortcuts. The buttons and corresponding shortcuts are shown in fig. 161. Note that you can have the same profile in multiple groups if needed. For example, you could use third-party lights as everyday lighting and safety lighting.

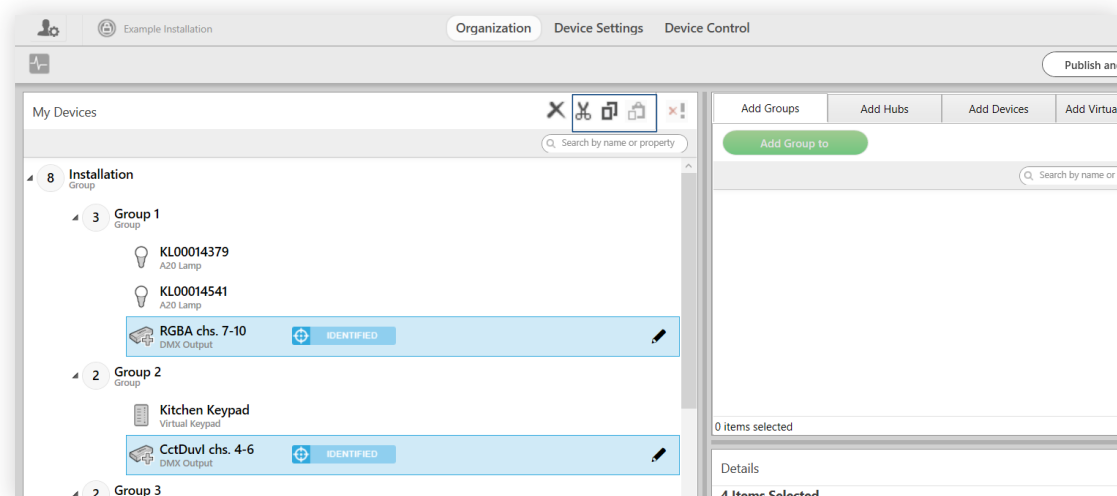


fig. 161

3 Customize the DMX outputs in scenes (See fig. 162)

- i Go to **Device Control > Scenes**.
- ii Select a scene in the **My Scenes** panel, or create a new one.
- iii Select a group from the scene's grouping hierarchy that contains a DMX output profile.

Note: The group's color and intensity settings do not apply to the DMX output, only to Ketra lights. If the group shows a color and intensity setting of blue, 50%, the DMX output will remain at its default unless you go to the **3rd Party Outputs** tab as covered in step 3.4 and make changes there.

- iv In the color picker panel on the right, click the **3rd Party Outputs** tab. You should see the profile's parameters as adjustable values.

Note: If you created a new scene and the group defaulted to NA, you will need to click the + icon next to the group's name before you can see the appropriate DMX sliders for the group.

- v Configure the information the N3 Satellite will send out on each channel when the scene is triggered.

Example: In fig. 162, when a user triggers the **Hangout** scene, the N3 Satellite will output the values 153, 0, 153, and 0 on channels 7-10 (since **Group 1** contains the output "RGBA chs. 7-10"). The receiving devices should be configured to interpret data from those channels as red, green, blue, and amber, respectively.

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Note: Using the intensity slider at the top of the color picker panel will only affect the group's Ketra lights. To control the DMX output's intensity, use the profile's intensity parameter or lower all of its RGB/RGBA values equally.

- vi Configure the number of seconds it will take the selected output's corresponding receivers to transition to the scene. This is done using the "Fade" text field. **Example:** In fig. 162, when a user triggers the **Hangout** scene, the receiving devices will transition from their current state to their **Hangout** state over the course of 2 seconds.
- vii Repeat steps 3.iii-3.vi for any additional groups DMX outputs.
- viii In the top-right, click **Publish and Save**.

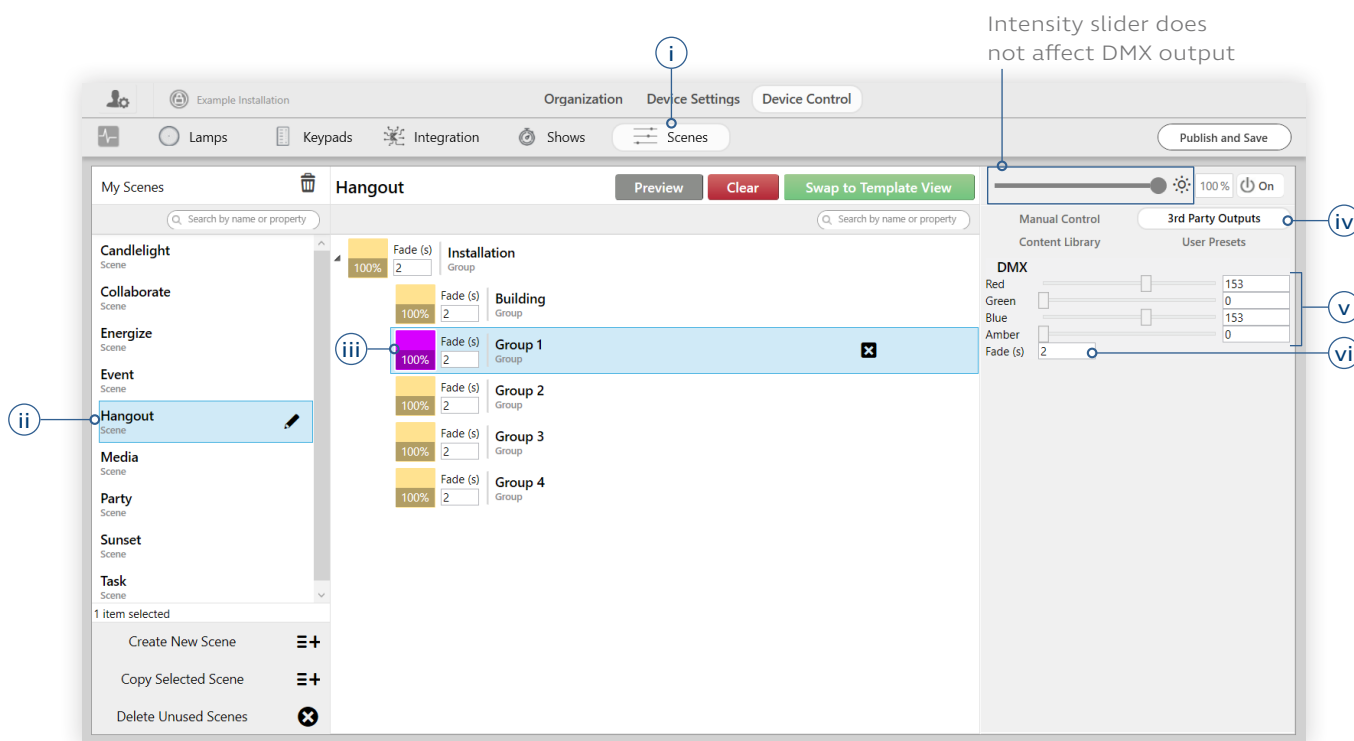


fig. 162

4 Assign the scene to an input trigger

You can assign the scene to any of the following:

- A HomeWorks QS keypad button (through the HomeWorks QS software)
- A Ketra keypad button
- A contact-closure input
- A time trigger in a show

Integrating with Lutron

Design Studio 3.0 supports LAN (local area network) integration with **HomeWorks QS** and **Quantum** control systems. After integration, these systems will be able to control Ketra by playing scenes and shows, raising/lowering intensity, and toggling power for Ketra groups.

Both types of integration (HomeWorks and Quantum) require that you commission an installation in Design Studio and then import it into the appropriate Lutron commissioning software (HomeWorks QS for HomeWorks, Q Design for Quantum). Specific instructions and references for each are included in the sections below.

Note: If you import a Ketra installation into the Lutron software and subsequently make changes in Design Studio, you will need to re-import the installation.

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Exporting a Command Set from Design Studio	147
Enabling N4 Hubs for Telnet Integration	149
Enabling Control of Multiple Groups	150

Integrating with HomeWorks QS

To integrate Ketra with HomeWorks QS, refer to Lutron's thorough app note on the subject ("Integrating Ketra productions into HomeWorks QS Systems," #696):

- [Web link](#) (Requires Internet access)
- [Appendix A](#), page 178

We also recommend reading **Enabling Control of Multiple Groups**, page 150, if you intend to use individual triggers (e.g., keypad buttons) to control multiple Ketra groups.

Integrating with Quantum

To integrate a Design Studio installation with Quantum, you have to export a command set from Design Studio, enable at least one N4 for telnet communication, import the command set into Lutron's Q Design software, and then link the command set to an N4.

Exporting a Command Set from Design Studio

A Design Studio command set lists every possible action that can be performed on every possible group. For example, "Group A-Intensity Up" or "Group B-Scene 1" might be lines in your command set. Once you import this list into Q Design, the Quantum system will be able to send any of these commands to an N4 Hub via telnet.

Caution: A command set is a static snapshot. If you make changes to the installation after exporting, you should also export a new command set, import that into Q Design, and link it to the N4.

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When you export a command set, Design Studio creates one or more CSV (spreadsheet) files. The number of CSVs determines the number of N4s you will need to enable for telnet in the next step.

For now, follow these instructions to export a command set:

- 1 **Navigate to Device Control > Integration.**
- 2 **Select any N4 Hub from the My Control Devices list.** At this point, it doesn't matter which N4 you select.
- 3 **In the Telnet Configuration pane, confirm that the Max Export Lines, Max Command Name Length, and Export Format fields look like fig. 163.**

Note: You can modify those fields, but Q Design will not accept CSVs with more than 1500 lines, or commands with names longer than 50 characters.

- 4 **Click Export.**

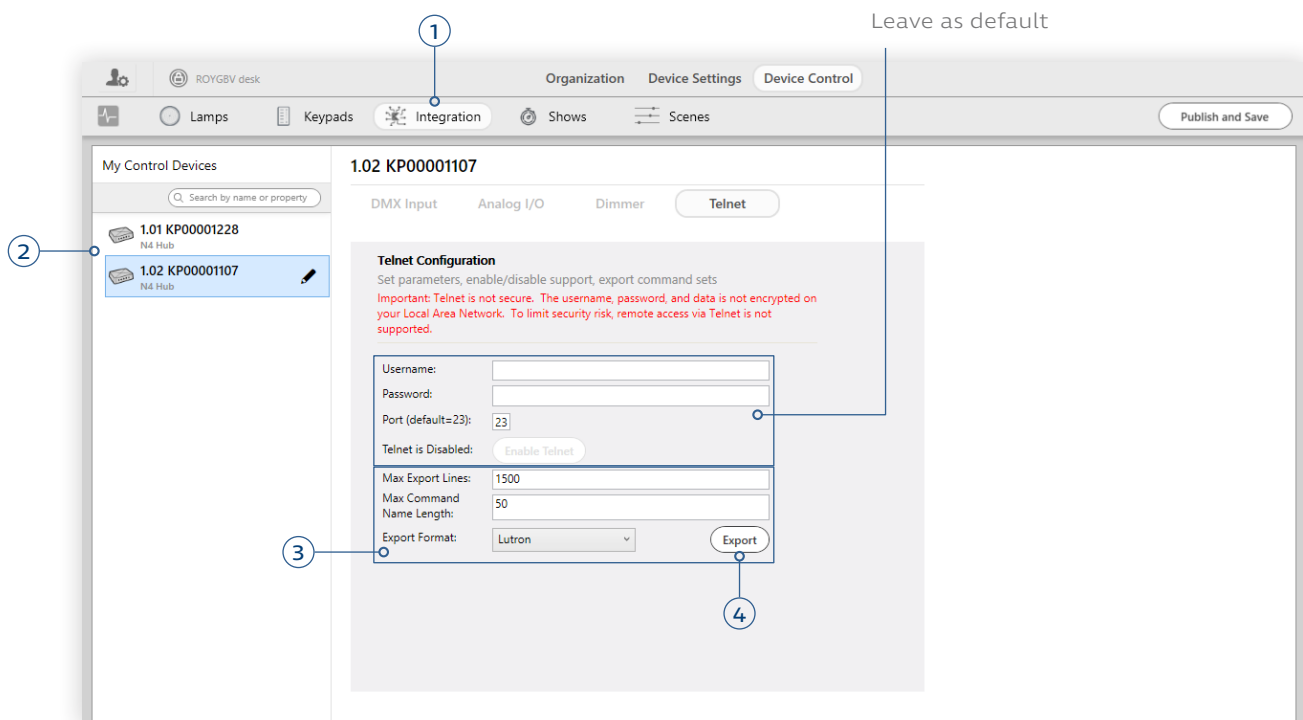


fig. 163

- 5 **Click Proceed in any popup windows.**
- 6 **In the Save As window, select a place to save the CSV(s) and click Save.**

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Enabling N4 Hubs for Telnet Integration

Quantum telnet commands reach the Ketra system via the N4 Hub. The hub then propagates those commands wirelessly to other Ketra devices.

This setup requires that you enable telnet on 1 N4 per CSV. For example, if the export generates 3 CSV files, you should enable telnet on 3 N4s. It doesn't matter which N4s you choose, because any hub is capable of relaying commands to others as necessary.

To see the number of CSVs that were automatically generated when you exported your command set, use the Windows File Explorer to navigate to the command set's folder.

To enable telnet on an N4, follow these steps:

- 1 **Navigate to Device Control > Integration.**
- 2 **Select any N4 Hub from the My Control Devices list.** Again, it doesn't matter which N4 you pick, because any N4 can relay commands to any other N4.
- 3 **In the Telnet Configuration pane, set the username and password that the N4 will look for in each command.** If you have already set a telnet username and password in Q Design, use the same values here.

Note: Telnet is not encrypted. Do not use sensitive passwords.

- 4 **Optional: Change the port number for the integration.** Use port 23 unless told otherwise by a facility IT administrator.
- 5 **Click Enable Telnet.**

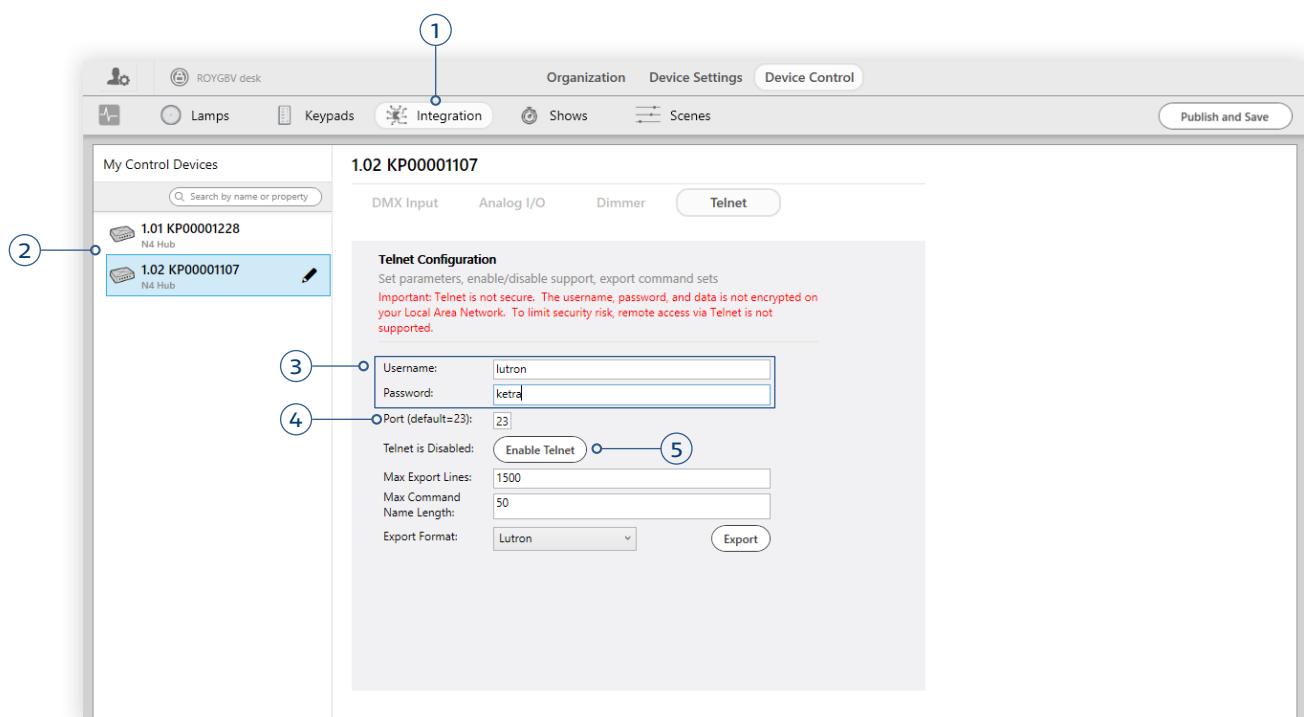


fig. 164

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- 6 If necessary, repeat steps 2-5 for additional N4 Hubs. You should enable telnet for 1 N4 per CSV file in the command set.
- 7 Click **Publish and Save** in the top-right corner of the screen.

Note: We recommend keeping Design Studio open as you perform the remaining integration steps in Lutron Q-Design. If not, make a note of the telnet-enabled N4s' serial numbers and IP addresses before closing Design Studio. IP addresses can be found on the **Organization** tab by selecting the hub in the **My Devices** panel.

For instructions on integrating third-party products with the Quantum system through Q Design, refer to the relevant Lutron documentation.

Caution: Telnet integration requires that the N4 Hub keep the same IP address over time. To accomplish this, you can either set a static address for the N4 (see [Setting Static IP Addresses for Hubs](#), page 28) or reserve an address in the DHCP server. If you do not do so, your integration will stop working as soon as the hub's address changes.

Enabling Control of Multiple Groups

Note: This section discusses control groups, a feature that is only useful for installations that integrate with Lutron control systems. If you are not integrating with Lutron, you do not need to use control groups.

Design Studio control groups make it easier to program a Lutron keypad button to control multiple Ketra groups. Control groups are created in Design Studio, then implemented in HomeWorks QS or Q Design.

Example: If you wanted a Lutron keypad button to control your Kitchen and Dining Room groups, you could create a Kitchen + Dining control group. In the Lutron commissioning software, you would then assign the scene to Kitchen + Dining, thereby having it affect the kitchen and dining room.

To create and configure a control group in Design Studio, follow these steps:

- 1 In the Design Studio installation, navigate to **Device Control > Control Groups**.
- 2 Click **Create New Control Group**. (See fig. 165, next page.)
- 3 Use the checkboxes to set the groups you want to include in the control group.
- 4 Click **Publish and Save** in the top-right corner.

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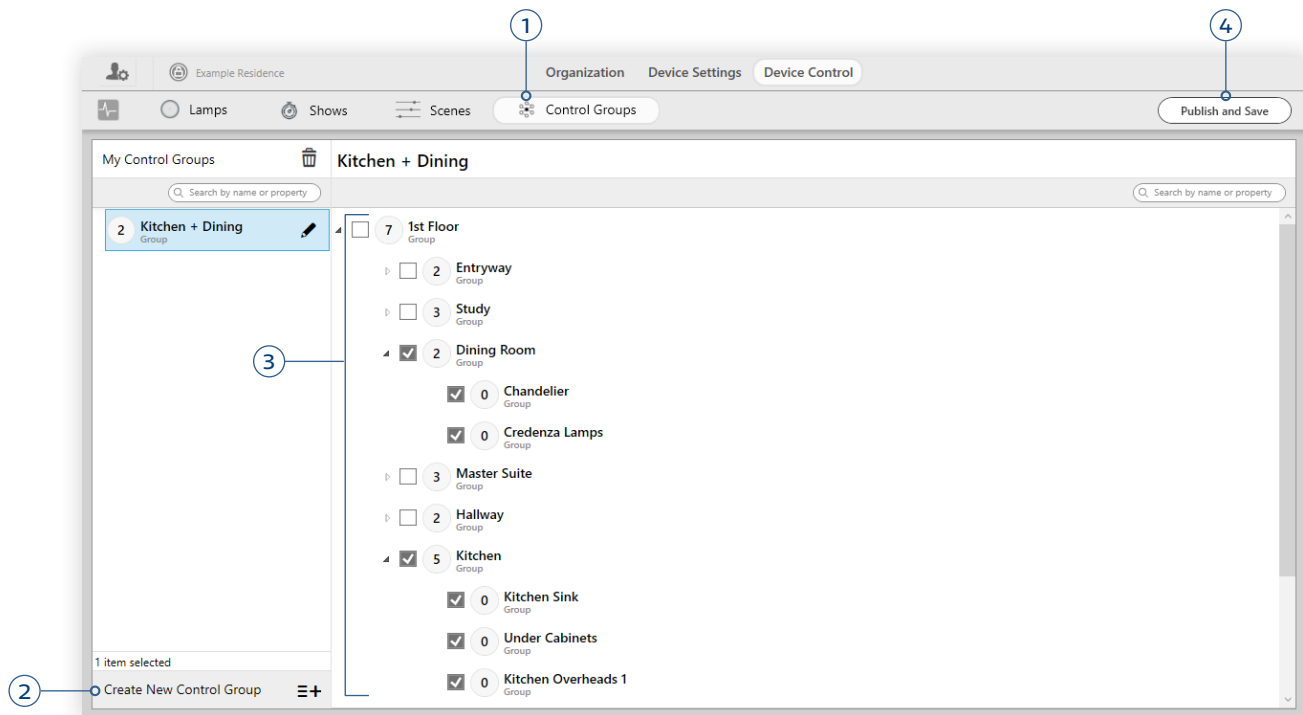


fig. 165

After following these steps, you may need to re-import the installation into Lutron's commissioning software. For Quantum systems, that requires exporting a command set and then importing the CSV into Q Design. For HomeWorks systems, you don't have to export anything from Design Studio; just re-import the Ketra installation into HomeWorks QS.

Note: Control groups do not appear in the installation's grouping hierarchy in Design Studio. You can only see them by going to **Device Control > Control Groups**.

Publishing: Saving Configurations to Devices

Publishing saves configurations to your devices as default states. Without publishing, most Ketra devices will return to their default states when power-cycled. For example, if you program a Ketra keypad in Design Studio but never publish, a power outage would cause the keypad to return to an unprogrammed, blank state.

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Problems While Publishing 153

Note: Publishing is an important last step to any changes that you make in Design Studio. However, it is not the only recommended way of saving progress in an installation. See [Part Four: Saving Your Progress](#), page 168, for more details.

In large installations, publishing can take a long time because it requires Design Studio to communicate with every device.

To receive their new defaults, the devices you are publishing to must be powered on.

You can publish from any **Device Control** tab, as well as the **Organization** tab, by clicking **Publish and Save** in the top-right corner of the screen.

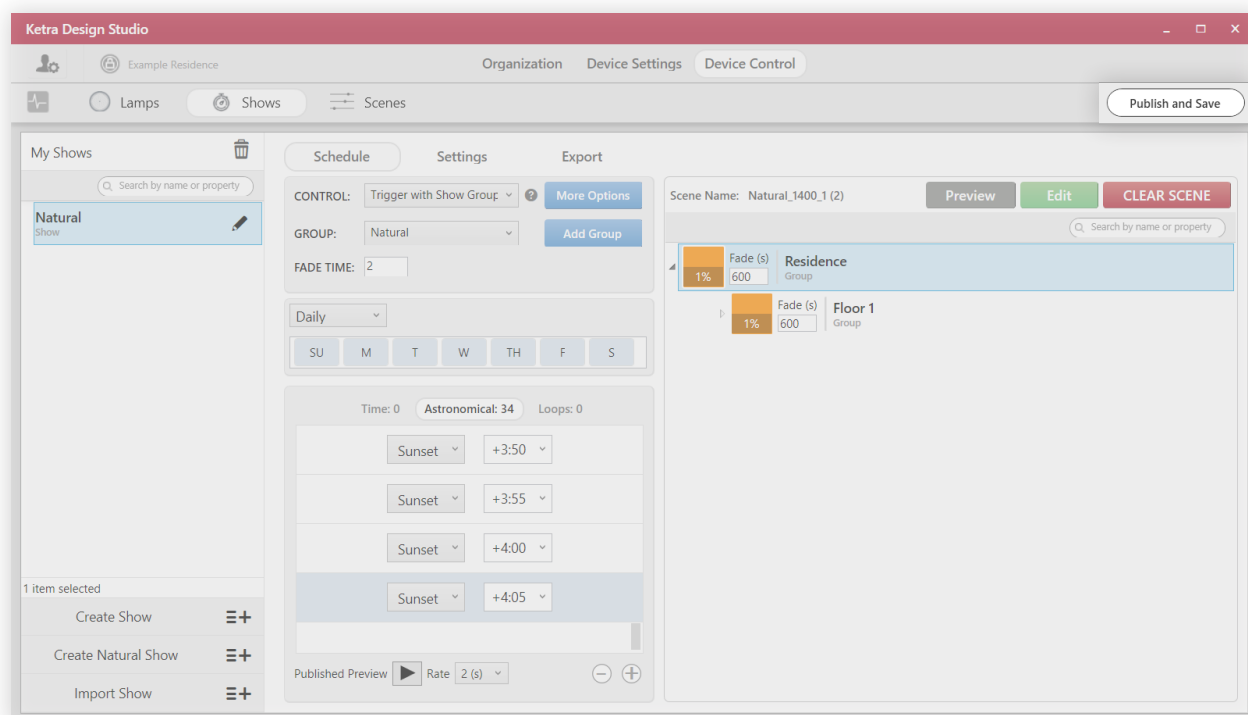


fig. 166

Problems While Publishing

Design Studio may encounter errors while attempting to publish, in which case you will see a screen saying “There was a problem with configuring your devices,” as well as a list of the specific devices that failed to publish. Below each device in the list is a brief summary of why the device failed to publish, and recommended steps for fixing the problem. For an example, see fig. 167.

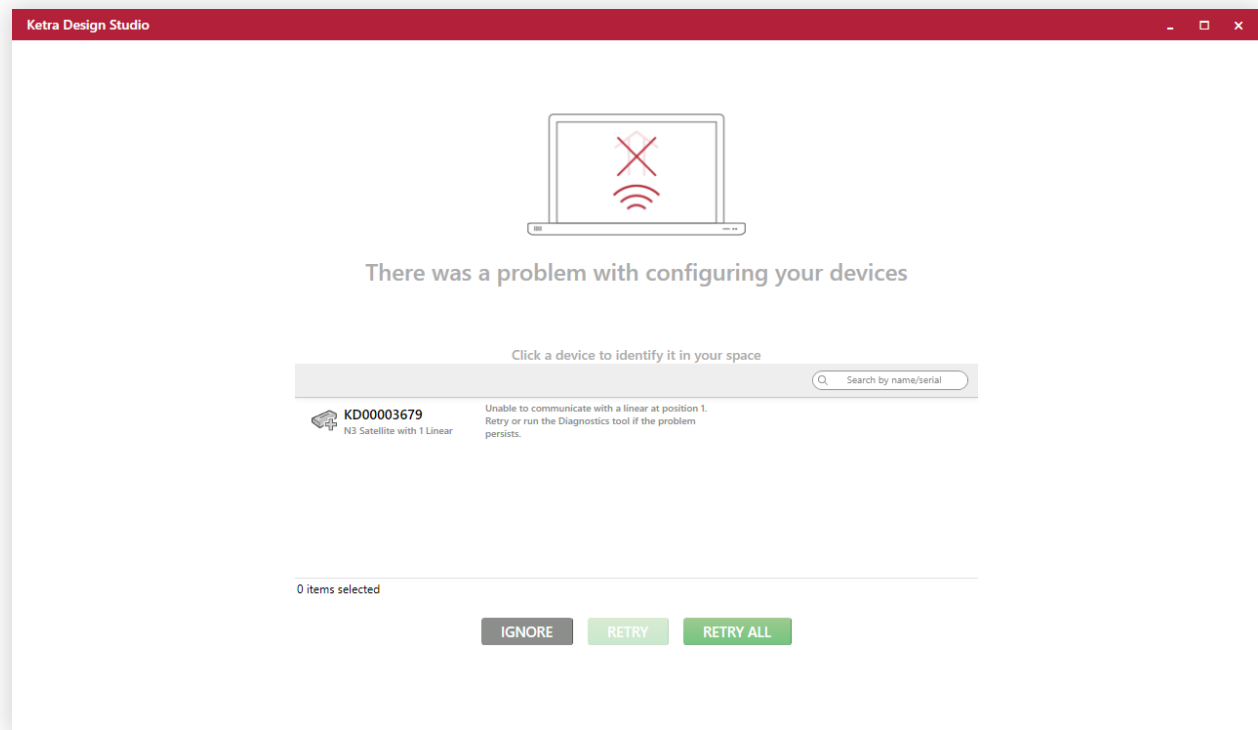


fig. 167

In this screen, you have the options to **Ignore**, **Retry**, or **Retry All**.

- **Ignore** dismisses all errors while publishing.

Caution: Devices may not function properly until published successfully. Do not click Ignore until retrying publishing. If devices repeatedly fail publishing, we recommend confirming that they are receiving power, and then (if they are receiving power) running diagnostics. See [Running Diagnostics](#), page 172.

- **Retry** allows you to redo publishing for a specific device. First highlight the device in the list, and then click **Retry**.
- **Retry All** allows you to retry publishing for all devices in the problem list.

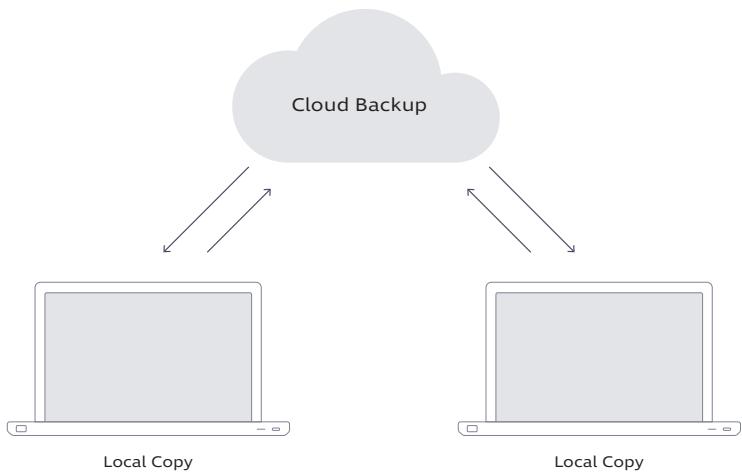
If problems persist, you can perform a diagnostics check. See [Running Diagnostics](#), page 172.

Collaborating with Other Users

Version Control Through Syncing

In any collaborative software, version control is essential. Version control refers to any method of keeping a file in-sync between multiple users or computers, so that no one makes changes to an outdated file version.

Ketra does version control using a cloud backup of every installation. Any computer can quickly sync with the cloud over Internet connection—i.e., pull the latest changes (*sync down*) or push its own updates (*sync up*). This enables collaboration without flash drives or other forms of manual file transfer.



Syncing enables version control across machines

fig. 168

Design Studio attempts to sync with the cloud at two different times:

- It syncs down whenever you open an installation. Syncing down overwrites your computer's local file with the cloud backup.
- It syncs up whenever you close out of the installation (by returning to the Existing Installations list or exiting Design Studio). Syncing up overwrites the cloud backup with your computer's local file.

Caution: Cloud-based version control streamlines collaboration, but it also comes with its own risks. To avoid potential data loss, we recommend reading [Collaboration Guidelines](#), page 150.

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Viewing an Installation's Sync Status

You can see the sync status of your installations in the Existing Installations menu.



fig. 169

There are three possible statuses:

- **Sync Successful:** When Design Studio last checked, your copy of the installation was up to date with the cloud backup.

Caution: Sync Successful does not necessarily mean you have the latest version of the installation.

- If you opened Design Studio without Internet access, the attempt to check your installation against the cloud will fail. However, the “Sync Successful” label will hold over from the last successful check.
- If another computer has made changes without syncing up, the cloud backup itself is outdated, and so is your local file. Since the out of date backup matches your out of date file, you will see the “Sync Successful” label in Design Studio.

- **Sync Pending:** Changes to your installation have been saved locally on your computer but not synced up to the cloud. No other computer will be able to see your changes. Your changes will be synced up the next time you open Design Studio with Internet access. Alternatively, once acquiring Internet access, you can right-click the installation in the Existing Installations list and select Sync Now.
- **Sync Required:** Your copy of the installation is out of date compared to the cloud backup. You must sync down before you can access the installation.

Collaboration Guidelines

Ideally, each installation's cloud backup is 100% up to date. However, if the backup is out of date because a computer has made changes but not synced, another computer might pull the outdated copy of the installation. This can end up causing significant data loss. For an example of how this might happen, see the “Wrong” column of the table below.

To avoid that situation, follow the guidelines below.

- **If possible, ensure that all computers editing the installation have Internet access.** Syncing with the cloud backup requires Internet connection, so all computers editing an installation should have Internet access.

DESIGN STUDIO 3.0

MAINTAINING AN INSTALLATION

- **During commissioning, sync regularly by closing out of the installation and reopening.**
This ensures that both the cloud backup and your local copy of the installation are up to date. To sync, confirm that you have Internet access and then follow these steps:
 - 1 Close out of the installation. You can do this by returning to the Existing Installations list from the sidebar, or closing Design Studio. This triggers a sync up—i.e., it overwrites the cloud backup with your version of the installation.
 - 2 Reopen the installation. This triggers a *sync down*—i.e., it overwrites your version of the installation with the cloud backup.
- **Always sync from one computer before opening on another. Never have multiple computers edit an installation simultaneously.**
Ignoring this recommendation will almost certainly result in data loss. Changes made on one computer are not reflected on others in real time. That means that if multiple computers are editing an installation file simultaneously, their copies of the file conflict with one another. When each computer syncs up to the cloud backup, Ketra will only preserve whichever one synced up last.

Example:

Wrong	Correct
1 Computer A and Computer B are both editing Example Installation. Computer A works on the Keypads tab while Computer B works on the Integration tab.	1 Computer A is editing the Keypads tab in Example Installation.
2 Computer A closes Design Studio, triggering a sync up (backup to the cloud). <i>The cloud now has Computer A's changes to the Keypads tab.</i>	2 Computer A closes Design Studio, triggering a sync up (backup to the cloud). <i>The cloud now has Computer A's changes to the Keypads tab.</i>
3 Computer B closes Design Studio, triggering a sync up. <i>The cloud now has Computer B's changes to the Integration tab, but Computer B's outdated keypad settings have overwritten Computer A's Keypads settings.</i>	3 Computer B opens Example Installation, triggering a sync down (updating local file with cloud backup). <i>Computer B now has the up to date Keypads tab.</i>
4 Computer A opens the installation in Design Studio, triggering a sync down (updating local file with cloud backup). <i>Computer A now has the up to date Integration tab, but all of its changes to the Keypads tab are gone.</i>	4 Computer B edits the Integration tab, then closes Design Studio, triggering a sync up. <i>The cloud now has Computer B's changes to the Integration tab.</i>
	5 Computer A opens the installation in Design Studio, triggering a sync down. <i>Both computers have the up to date Keypads and Integration tabs.</i>

Sharing Access to an Installation

Sharing allows another Design Studio account to access an installation. The account will be able to access the installation on-site and remotely (as long as remote access is enabled; see **Enabling Remote Access**, page 159).

There are two requirements for sharing:

- Only the account that created the installation can share access.
- Sharing only works when the computer that is trying to share access has an Internet connection.

Note: If you need to share an installation but cannot access the account that created the installation, contact Ketra Tech Support. You can reach us Monday through Friday, 9 AM - 5 PM, CST. Call 1-844-588-6445, or email ketrasupport@lutron.com.

Caution: After sharing, we strongly recommend against having more than one computer edit the same installation simultaneously (regardless of whether they are using the same or different Design Studio accounts). If that happens, the computer that syncs last will overwrite any changes made from the other computer(s).

You can share an installation in one of two ways:

- Share from the Existing Installations list
 - 1 Go to the Design Studio home screen.
 - 2 Right-click the installation in the Existing Installations list.
 - 3 Choose Share.
 - 4 Enter the Design Studio account email address and click Share. A green Success message will appear below the email address field to confirm that the installation shared successfully.

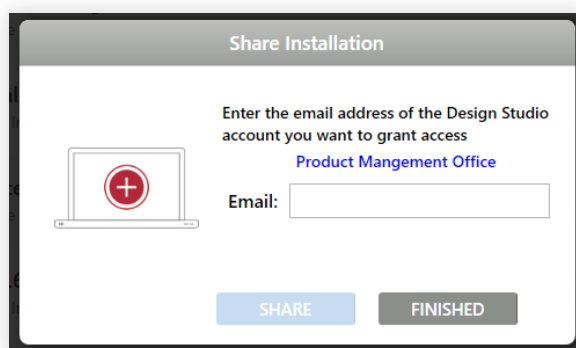


fig. 170

- Share from the my.goketra Customer Web Portal
 - 1 Navigate to <https://my.goketra.com>.

- 2 **Log in if prompted.** You should log in with the same Design Studio account that created the installation.
- 3 In the list of installations, find the installation and click **Share**.
- 4 Enter the Design Studio account email address and click **Share**.

The user will now be able to access the installation from their Existing Installations list in Design Studio and my.goketra.

Viewing an Installation's Authorized Users

To see which Design Studio accounts have permission to access an installation, follow these steps:

- 1 Navigate to <https://my.goketra.com>.
- 2 Log in if prompted.
- 3 In the list of installations, find the installation and click **Details**.
- 4 Look at the list under the *Users* heading.

Revoking Access Permissions

For security reasons, you may decide to deauthorize an account's access to an installation file. This will remove the file from the user's Existing Installations list, ensuring that they cannot access it to make changes.

Only Ketra Tech Support can revoke access permissions for a Design Studio account. **You can reach us Monday through Friday, 9 AM - 5 PM, CST. Call 1-844-588-6445, or email ketrasupport@lutron.com.**

Note: You can also remove an installation from your account using the Customer Web Portal. However, the installation will not be removed from Design Studio until you log out and log back in.

Accessing Remotely

If remote access is enabled for an installation, you (and other shared Design Studio users) can access the installation file without being on the N4s' LAN. This enables you to make changes off-site, perform remote firmware updates, and streamline troubleshooting by Lutron and Ketra tech support when needed.

Note: For security, remote access can only be enabled by an on-site computer connected to the same network as the N4s.

Note: Accessing the N4s' LAN remotely requires that the computer and the N4s' network have Internet access.

Only users who have permission to open the installation file—i.e., users with whom the installation's creator has shared the install—can access the installation remotely. As a safety measure, someone controlling an installation remotely cannot deprovision or replace N4 Hubs, or delete the installation.

If you encounter problems trying to access an installation remotely, see [Trouble Accessing an Installation](#), page 170.

Enabling Remote Access

To enable remote access, follow these steps:

- 1 While connected to the N4s' LAN, open the installation in Design Studio.
- 2 Open the installation sidebar by clicking the user icon.
- 3 Click **Enable Remote Access**.
- 4 Click **Yes**.

Ensuring Security with Remote Access Enabled

When remote access is enabled, any Design Studio account that has permission to access the installation (i.e., with which the installation's creator has shared the installation) will be able to do so at any time.

Note: As a security measure, no one accessing an installation remotely can deprovision or replace N4 Hubs, or delete the installation.

If desired, an on-site user can keep remote access **off** most of the time, only turning it on for technical support or scheduled maintenance.

Updating Firmware

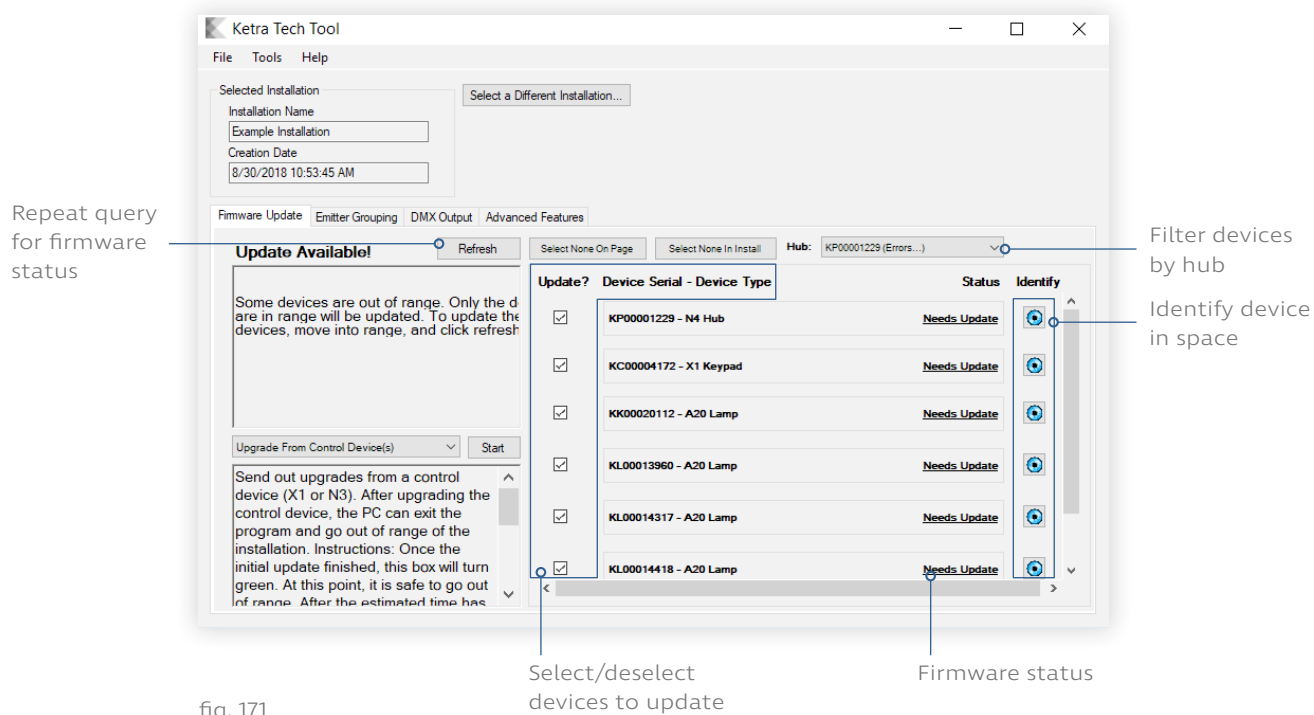
Periodically, Design Studio may prompt you to update your Ketra devices' firmware. Firmware updates can add new device functionality and often improve device longevity.

Firmware updates can be performed on-site or remotely. Instructions for both are included in [Performing an Update](#), page 162.

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The Firmware Update Tab



As shown in fig. 171, Tech Tool's Firmware Update page provides a list of your devices and tells you whether they need a firmware update. You can perform the update itself from this page as well.

Before Updating

Plan a time to perform the update.

We recommend performing the update at a time when the space is not in use. The time required to update an entire installation varies by the number and type of devices, and may take several hours. Lights and control devices will remain functional throughout the update, though you may notice lights flashing as they reset.

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Updating may cause lights to go to their default restore states.

Firmware updates often end with Tech Tool rebooting Ketra lights' onboard computers. In **Ketra with HomeWorks QS** installations, this will (by default) cause lights to go to whatever their state (color and intensity) was before the update. In **Ketra Only** installations, it will (by default) cause lights to go to their default restore states; the unmodified factory default is 3000K, 100% brightness. To control your lights' restore states, see [Managing Lighting Power-Restore States](#), page 59.

Try to resolve any communication issues before updating.

Use the Diagnostics tool in Design Studio (see fig. 169) before administering the update. If any devices fail to communicate, ensure that they are powered on in the installation space. If the devices are powered on and can't communicate after a retry, make a note of their serial numbers. You can expect those serial numbers to fail the firmware update. For more details on Diagnostics, see [Running Diagnostics](#), page 172.

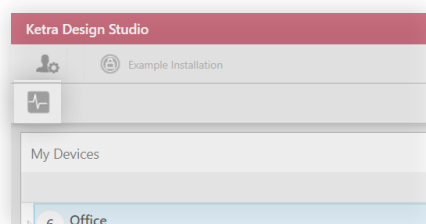


fig. 172

For remote updates, ensure the installation is remote access enabled. (See fig. 173)

Remote access must be enabled for the installation before any operations can be performed remotely. Enabling remote access must be done on-site, and requires firmware version 1.14 or higher on all N4 Hubs. To enable remote access, open the installation in Design Studio, click the user icon in the top-left corner to open the sidebar, and click **Enable Remote Access**.

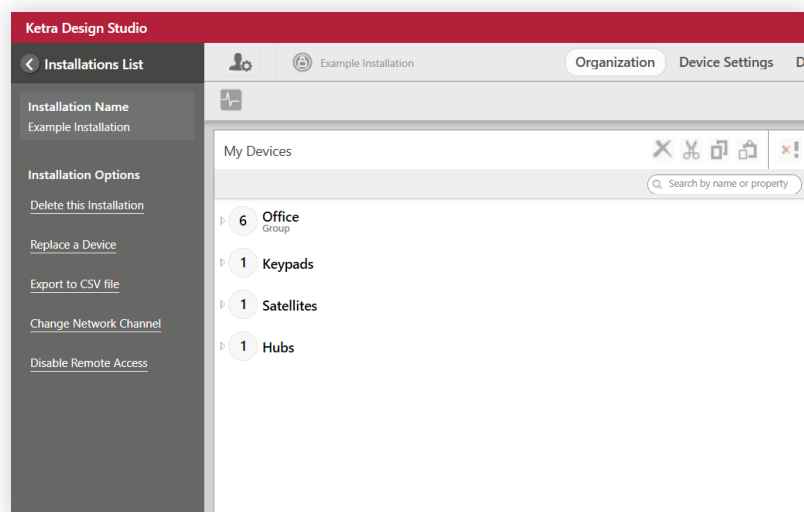


fig. 173

Performing an Update

Note: We recommend reading **Before Updating**, page 160, before updating firmware.

To perform the update (on-site or remotely), follow these steps:

- 1 Open the installation in Ketra Tech Tool.
- 2 If performing remotely, click **Yes** in the remote connection popup.

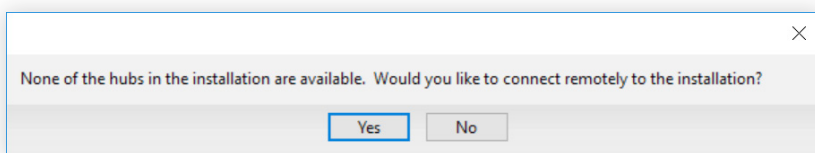


fig. 174

Note: If this popup does not appear, the installation is not enabled for remote access. Enabling must take place on-site within the Design Studio installation, and it requires firmware 1.14 or higher on all N4 Hubs.

- 3 In the installation dashboard, check for any warnings in the **Status** column of the **Firmware Update** tab. Any warnings will appear as clickable links that open additional information about the issue.
- 4 In the **Update Method** dropdown, choose "Upgrade From Control Device(s)". A general estimate of update time is in the lower left.
- 5 Click **Start**. Tech Tool will first update your installation's N4s, and then the N4s will propagate the update to the devices on their KNets.

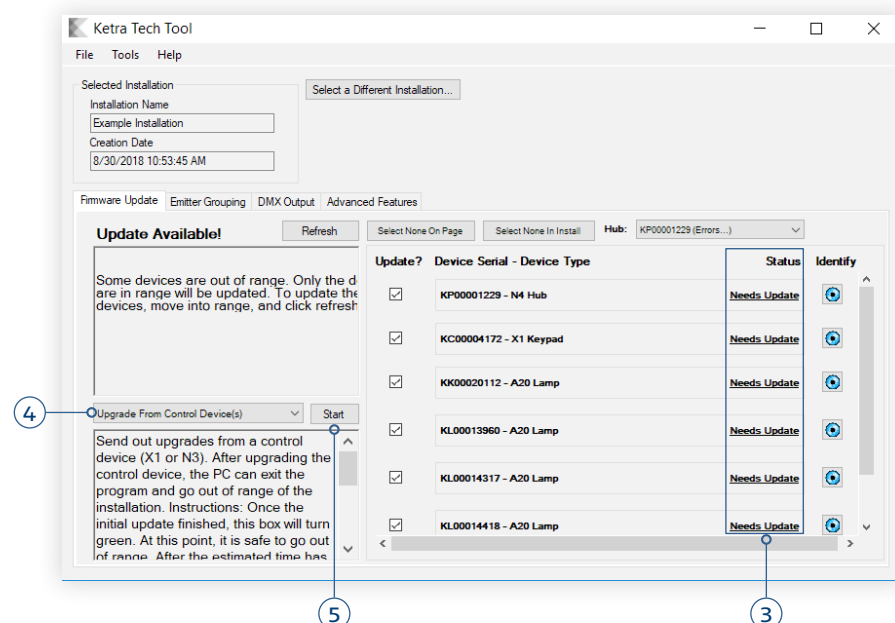


fig. 175

- 6 Keep Tech Tool open at least until the box at lower left turns green. That indicates that the N4 Hubs have been updated. They will now update the rest of the installation in parallel.

When the box turns green, you can close Tech Tool. (You will not be able to use Design Studio until after the update.)

Note: If older lights are later added to the installation, they will need to be updated before you can set any configurations. Until they receive the update, the **Device Settings** and **Device Control** tabs in Design Studio will be grayed out.

Other Operations

Removing a Healthy Device (Deprovisioning)

Deprovisioning removes functioning devices from your installation and restores them to factory default settings. You will be able to discover the device again by clicking **Find New Devices** in the top-right corner of the screen. In **Ketra Only** installations, deprovisioning can also be used to delete virtual devices.

Note: Deprovisioning only works for devices that are functioning normally. For troubleshooting unresponsive devices, see **Device Troubleshooting**, page 172.

To deprovision a device, follow these steps:

- 1 Open the installation in Design Studio and go to the **Organization** tab.
- 2 Select the device(s) in the **My Devices** list.
- 3 At the top of the **My Devices** list, click the **x!** button.

If you are unable to deprovision the device due to communication failures, ensure that the device is powered on.

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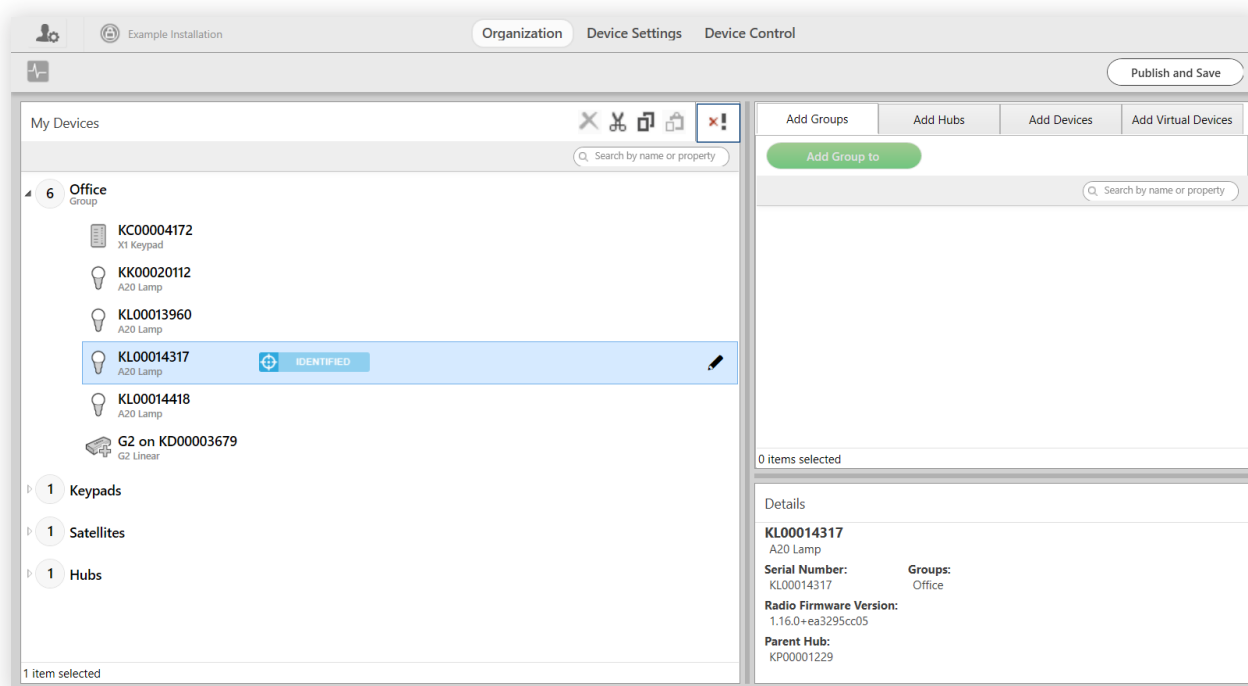


fig. 176

Renaming an Installation

Any user can rename an installation. To rename, follow these steps:

- 1 Open the installation in Design Studio.
- 2 Click the user icon in the top-left corner to open the sidebar.
- 3 Double-click the name in the Installation Name box, then type a new name.

The installation name will be automatically updated for all accounts with access to the installation.

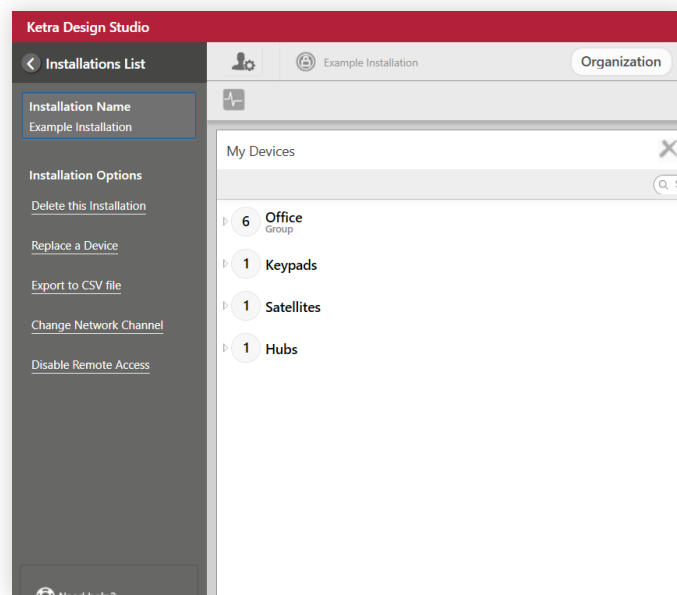


fig. 177

Converting to a Secure Installation

If you created the installation as an open installation, you can convert to secure at any time. Secure installations have two advantages over open installations:

- **Exclusive control:** All devices get set to private networks unique to the installation, meaning they cannot be discovered by other installations.
- **Multiple N4 Hubs:** Whereas an open installation can only support 1 N4 (limiting the installation to 50 devices), a secure installation can support multiple.

To convert to a secure installation, follow these steps:

- 1 **Make sure all your installation's devices are powered on!** If a device doesn't have power when you convert to a secure installation, it won't join the new secure network and therefore it won't be able to communicate with the rest of your installation.

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Note: If you encounter that problem, you can resolve it using Tech Tool's *Find a Missing Device* feature in the **Advanced Features** tab. See [Recovering a Device](#), page 174.

- 2 Open the installation in Design Studio.
- 3 Click the user icon in the top-left corner to open the sidebar.
- 4 Click **Convert to Secure Installation**.
- 5 Select your N4 Hub.
- 6 Select a channel for your N4 Hub. 20 and 25 are ideal. The next preferred channels are 11, 14, 16, 19, 21, and 24.

When selecting a channel, keep in mind that adjacent KNetS should be on different channels to prevent interference.

- 7 Click **Change**.

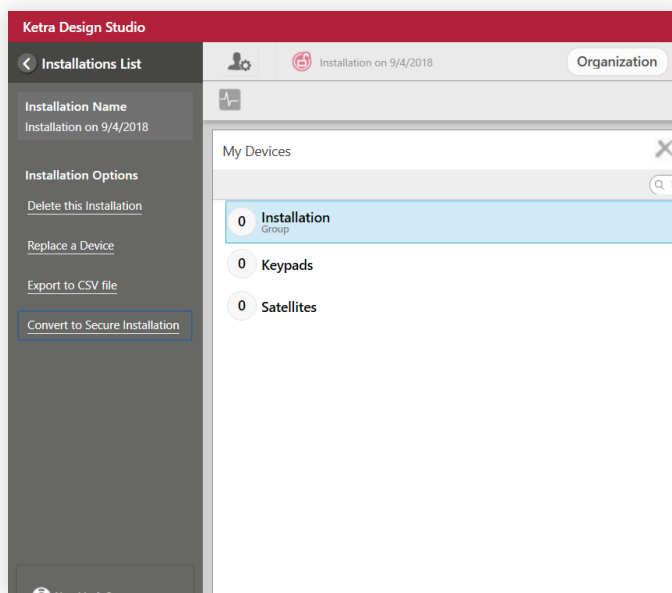


fig. 178

Deleting an Installation

Deleting an installation removes it from your Existing Installations list as well as that of any user with whom you've shared it, and from the Customer Web Portal (my.goketra). Any user with access to an installation can delete it; however, installations must be deleted on-site, not via remote access.

To delete an installation, follow these steps:

- 1 Open the installation in Design Studio.
- 2 Click the user icon in the top-left corner to open the sidebar.

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3 Click Delete this Installation.

4 In the popup, click Delete.

Your devices will turn red for 30 seconds to confirm deletion before returning to their factory default settings. They will be removed from secure networks.

Note: Design Studio requires that all your devices be powered on and in range when you delete the installation. If Design Studio cannot communicate with all your devices, the deletion will fail (although the ones it can communicate with will be deprovisioned). If you've lost a device or a device is malfunctioning when you intend to delete the installation, see [Deleting a Malfunctioning Device](#), page 177.

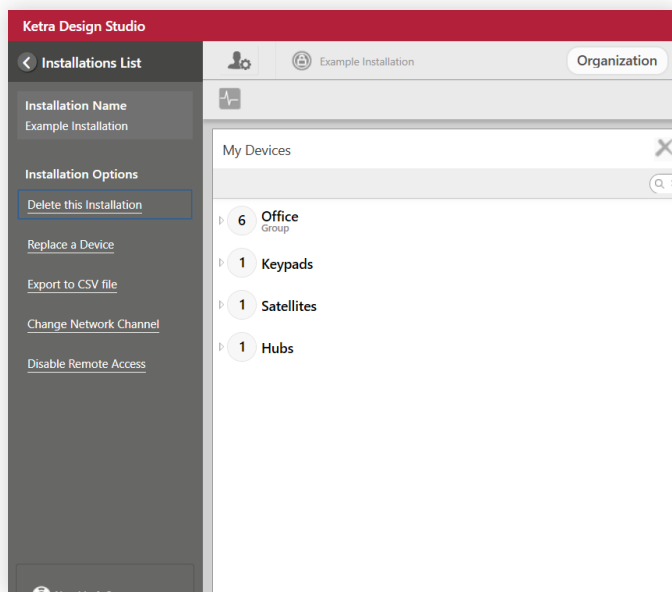


fig. 179

| Two Ways to Save

There are two ways to save progress in Design Studio: **publishing** and **syncing**. It is very important to do both whenever you make changes to an installation.

Publishing saves configurations to your devices. For some devices (e.g., Ketra keypads), this is required before your changes can take effect. For all devices, this is required before your devices will preserve their configurations between power-cycles. (For more details on publishing, see **Publishing: Saving Configurations to Devices**, page 152.) In large installations, publishing can take a long time because it requires Design Studio to communicate with every device.

Syncing backs up your copy of the installation to the cloud, making it a quick way to ensure that none of your settings gets lost. It requires Internet access. In addition to backing up your configurations, syncing also streamlines collaboration. For more details on syncing, see **Version Control Through Syncing**, page 154.

Our recommendations for publishing and syncing vary depending on whether the computer making changes has Internet access.

Saving With Internet Access

- **Sync regularly.**
To sync, close out of the installation by exiting Design Studio or returning to the Existing Installations list from the sidebar. This overwrites the cloud backup with your local copy of the installation.
- **Click Publish and Save whenever recommended by instructions in this manual, and when you wrap up your changes.**
This requires communication with every device in the installation and may take a substantial amount of time in large installations. Unfortunately, there is no way to publish a subset of changes. Because of the time delay involved, we do not recommend regular publishing during commissioning.

Saving Without Internet Access

Always try to commission with Internet access, even if it entails using your phone as a Wifi hotspot. If Internet access is unavailable, do the following to save your progress:

- **Leave Design Studio open until you reacquire Internet access, then close.**
Closing the installation when you have Internet access will trigger a sync up, so that your configurations get written to Ketra's cloud backup of the installation.
- **In small installations (1 or 2 KNets), click Publish and Save regularly during commissioning.**
This saves configurations to the devices and to your local installation file.

- In large installations, avoid clicking **Publish and Save** until you have finished making changes and successfully synced.

Publishing requires communication with every device and may take a substantial amount of time in large installations. In some cases, Design Studio may time out and have to restart, in which case your configurations will be lost. This is why we recommend syncing before publishing in large installations.

Trouble Accessing an Installation

When attempting to open an installation, you may encounter the following error messages.

Error Message: *Failed to Sync* (fig. 180)

- **Meaning:** Design Studio could not sync up or down from the installation's cloud backup.
- **Correction:**
 - Confirm you have Internet, then click **Retry**.
 - Continue to commissioning by clicking **Ignore**. Note that editing an unsynced installation copy can cause data loss in collaborative installations. For details, see [Version Control Through Syncing](#), page 154.

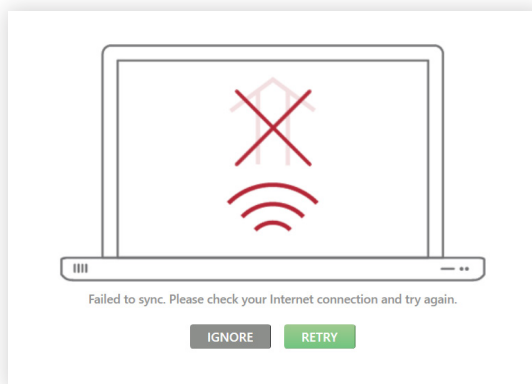


fig. 180

Error Message: *Sync Required* (fig. 181)

- **Meaning:** This installation's cloud backup is more current than your copy. Design Studio cannot continue until you sync down.
- **Correction:** Acquire Internet access and retry opening the installation.

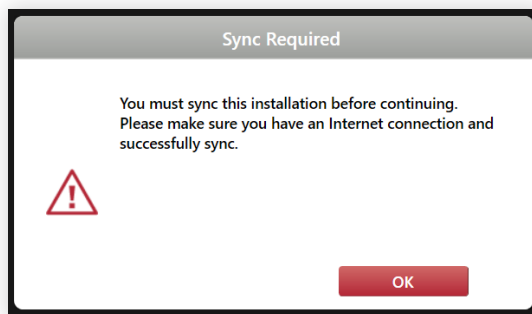


fig. 181

Error Message: *Could Not Connect to Network*, with prompt to connect remotely (fig. 182)

- **Meaning:** You are not on the N4s' LAN (Local Area Network), but remote access is enabled for the installation.
- **Correction:** Click **Yes** to connect to the N4s via Internet (if available). Changes you make in Design Studio will be reflected on the devices themselves, and you will be able to publish configurations.

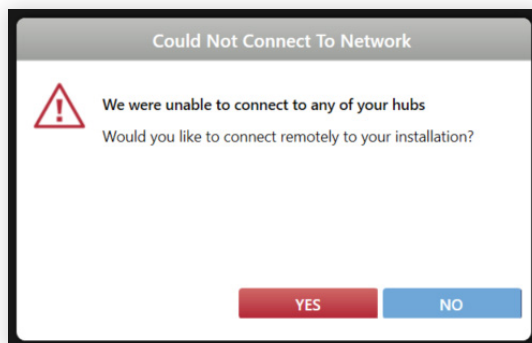


fig. 182

DESIGN STUDIO 3.0 TROUBLESHOOTING

Error Message: *Could Not Connect to Network*, with warning that hubs are not available (fig. 183)

- **Meaning:** One or multiple N4s are not on your computer's network.
- **Correction:**
 - Make sure all N4s are powered on. (Will take a few minutes to power on.)
 - If remote access is enabled, confirm that you and the N4s' network both have Internet connection, then click **Try Again**.
 - If remote access is disabled, make sure all N4s are connected to the same network as your computer, then click **Try Again**.

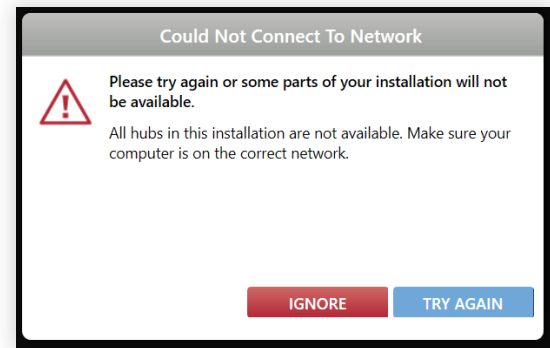


fig. 183

Error Message: *It appears that someone else has accessed this installation without syncing afterwards* (fig. 184)

- **Meaning:** Another computer has accessed this installation without syncing. If it made changes, your copy of the file will be out of date. Modifying an outdated file causes data loss.
- **Correction:**
 - If Internet: close out, sync from the other computer, reopen on this computer.
 - If no Internet: close out, acquire Internet, reopen; follow steps in previous bullet.
 - For an explanation of how editing an outdated file can result in data loss, see **Version Control Through Syncing**, page 154.

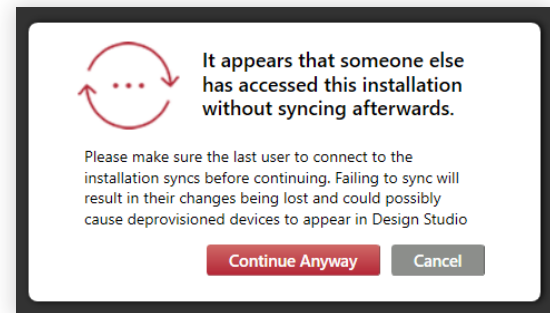


fig. 184

Error Message: *Could not verify that this installation has been synced correctly* (fig. 185)

- **Meaning:** DS failed to query the N4s for a date of last access. If another computer has accessed and changed the install, your copy of the file will be out of date. Modifying an outdated file causes data loss.
- **Correction:**
 - If you are sure no other computer has accessed this installation, continue.
 - Otherwise, connect to the N4s' LAN and retry. If necessary, use the flowchart in **Troubleshooting N4 Hubs**, page 25 (skipping the "Add N4s to Installation" step).
 - We strongly recommend acquiring Internet access and reopening.
 - Note that after clearing this error, you may encounter a different error that says, "It appears someone has accessed this installation without syncing afterward." If so, reference this section for instructions.

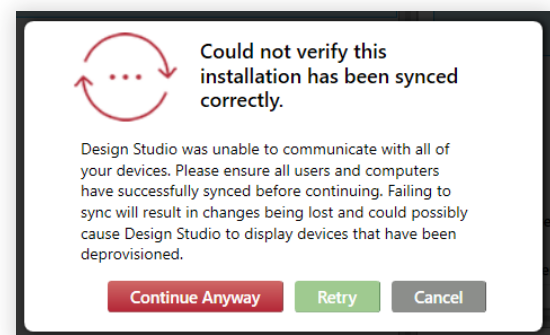


fig. 185

Device Troubleshooting

Running Diagnostics

Design Studio provides a diagnostic feature to help you identify hardware and communication problems with your Ketra devices. The diagnostics program queries on every device (not group) in the installation.

Note: Runs of linear fixtures are not included separately from their N3 Satellite.

We recommend running a diagnostic test before contacting Tech Support, because the problem might be easy to resolve on-site; however, this is a recommendation, not a requirement.

To run a diagnostics check on your installation, follow these steps:

- 1 From the **Organization** tab or **Device Control** tab, click the heartbeat icon in the top-left corner.
- 2 Click **Start**. The program may take a while to run, since it attempts to contact every device in the installation.

The results will tell you two things:

- Radio signal strength of your devices
 - Green: Good
 - Yellow: Fair
 - Red: Poor — The device’s housing is interfering with its signal, or it is too distant from other nodes on the same KNet
 - Dark: Unknown — The device is not powered on or is completely out of range
- Device problems, represented by an error code to the right of the signal-strength status. Click the error code to open a detailed description.

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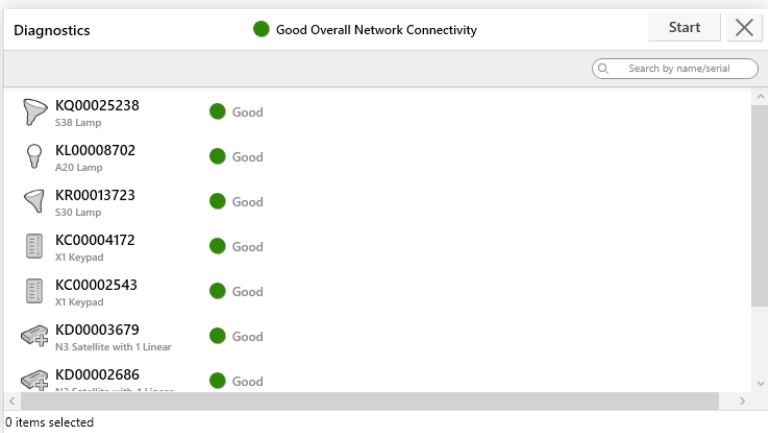


fig. 186

Replacing a Malfunctioning Device

Design Studio supports device replacement for when a device is no longer functioning and you have already received a replacement device from Ketra.

Note: **Replace a Device** is intended only for devices that are no longer functioning and cannot be wirelessly addressed. If you mean to replace a functioning device, deprovision it in the Organization tab and provision the replacement device. (See **Removing a Healthy Device (Deprovisioning)**, page 164.)

When you replace a device, the bad device's configurations in Design Studio will automatically map to the replacement device. This ensures that you do not have to do any reprogramming after replacing the device.

Note: If you are replacing multiple linear fixtures in a single run, physically replace all linear fixtures in the run before using **Replace a Device**, and just specify the serial number of one replaced linear and whatever replacement linear will go in the same position. Design Studio will republish all fixtures in the run in a single pass.

Follow these steps to replace your malfunctioning Ketra device (see fig. 187, next page):

- 1 **Write down the replacement device's serial number.** In most cases, serial numbers are easy to locate on the devices themselves. They all begin with two letters followed by eight digits, e.g. KA00112325.
- 2 **Remove the malfunctioning fixture.**
- 3 **Plug in the replacement fixture.** Ensure that your replacement device is powered on. Design Studio has to be able to communicate with it in order to provision it for your installation. Note that N3 Satellites may take a minute between when they power up and when they start communicating.
- 4 **Open the installation in Design Studio.**
- 5 **Click the user icon in top-left to open the installation sidebar.**
- 6 **In the sidebar, click **Replace a Device**.**
- 7 **Follow the instructions in the Device Replacement window.** You have to enter the serial number of the old device, even if you have renamed it in Design Studio. The serial number can be found on the device itself or on the **Organization** tab.
- 8 **Click **Replace**.** Design Studio automatically programs the new device with the old device's configurations.

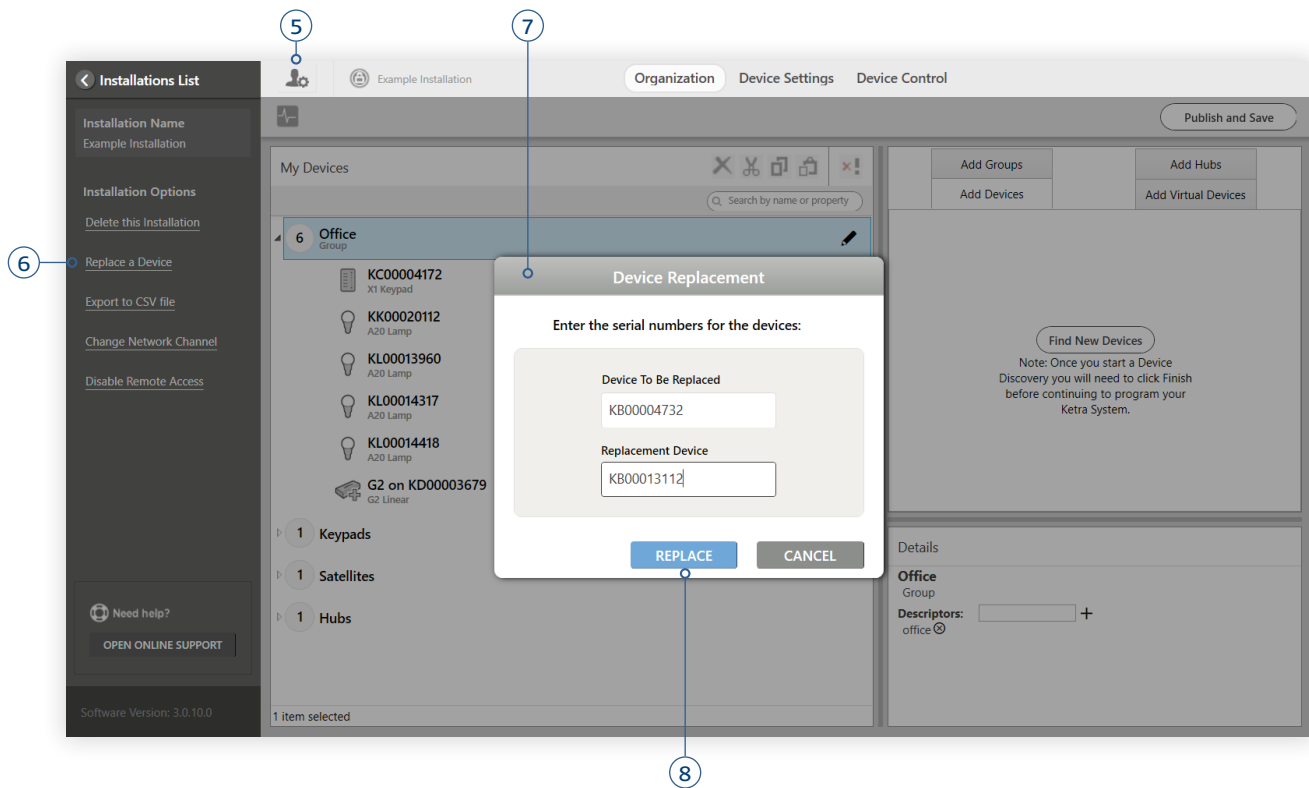


fig. 187

Note: If the replacement device requires a firmware update, Design Studio will notify you. Firmware can be updated in Tech Tool. For details, see [Updating Firmware](#), page 160.

Recovering an Unresponsive Device

Tech Tool's **Find a Missing Device** feature reestablishes communication with functional devices that for some reason fell off the communication grid. Use this tool if:

- You lost communication with devices after changing an N4 Hub's channel
- You lost communication with devices after converting to a secure installation
- You lost communication with devices for an unknown reason, but they are still emitting light or their indicator lights are still illuminating

To run Find a Missing Device, follow these steps:

- 1 Make sure the device is powered on.
- 2 Open the installation in Tech Tool.
- 3 Go to the **Advanced Features** tab.
- 4 Use the **Select a Feature** dropdown to select **Find a Missing Device**.

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5 If possible, set options to save runtime:

- **Select the N4 Hub that the device or devices belong to.** We recommend doing this if the devices belong to a single N4's KNet, as it saves runtime. However, if you lost communication with devices across multiple KNets, leave this set to <All>.
- **Enter a specific serial number to search for.** Like setting an N4 Hub, this option saves runtime.
- **Use an N1 Network Dongle rather than an N4 Hub.** Use this feature if the device is no longer in range for radio communication with its original N4. Connect an N1 to your laptop and move closer to the device.

6 Click *Start Search*.

Note: If Tech Tool does not find the devices, confirm that they are all powered on. Run the search again. (If the devices are controllers like keypads or N3s, you may need to wait a few minutes between power-up and running the search.) If you still can't find the device, contact Ketra Tech Support. You can reach us Monday through Friday, 9 AM - 5 PM, CST. Call 1-844-588-6445, or email ketrasupport@lutron.com.

7 Once Tech Tool finds the devices, deprovision them from the installation. To do so, check their boxes and click *Deprovision Selected Devices*.

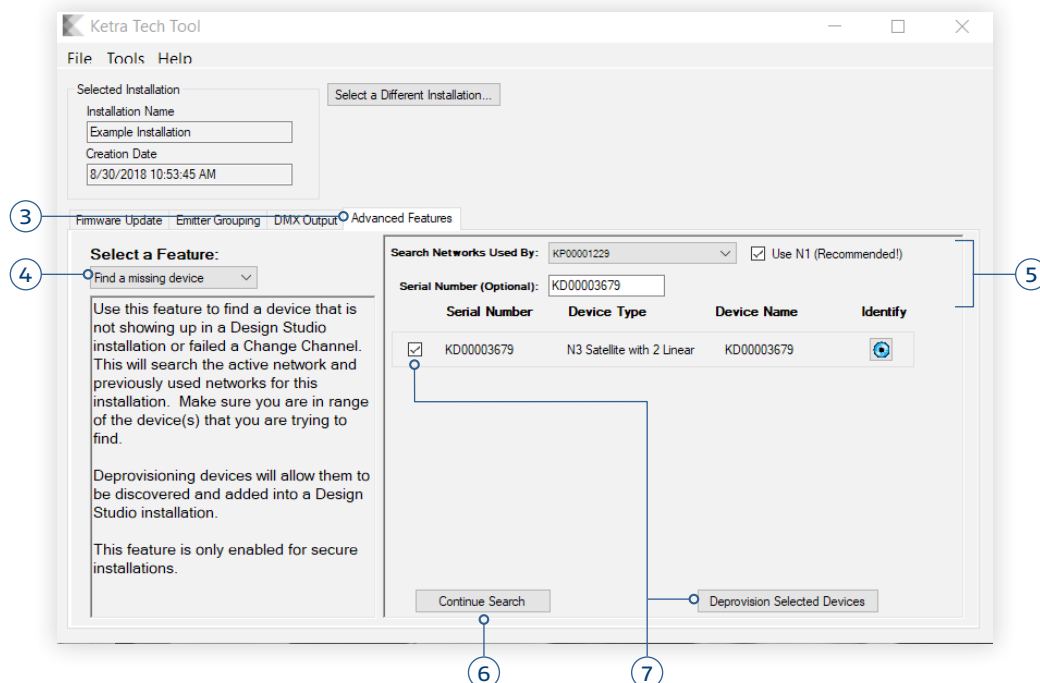


fig. 188

DESIGN STUDIO 3.0 TROUBLESHOOTING

- 8 Close Tech Tool and open the installation in Design Studio.
- 9 Go to **Organization > Add Devices** and click **Find New Devices**. If the installation has multiple hubs, select the hub the device previously belonged to.

Note: Control devices such as N3s or keypads may take a few minutes to initialize before you can find them. If they do not appear on the first search, wait a few minutes and click **Refresh**.

- 10 Provision the devices to the installation. If you need instructions on provisioning, refer to **Adding Devices**, page 38.
- 11 Click **Finish This Hub**.

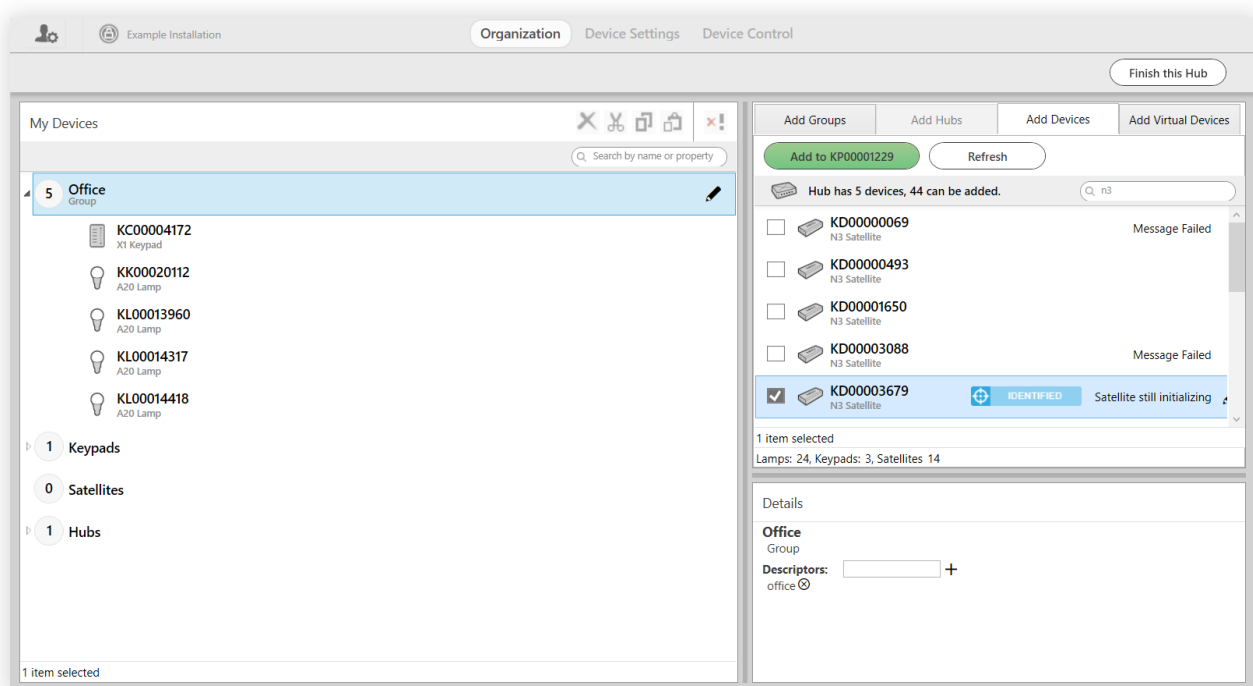


fig. 189

- 12 Click **Publish and Save**. Publishing configurations ensures that the re-added device receives the configurations it had prior to deprovisioning.

Deleting a Malfunctioning Device

Tech Tool's **Delete a Device** feature can be used to remove malfunctioning devices from the installation file. There are two common applications for this feature:

- Design Studio won't let you delete an installation because it can't communicate with a missing or malfunctioning device.
- A replacement device was provisioned to the installation on the **Organization** tab rather than using the **Replace a Device** feature (described in [Replacing a Malfunctioning Device](#), page 173).

Note: Do not use this feature to a) replace a malfunctioning device or b) remove a functioning device from your installation. Instead, see [Replacing a Malfunctioning Device](#), page 173, or [Removing a Healthy Device \(Deprovisioning\)](#), page 164.

To delete a device from your installation, follow these steps:

- 1 Open the installation in Tech Tool.
- 2 Go to the **Advanced Features** tab.
- 3 Make sure the **Select a Feature** dropdown says "Delete a device".
- 4 Check the device or devices' boxes in the device list. For convenience, you can also filter by hub.
- 5 Click **Delete Selected Devices**. It is not necessary to turn the device on prior to using this feature.

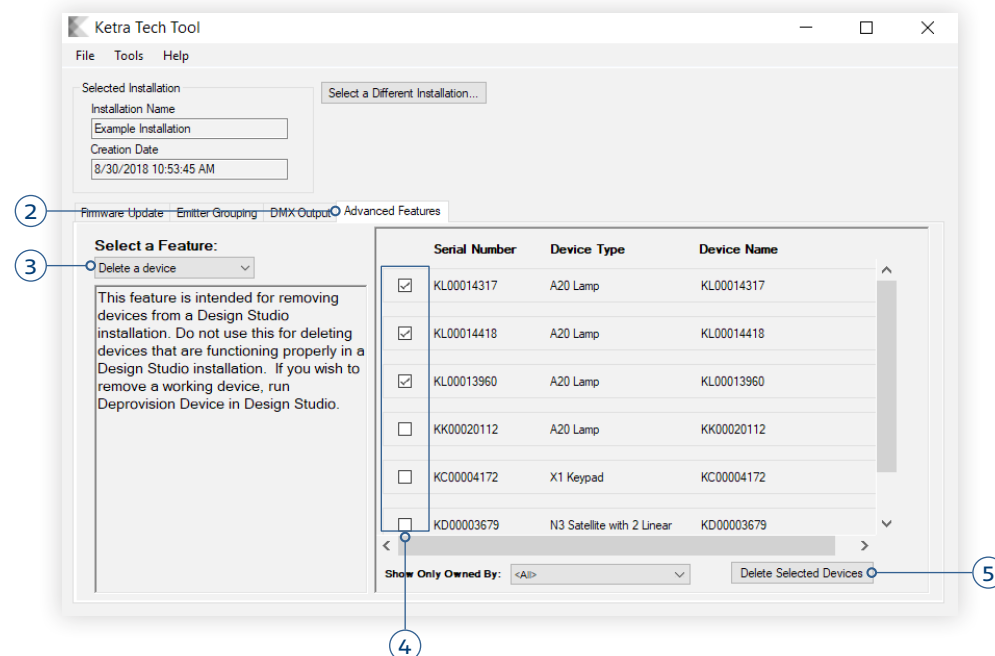


fig. 190

APPENDICES

Appendix A App Note:

Integrating Ketra Products into HomeWorks QS Systems

Overview

Lutron Designer version 14.0 introduces functionality that allows a dealer to import Ketra Design Studio installations. After the import process is complete, Ketra scenes and shows will be assignable items in Lutron Designer. These scenes and shows can be triggered from any HomeWorks QS input action (e.g., keypad button press, timeclock event).

Scenes and shows are triggered at a group level and Ketra groups are typically comprised of zone, room, floor, and residence levels. These groups are then mapped to areas created in Lutron Designer using the import function found in the Tools menu.

This system works by having HomeWorks QS processors, a Lutron Connect bridge, and Ketra N4 hubs communicate over a local network connection. If the network is configured correctly, the system will continue to function if an internet connection is lost or the router goes offline.

Programming and commissioning is done by using both Ketra Design Studio and Lutron Designer software applications. HomeWorks QS firmware updates are performed using Lutron Designer and Ketra firmware updates are performed using the Ketra Tech Tool.

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Devices and Features

- Ketra scenes and shows can be controlled from any HomeWorks QS trigger (e.g., button press, timeclock event, occupancy sensor).
- HomeWorks QS keypad raise or lower control of Ketra groups
- HomeWorks QS keypad LED feedback of Ketra scenes
- Ketra groups can be controlled from the Lutron Connect app
- Ketra groups can be controlled through voice control (e.g., Amazon Alexa, Google Home)

Required Devices

- HomeWorks QS processor with firmware version 14.0 or later
- Lutron Connect Bridge
- Ketra N4 hub with firmware version 2.0 or later
- HomeWorks QS designer version 14.0 or later
- Ketra Design Studio version 3.0 or later

Required Devices

- Ketra model numbers starting with "HW-":
 - Lamps (A20, S30, S38)
 - Downlights (D3, D4R)
 - Linear luminaires (G2, P4, L3I, L4R)
 - N3 satellite
 - N3 DMX output
- Ketra N4 hub (required for system communication)
- Ketra devices require firmware version 2.0 or later
- HomeWorks QS processors require firmware version 14.0 or later
- Lutron Connect Bridge (e.g., CONNECT-BDG-1, CONNECT-BDG2-1)

Devices Not Supported

- Ketra model numbers that do not start with "HW-"
- Integration with Ketra products via N3 inputs/outputs
- Ketra X2 keypads
- Ketra virtual keypads or the Ketra app
- Integration with Ketra products via telnet
- Ketra emergency mode. For general information on emergency lighting with Lutron systems, see Application Note #106 (P/N 048106) at www.lutron.com

Design and Programming

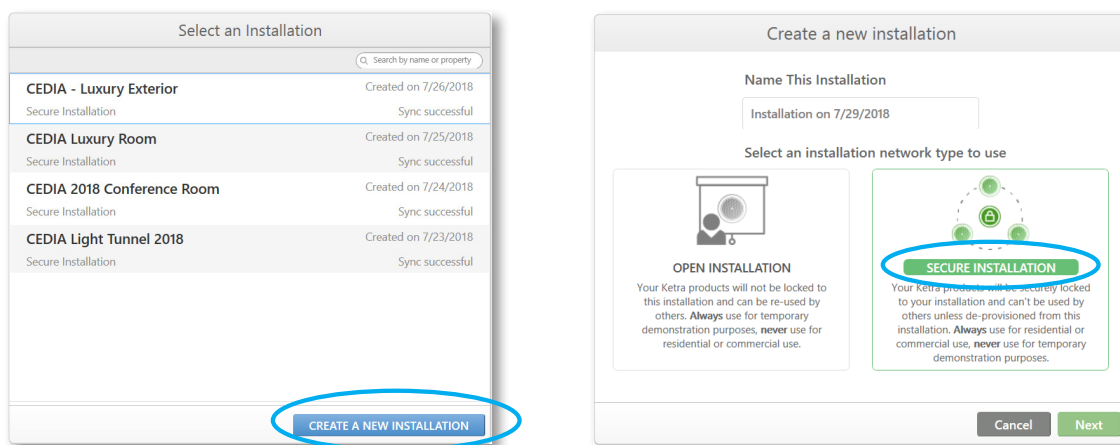
Design and programming steps can be performed off-site, prior to commissioning, and in both Lutron Designer and Ketra Design Studio. Groups, scenes, and shows can be created in Ketra Design Studio before identifying lights and adding them to groups. An area tree can be created in Lutron Designer that matches the organization layout in Ketra Design Studio. The Ketra Design Studio groups will be mapped to areas in Lutron Designer during the import or update process. After the import or mapping is completed, Ketra scenes and shows will show as assignable items in Lutron Designer and they can be triggered by any HomeWorks QS input action.

Note: Design Studio (DS) must be initially logged into while connected to the internet. However, after that point DS does not require internet access to run. DS will automatically sync once it is opened when there is internet access.

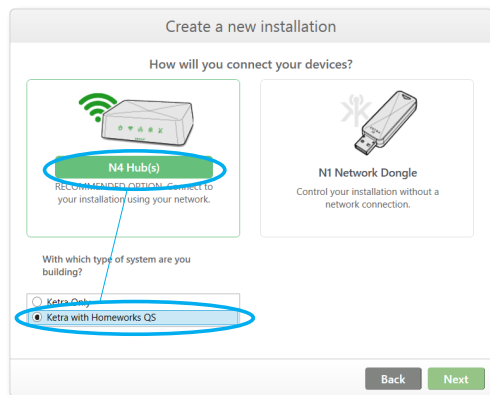
Ketra Design Studio

For more information on configuring the Ketra installation, please refer to the Ketra Design Studio 3.0 user manual.

- 1 Click **CREATE A NEW INSTALLATION** and then **SECURE INSTALLATION** to create a new secure installation in Ketra Design Studio.



- 2 Click **N4 Hub(s)** and select **Ketra with HomeWorks QS**. Only installations with an N4 hub can integrate with HomeWorks QS systems.



- 3 Enter the Installation Location and click on the appropriate Installation Template.

Create a new installation

Installation Location

Design Studio needs the installation's location in order to create natural light shows that track your location's sunrise and sunset.

Allentown, PA

Enter city in which this installation will be used. Press skip if city not found.
(This can be changed later)

Installation Template

Choose an installation template to get default content and group suggestions.

☐ Basic
☐ Office
☒ Residential

Skip Back Next

- 4 If the N4 hub is available, select it, click **Add Hub to Installation**, and click **Continue**. If an N4 hub is not currently available, click **Continue** and add it later.

When multiple N4s are physically close together, they can cause mutual interference if they are on the same channel. When using multiple N4s, each N4 should be set to its own channel. This will improve performance when devices on multiple N4s are entering the same scene, as well as improve firmware transfer speeds to devices.

Create a new installation

Select hubs and their radio channel or Continue to add hubs later ?

Add Hub to Installation Refresh

Search by name or property

0	KP00004937	N4 Hub	Channel 25
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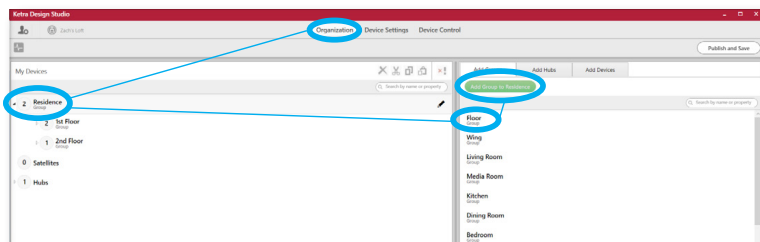
1 item selected
Number of hubs in this installation: 0

Back Continue

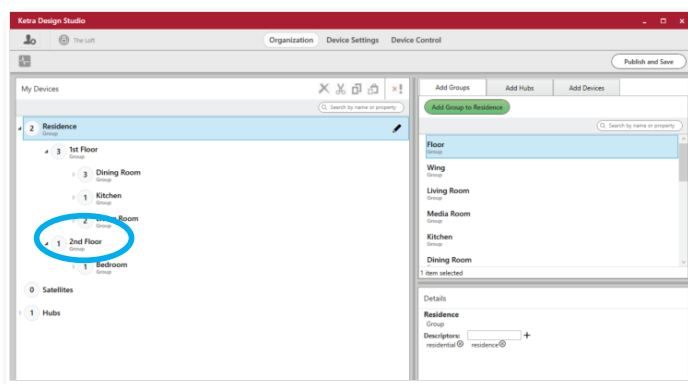
5 Create group hierarchy

Consider the area layout and lighting for the installation. These groups will be mapped to areas in Lutron Designer. See step 6 on page 194 for more information on the mapping process.

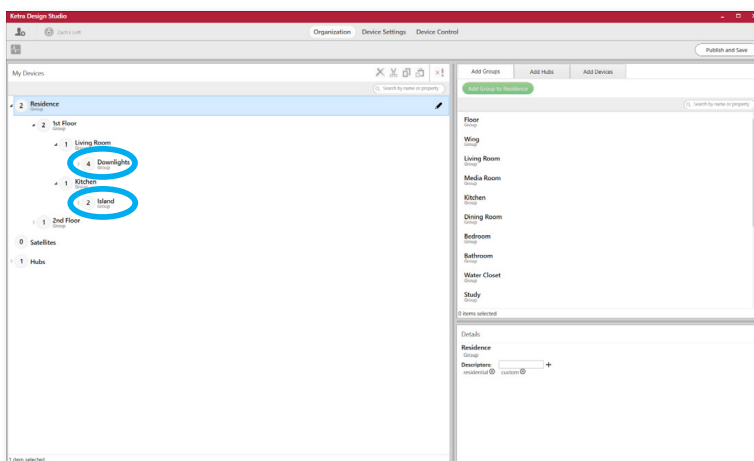
- i On the Organization tab, add groups by highlighting the higher level (parent) groups in the My Devices list, selecting a group template at right, and pressing the green **Add Group** button.



- ii Add the parent groups (e.g., wings, floors, other sections of the home) and then lower level (child) groups (e.g., rooms).



6 Create groups for each intended zone of lighting (e.g., downlight, overhead, accent light). Actual lamps and fixtures will be added to these groups later.

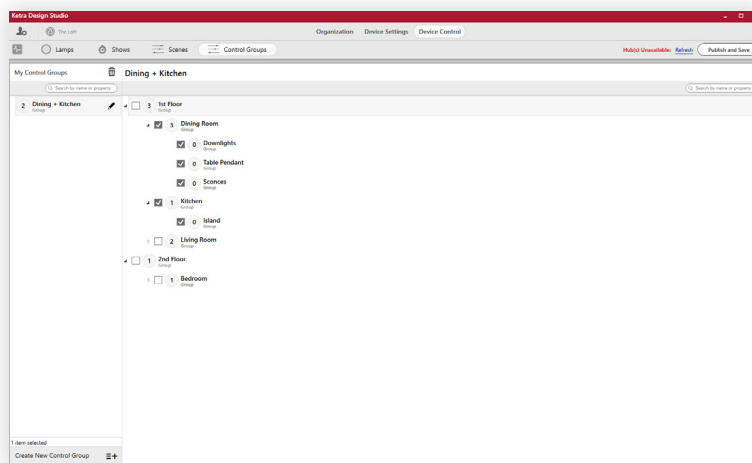


7 **Optional: Divide runs of G2 linear luminaires into separate groups.** By default, all G2 linear luminaires in a run have to be grouped together. A run of G2 linear luminaires can be divided into multiple groups using the Ketra Tech Tool. For more details, see the Ketra Design Studio 3.0 user manual.

8 Creating Control Groups

When a scene will affect lights in multiple Ketra groups, a Control Group should be created in Design Studio. For example, if a dining scene is to control lights within the “Dining Room” and “Kitchen” groups, a separate Control Group named “Dining Room + Kitchen” should be created.

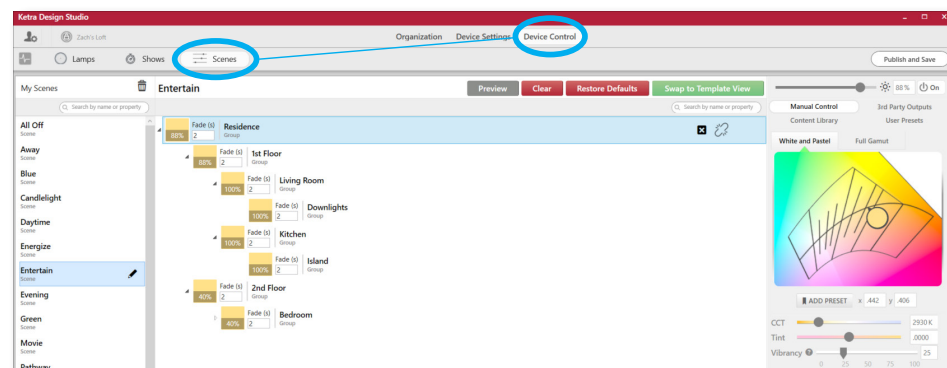
- i Navigate to **Device Control > Control Groups** in Design Studio
- ii Click **Create New Control Group**
- iii Name the Control Group
- iv Select the groups to include



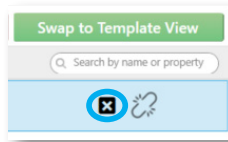
9 Creating Scenes

The process below outlines scene creation using the tree view. For information on building scenes using the template view, please refer to the Ketra Design Studio 3.0 user manual.

- i From the **Device Control** tab, select the **Scenes** panel. There are several predefined scenes based on the installation template used and the types of groups added. These scenes can be customized and new ones can be added.



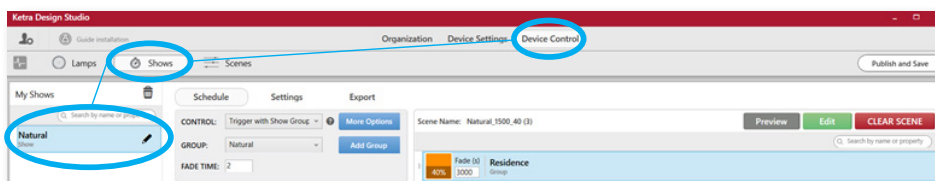
- ii Select brightness, fade time, white light color temperature and vibrancy, and saturated color settings for each group. Click "x" to make the group unaffected.



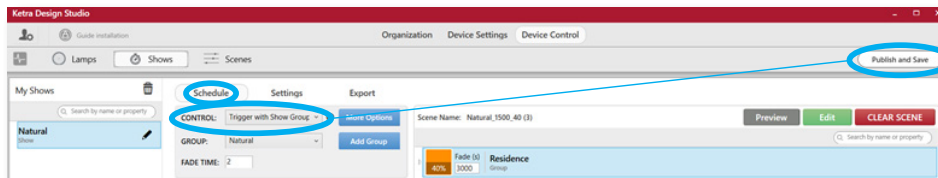
- iii Changing the settings for a parent group will update the values of the child groups. However, if settings are then changed for one of the child groups, those settings will have priority over the settings automatically updated by the parent group.

10 Creating Shows

- i From the **Device Control** tab, click on the **Shows** panel. There will be a pre-built *Natural* show that consists of many astronomical steps (scenes) that have color temperature and fade settings for each group. The *Natural* show can be customized and up to 10 new shows can be created.



- ii Click **Schedule** and in the **CONTROL**: field, select **Trigger with Show Group**.

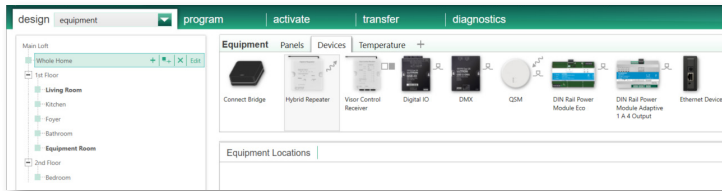


- iii If you want the show to start automatically, set a timeclock event in Lutron Designer to trigger the show group rather than selecting **Run Always** in Ketra Design Studio.

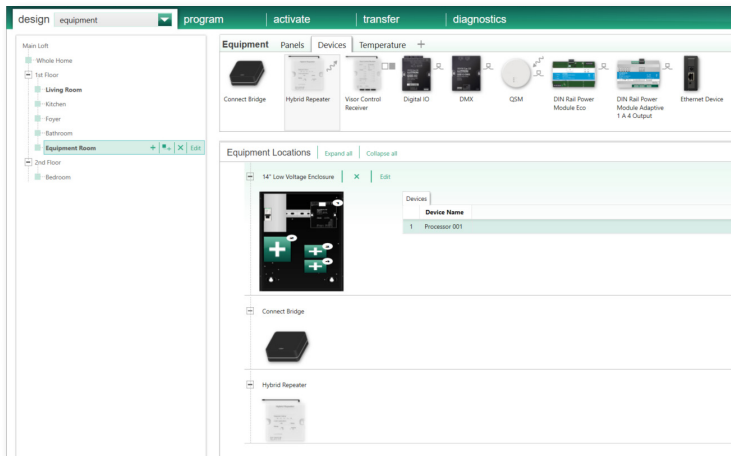
11 Click **Publish and Save**.

Lutron Designer

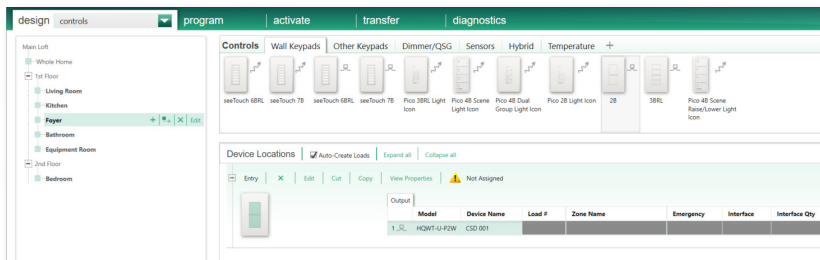
- 1 In Lutron Designer, create a new project or choose an existing project.
- 2 Create the Area hierarchy in Lutron Designer.
 - i The area tree in Lutron Designer should be similar to the grouping hierarchy in Ketra Design Studio.
 - ii Create a separate area in Lutron Designer named "Whole Home" or "Residence" that does not contain children areas. Ketra groups cannot be mapped to Lutron Designer areas containing children.



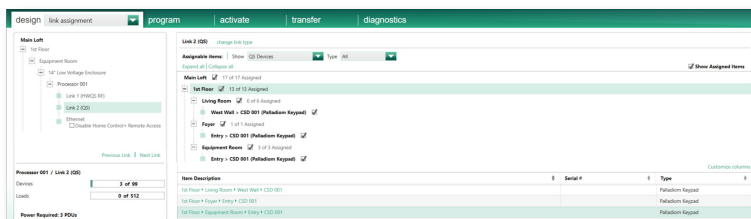
- 3 To add equipment, click the **design** tab and select **equipment** from the drop down menu. Examples of equipment that can be added are: panels, processors, Lutron Connect bridges, hybrid repeaters.



- 4 To add controls, click the **design** tab and select **controls** from the drop down menu. Examples of controls that can be added are: keypads, Pico wireless controls, sensors, thermostats.

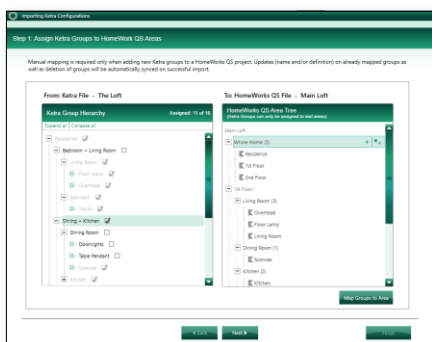


- 5 Click the **design** tab and select link assignment from the drop down menu to configure the processor links and link-assign Lutron devices.

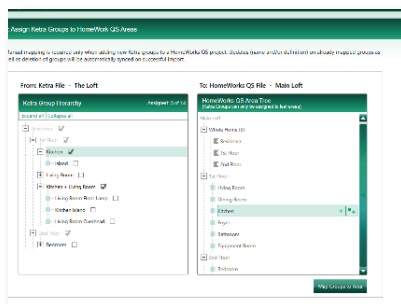


- 6 Import a Ketra project.

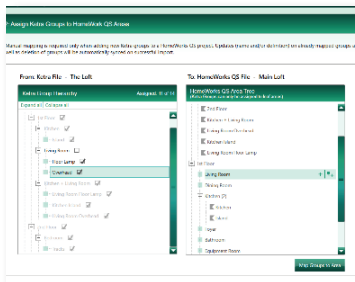
- i Click Tools and then Import Ketra Project. Select the desired Ketra installation.
- ii Map Ketra groups to Lutron Designer areas. Assign residence and floor level Ketra groups to a Lutron Designer area. In the example below, a Lutron Designer area (without children) was previously created and named "Whole Home". Control Groups that include multiple rooms (example: Dining Room + Kitchen) can also be mapped to this Whole Home area.



- iii Map parent level Ketra groups to Lutron Designer areas. This allows a HomeWorks QS system to trigger a scene or show at the room level. This group will show under Assignable Items in Lutron Designer but it will not show in the Lutron Connect app.



- iv Map child level (lowest level) Ketra groups to Lutron Designer areas. These groups will appear in the Lutron Connect app as zones.

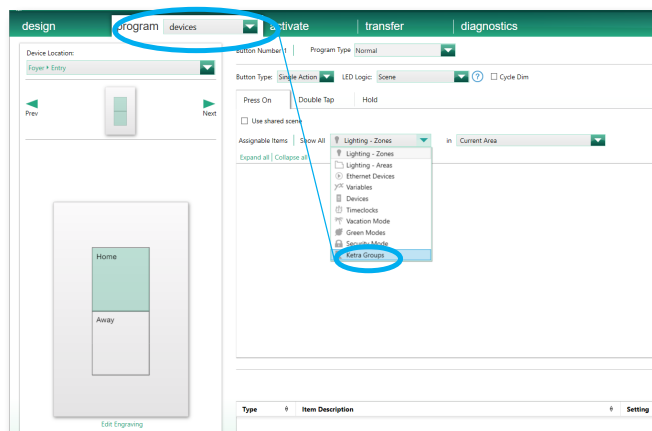


- v Review report.

7 Program a Ketra Project.

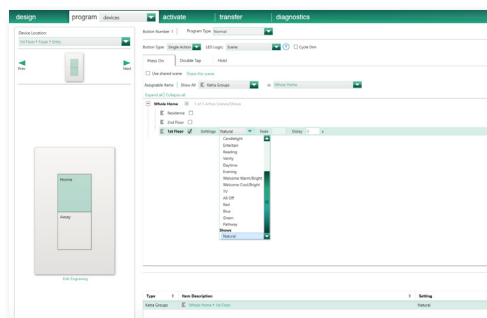
Now that a Ketra project has been imported, the Ketra groups, scenes, and shows will be available for selection during programming.

- i Single action buttons
 - a Click the **program** tab and select devices from the drop down menu. In the Assignable Items drop down menu, select **Ketra Groups**.

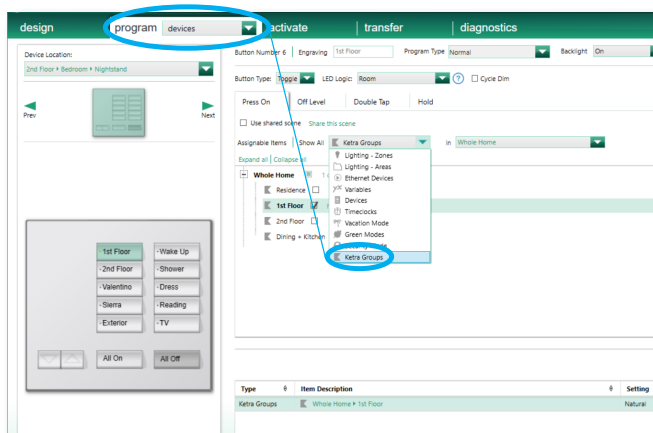


- b Select a Ketra scene or show at the desired group level. In the example below, the *Natural Show* will only affect Ketra groups included in the **1st Floor** group.

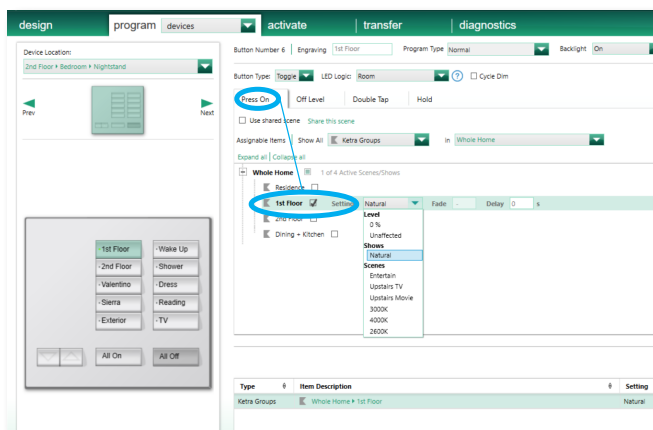
Note: Only one Ketra scene or show can be recalled at a time from a single HomeWorks QS button press or input action.



- ii Toggle buttons
 - a Click the **program** tab and select devices from the drop down menu. In the Assignable Items drop down menu, select Ketra Groups.

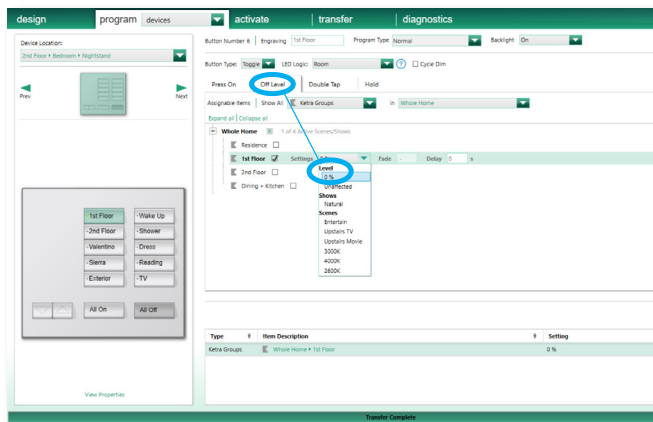


- b On the Press On tab, select a Ketra scene or show.



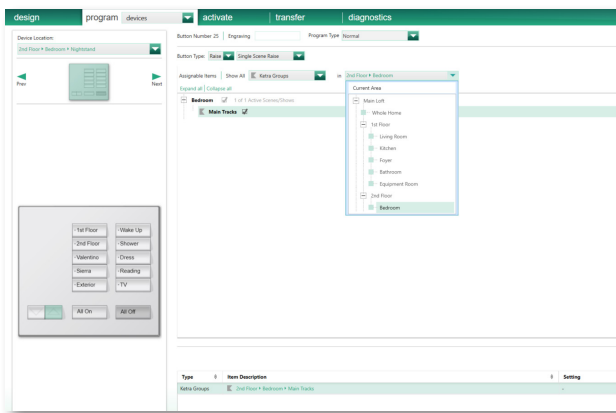
- c On the Off Level tab, select 0% level for the Ketra group.

Note: A scene or show can also be selected for the Off Level if a level other than 0% is desired.



- iii Raise or lower buttons
 - a Master raise or lower buttons will affect all lights assigned to the last button pressed on the keypad. This includes Lutron lighting zones and Ketra groups.
 - b Single Scene Raise/Lower buttons allows a single Ketra group (and multiple Lutron lighting zones) to be affected by the raise or lower button, regardless of the last button pressed on the keypad.

Note: Only one Ketra group can be affected from a Single Scene Raise/Lower button. To raise or lower more than one group at a time, raise/lower a higher group in the hierarchy or use Master Raise/Lower buttons.



Additional Actions Available

Adding Ketra Devices in Ketra Design Studio

Note: On-site radio communication required to add Ketra devices.

N4 hubs

- 1 Click Organization and select the Add Hubs tab on the right pane.
- 2 Click Find New Hubs and add to the installation.
- 3 To set network settings, click the Device Settings tab and then click Settings for: Hubs.
- 4 Click Publish and Save.
- 5 In Lutron Designer, click Tools > Map Ketra Project File > Import/Update Ketra Configurations.

Lamps and Luminaires

- 1 Click Organization and select the Add Devices tab on the right pane.
- 2 Click Find New Hubs and add to the installation.
- 3 Click Find New Devices and add the discovered devices to the appropriate groups.
- 4 Click Publish and Save.

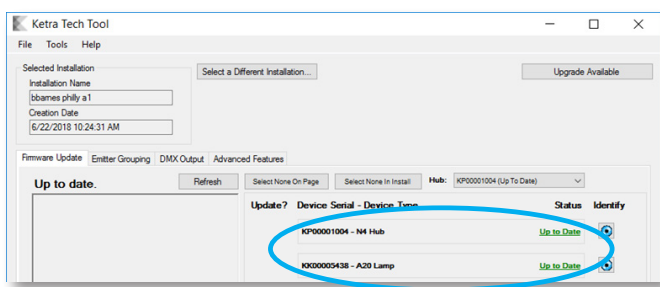
5 In Lutron Designer, click Tools > Map Ketra Poject File > Import/Update Ketra Configurations.

Firmware Updates in Ketra Tech Tool

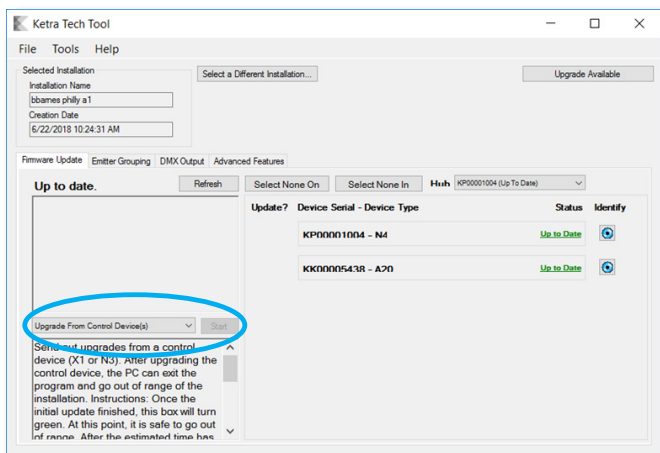
The Ketra devices may need the firmware version to be updated. This is accomplished via the Ketra Tech Tool. Firmware updates can take up to 4 hours to complete for a system with fully loaded N4 hubs; however, the initial update to the N4 hubs takes a lot less time. After the N4 hubs are updated, the Ketra Tech Tool can be closed and the computer can be disconnected from the network while the N4 hubs update the associated devices.

Ketra Design Studio cannot be opened while the Ketra Tech Tool is in use. If you want to keep the Ketra Tech Tool open to monitor the status of the updates, first build the Ketra groups, scenes, and shows in Ketra Design Studio before updating the firmware with the Ketra Tech Tool. Mapping, programming, and activation can be performed in Lutron Designer while the Ketra device firmware update is taking place.

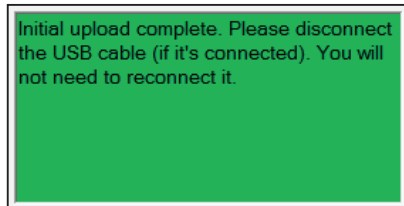
- 1 Open the Tech Tool and select the installation.
- 2 The tool will show a list of all Ketra devices and their status.



- 3 To update your device, select Upgrade from Control Device(s) from the drop-down on the left and then click Start.



Note: Once the initial upload to the N4s is complete (indicated by receiving the message below), the programming computer can be disconnected from the network and the Tech Tool can be closed.



Firmware Updates in Ketra Tech Tool

- 1 In Lutron Designer, click the **activate** tab and select **processors** from the drop down menu.
- 2 Activate the Lutron Connect bridge and all other desired devices.

Note: Select **Save and Transfer** when prompted before initial device activation, after any new devices are added, or after link assignments are changed.

Transfer

- 1 Go to the **transfer** tab in the HomeWorks QS Designer software.
- 2 Press **Start Transfer**.

Test

After programming is complete, walk around and check that all devices are working as expected.

Lutron Connect App

- 1 Download the Lutron Connect app from the Apple App Store or Google Play online marketplaces.
- 2 Create an account for the homeowner.
- 3 Pair the homeowner account with the Lutron Connect bridge.
- 4 Once connected, the Ketra zones will be displayed in their appropriate areas and can be controlled.

Note: For more information, see the [Application Note #649](#) (P/N 048649) at www.lutron.com.

Voice Control

- 1 In the Lutron Connect app, click **Settings > Amazon Alexa & Google Home**.
- 2 Select the scenes and lighting zones to be available and add them. Customize the voice command if desired.
- 3 In the Amazon Alexa or Google Home app, add the Lutron Connect smart home skill.
- 4 Log in with the homeowner account.
- 5 Discover the devices. The scenes and zones that were specified will now be available for voice control.

Best Practices

Ketra Scenes

Only one Ketra group can be controlled at a time. This is good for certain applications, like when a dining scene is set to control Ketra lights only within the "Dining Room" group.

If the dining scene is to control lights within the "Dining Room" and "Kitchen" groups, a separate Control Group named "Dining Room + Kitchen" should be created.

App Control

Create virtual keypads in Lutron Designer to be used in the Lutron Connect app. When building a Ketra and HomeWorks QS installation, virtual keypads have been removed from Ketra Design Studio.

Customers will be able to access physical keypad buttons in the Lutron Connect app, but they may desire additional control. Consider creating virtual keypads with buttons that change group settings. This will provide control of intensity, correlated color temperature, tint, vibrancy, and the full gamut of color settings.

Remote Access

HomeWorks QS systems and Ketra installations can be accessed remotely. It is recommended that remote programming be reserved for system tweaks like changes to keypads button programming and scene settings. More substantial actions like firmware updates or lamp commissioning should be performed on site.

Lutron recommends using a VPN connection for remotely programming a HomeWorks QS system. For more information, refer to [Application Note #231](#) (048231) at www.lutron.com.

It is possible to **Publish** to a Ketra system remotely. To enable this option, navigate to **Settings > Enable Remote Access** in the Ketra Design Studio. Enabling remote access must be done while connected to the same local network as the installation.

Upgrading an Existing Ketra Installation

If the Ketra Design Studio installation was created with a software version older than 3.0, it cannot be added to a HomeWorks QS system. Additional actions are needed. Follow the steps below to decommission and update all Ketra products so that they can be added to a new HomeWorks QS installation.

- 1 Use the Ketra Tech Tool to update the firmware in all Ketra devices to version 2.0 or later.
- 2 Open the existing installation in the Ketra Design Studio and click **Delete Installation**. This will decommission all the Ketra devices.
- 3 Create a new Ketra with HomeWorks QS installation. Follow the system design and commissioning practices explained previously in this document.

Lutron Button Type and LED Logic

Button Type: Single Action

LED Logic: Scene

This should be used for buttons that correlate with daily activities or moods (e.g., dining, watching TV, reading, relaxing). When a keypad contains these buttons, the customer should be provided with an "Off" button at the bottom of the keypad. Each button press or input action will typically trigger the same output action when using normal programming.

Scene LED logic means that all affected lighting zones, Ketra groups, and shades need to be at their programmed level for the status LED to be on. Changing the level of any of the affected devices will cause the LED to turn off.

Button Type: Toggle

LED Logic: Room

This should be used to turn on/off zones or groups with one button (e.g., pendants, main tracks, basement). "Press on" action typically turns on affected lights to a programmed level. "Press off" action either turns off affected lights or dims them to a low light level.

Room LED logic means that the status LED will be on if any of the affected lights in the area are on at any light level. If the status LED is on, the next button press will trigger the "Press off" action. If the status LED is off, the next button press will trigger the "Press on" action.

Button Type: Single Action or Toggle

LED Logic: Pathway

This should be used for creating a path of light from one area to another (e.g., midnight snack, bathroom). The status LED will be on if affected Lutron lighting zones are on at any level. The status LED will turn off if any of the affected zones are turned off.

Pathway LED logic functions differently when Ketra groups are included. The status LED uses scene LED logic for any Ketra groups. If the settings of the affected Ketra group change at all, the status LED will turn off.

Button Type: Single Action
LED Logic: Room

Not Recommended

Button Type: Toggle
LED Logic: Scene

Not Recommended

Double Tap Programming: If both the press and the double tap include Ketra groups, the Ketra lights will incur a delay (about 1 second) on the double tap due to the propagation of the first command.

Automatic Sequences: Due to the 1.5 second delay between Ketra commands, automatic sequences for Ketra scenes should not be run faster than 1.5 seconds per step.

Troubleshooting

Lutron Designer

- 1 Ketra mapping is only supported in Lutron Designer version 14.0 or later.
- 2 If the Ketra installation is not showing, verify that the installation was created as a Secure Installation, using a Ketra N4 hub, and with Ketra with HomeWorks QS selected.
- 3 Publish or sync the Ketra installation.
- 4 If Ketra groups are not showing on the **programming** tab, ensure that assignable items are shown in an area containing mapped Ketra groups.
- 5 Cycle dim is not supported.
- 6 If Ketra groups, scenes, or shows are not showing in Lutron Designer:
 - i Make sure the area has Ketra groups mapped to it.
 - ii Verify that the Ketra project was synced after the group, scene, or show was added. Syncing is accomplished by clicking **Publish and Save** and then closing Ketra Design Studio.

Lutron Connect Bridge and App

- 1 Make sure the Lutron Connect bridge was activated successfully using Lutron Designer.
- 2 Verify that the Lutron Connect bridge firmware is updated. Performing a power-cycle while the Lutron Connect bridge has an active internet connection will prompt a firmware download and installation if an update is available.

- 3 If Ketra groups are not showing in the Lutron Connect app, ensure the following steps were performed:
 - i The Ketra installation was published or synced successfully.
 - ii The Ketra installation was imported or updated in Lutron Designer.
 - iii The Lutron Designer database was transferred successfully.
 - iv Cycle power to the Lutron Connect bridge.
 - v In the Lutron Connect app, go to **Settings > Edit Home > Diagnostics > Redownload System Configuration**.

Basic Functionality is Lost (e.g., keypad control, app control)

- 1 When launching the Lutron Connect app, a warning message will be displayed if the Lutron Connect bridge cannot communicate with the Ketra N4 hub.
- 2 Make sure the N4 Hub, Lutron Connect bridge, and the HomeWorks QS processor can be pinged at their expected IP addresses.
- 3 Major changes to organization can “break” the integration between the HomeWorks QS system and Ketra devices. Since HomeWorks QS programming points to Ketra groups, removing lamps from a group will cause them to stop responding to HomeWorks QS input actions pointing to that group.

Ketra N4 Hub

- 1 Ensure the Ketra N4 hubs have been updated using the Ketra Tech Tool.
- 2 In Ketra Design Studio, verify communication with the N4 hub.
- 3 In case the multicast traffic is blocked, enter the IP addresses of the Ketra N4 hubs into Lutron Designer.

Orphaned Ketra Lamps

Once the lamps are in a Ketra N4 hub system, they must be decommissioned (via the associated N4 hub) before they can be added to another system.

- Lamps cannot be returned to factory settings.
- If an N4 hub has lamps associated to it, do not reset the N4 hub as this will leave the lamps stranded.
- If an N4 hub with associated lamps is reset, open the installation and use the device replacement tool to add a new N4 hub to the installation.

Special Considerations

Backup Control Options

Ensure reliable network

Successful integration of Ketra devices in a HomeWorks QS system relies on the local network for all of the devices to function properly. Therefore, it is essential to have the HomeWorks QS processors, Lutron Connect bridges, and Ketra N4 hubs all connected together in a robust way.

Networking Rule 1

Avoid daisy-chaining through other devices and switches. Instead, connect all devices directly to the same switch (home run). This will allow the lighting devices to communicate even if other components have issues.

Networking Rule 2

Use a reliable switch that can function independently from the router or other network equipment. If using DHCP and the DHCP server goes down, the Lutron and Ketra devices will maintain their DHCP addresses and still be able to communicate. Alternatively, static IP addresses can be used.

Note: Internet access is not required for run-time system functionality but is required for LAN connectivity. If the internet connection is lost, the system will not be affected. Internet access is still desirable for periodic updates.

Networking Rule 3

HomeWorks QS processors are the only devices that should be daisy-chained via the built in Ethernet ports. Do not connect N4 hubs or Lutron Connect bridges to the Ethernet ports.

Networking Rule 4

Connect each N4 hub to a port on the network switch rather than daisy-chaining the N4 hubs.

Networking Considerations

Consider putting the network switch, HomeWorks QS processor, Lutron Connect bridge, and the N4 hub on a battery backup in case power is lost.

Optional Manual Bypass Control

By default, all Ketra and Lutron lights will turn on to their last level. Lutron recommends keeping this default setting for almost all applications to avoid lights from coming on after a power outage. However, to provide control of Ketra lighting in an unexpected loss of system functionality due to networking or other problems, there are options to allow for backup control. Consider these when designing and wiring the installation or when solving a problem.

Specific Ketra lamps or fixtures can be wired and designated as safety lighting. This is accomplished by setting their poweron behavior to go to a predefined level. This can be specified per device in Ketra Design Studio. By doing this and allowing a means to toggle power to these lights, the occupant will be able to turn them on or off even if the system is completely off or disconnected.

Ensure that there is an accessible, convenient way to toggle power to these lamps and wire them appropriately. Possibilities include:

- Toggle switches in closet or mechanical room
- Lutron PowPak module paired directly (a.k.a. standalone) to a Pico wireless control
- Lutron switching power module (e.g., LQSE-4S8-120-D) with system control and manual override switch
- Lutron Remote Power Module (RPM) with system control and manual override switch
- Breaker

Scenarios

Scenario 1

The specified Ketra safety lights come on after power outages at an unoccupied vacation home.

Recommendation: Add a timeclock event to be activated along with vacation mode. If these lamps are turned on after a power outage and the home is vacant, the system will turn them off.

Scenario 2

The specified safety lights come on after power outages in the middle of the night.

Recommendations:

- Do not specify bedroom lights for this feature.
- Select lights as needed for stairways, egress areas, and other common areas.
- Avoid selecting all lights or bright light levels.

Note: These lights will be controllable after the system is restored after the power loss.

Best Practices

- Communicate with the homeowner regarding the behavior of any specified safety lights, specifically the power outage scenarios.
- Once a lamp loses power for more than 2 seconds, even with a generator, the lamp will perform its specified power-on behavior when power is restored.
- Considering using locally controlled Lutron dimmers and switches in addition to Ketra lighting for manual bypass control.
- Clearly label any backup points of control.

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Appendix B App Note:

DMX Control Support with Ketra

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Introduction

About DMX

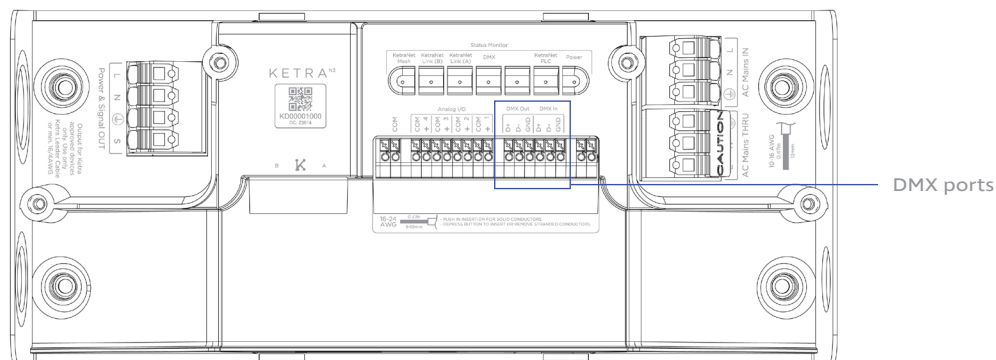
DMX512 is an industry-standard control protocol, built upon RS485, that has roots in entertainment and theatrical lighting applications. It is easy to use, robust, and low-cost, and has found its way into many applications beyond the theater. As the name suggests, it is a way to send 512 8-bit data values over a single cable.

There are several rules of thumb to follow when physically wiring DMX networks:

- Total run length should not exceed 300m (~1000 feet)
- Maximum number of receivers connected to the cable is 32
- The end of the cable run (farthest from transmitter) should be terminated properly with a 120-ohm resistor
- All products should be connected in a serial fashion, not in star or “home run” topologies

N3 Satellite as DMX Console

The N3 Satellite acts as a bridge between the external DMX system and the Ketra lighting system. Its DMX ports (shown below) can send or receive a full universe (512 channels) of DMX512-A.



An N3 can be configured as DMX master or DMX slave, which determines the directionality of control data.

- **DMX master** — N3 outputs DMX to a 3rd party device (i.e., Ketra controls external system)
- **DMX slave** — N3 receives DMX from a 3rd party device and relays it to the Ketra system (i.e., external system controls Ketra)

DMX vs. Analog Control

In addition to supporting DMX input and output, the N3 Satellite separately supports analog input and output, including 0-10V, 0-24V, and sustained contact closures. Each method is useful in different applications.

	Ideal Usage	Input Example	Output Example
DMX	Sending or receiving adjustable color and intensity configurations	Ketra controlled by a third-party console with sliders for red, green, blue, and intensity	Ketra controls third-party lighting with red, green, blue, and intensity parameters
0-10V / 0-24V (Analog)	Sending or receiving adjustable intensity configurations	Ketra controlled by a photosensor outputting a 0-10V signal	Ketra controls third-party lighting's intensity
Contact Closure (Analog)	Sending or receiving triggers, such as commands to turn on/off or play a scene	Ketra controlled by an occupancy sensor	Ketra controls a window shade with raise and lower commands

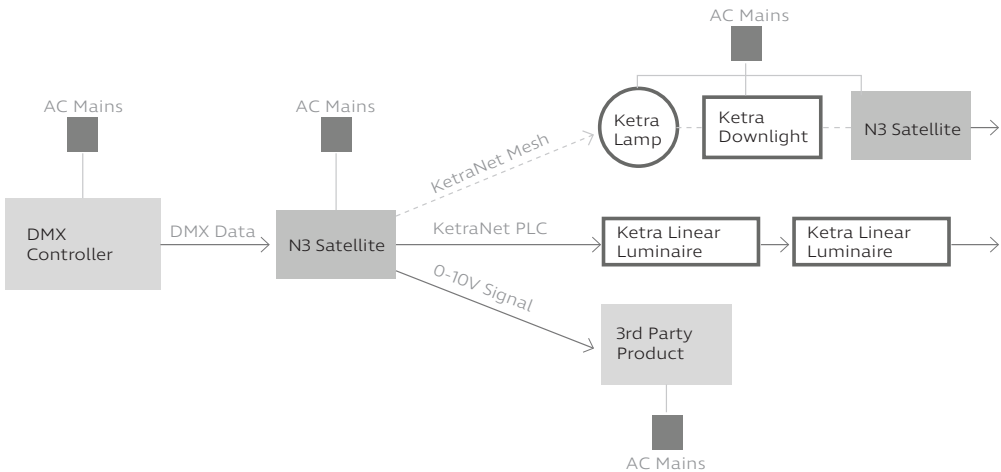
This app note discusses DMX, not analog integration.

DMX Slave

When an N3 Satellite is configured as DMX slave, it enables external DMX to control the Ketra lighting system. The N3 receives data from a DMX driver, then patches (transmits) that data to Ketra groups (i.e., to each control zone's lights).

The N3 uses any combination of 3 methods to patch DMX data to Ketra groups:

- KetraNet Mesh — wireless communication between the N3 and Ketra products, including lamps, downlights, and other N3 Satellites
- KetraNet PLC — wired communication between the N3 and an attached run of linear fixtures
- 0-10V signal — wired communication between the N3 and a third party product that accepts 0-10V intensity information



Workflow

- 1 Physically install and connect power to Ketra's products.
- 2 Run the Design Studio software and create an installation file.
- 3 Create groups and add devices as required for project application.
- 4 Set up DMX profiles in Design Studio and select which lighting groups each profile is mapped to. "Publish" Ketra installation data.
- 5 Set up 3rd party controller to send the corresponding DMX profile ranges to the Ketra N3 Satellite.

For instructions on steps 2-5, see the Design Studio user manual.

Performance

The N3 patches DMX to Ketra devices in 55-channel data frames, one frame at a time. Once all frames have been sent out, a final "go" command is issued and all of the affected lighting products change state in unison.

The frame rate varies based on whether data is being patched over wire or KetraNet Mesh.

- Over wire, the N3 patches data at a rate of 20 Hz, or ~20 f/s. So, patching a full DMX universe would take at most ~0.5 seconds. That means speed is seldom an issue when patching solely by wire.
- Over KetraNet Mesh, the N3 patches data at a rate of 0.67 Hz, or ~0.67 f/s (1.5 seconds per frame after the first frame). So, patching a full DMX universe would take up to ~13.5 seconds.

Note: In an application where both KetraNet Mesh and wired communication (KetraNet PLC or 0-10V output) are used, the wired communication speed will "downgrade" to match the KetraNet Mesh speed. This ensures that all devices change in sync.

Since the delay when communicating over KetraNet Mesh can be significant, we recommend reading **Wireless Latency** to calculate and account for delays.

Performing Fades

Fade rates should be sent from the DMX controller as a parameter.

Ketra offers profiles that include a fade rate parameter (e.g., RGBIF). When the N3 Satellite receives the DMX input, it will relay the fade value to Ketra groups; when the "go" command is given, the groups will transition to the desired color and intensity over the period of time set by the fade rate parameter.

This is especially important in applications that patch DMX input over KetraNet Mesh. Due to wireless latency, initiating a fade up or fade down from a DMX console may result in the wireless Ketra lights making large steps in intensity rather than smoothly transitioning. Sending fade rate as a parameter eliminates this problem.

Wireless Latency

If the N3 Satellite has to patch DMX data to at least 1 KetraNet Mesh device (lamp, downlight, or other N3 Satellite), you may experience delays between the beginning of transmission and the Ketra lights' response.

In most cases, the first 55-channel data frame broadcasts immediately. After the first frame, each additional frame requires up to 1.5 seconds to broadcast. Once all frames have been broadcast, a final "go" command is issued and all of the affected lighting products change state in unison.

Note: The 1.5-second delay occurs between all broadcasts. Therefore, the first 55-channel frame will only experience a delay if the N3 Satellite broadcast a frame from another command less than 1.5 seconds previously.

To calculate the maximum delay possible (in seconds), use the following four-step calculation:

- 1 Divide the number of DMX channels the N3 is listening to by 55. (You do not need to count the same channel range multiple times if you are patching it to multiple groups.)
- 2 Round up to nearest whole number.
- 3 Multiply the result by 1.5.
- 4 Subtract 1.5 to represent the first frame, assuming no other frame was broadcast within 1.5 seconds previously.

$$T = 1.5 \times \text{ceil} \left(\frac{n}{55} \right) - 1.5$$

where T is delay in seconds, and n is the number of DMX channels the N3 is listening to

Note: 1.5 seconds is a maximum figure. Actual latency time varies with signal interference.

Example: An N3 patches 60 DMX channels over KetraNet Mesh. 2 data frames will be required: 1 for the first 55 channels, and 1 for the remaining 5 channels. The first frame experiences no delay, while the second takes up to 1.5 seconds to broadcast. Therefore, the maximum latency is 1.5 seconds.

One way to account for wireless delays is to calculate the expected latency using the formula above, then send the DMX values that far in advance of when a transition should occur. Most DMX controllers include timeline editing and can support this use case.

However, since 1.5 seconds per frame is a maximum figure, the transition may occur before the desired time. How much before depends on the number of data frames being broadcast. This is one reason we recommend against using Ketra's wireless network for live applications such as theatre.

Wireless Restrictions

Only 1 N3 Satellite can wirelessly patch input per KNet. A KNet refers to all the devices associated with a single N4 Hub.

- If the installation only has 1 N4 Hub, then only 1 N3 Satellite can wirelessly relay DMX commands.
- If the installation has multiple N4 Hubs, each KNet can only receive wirelessly-patched DMX data from one N3.

Fig. 1 illustrates a *valid* DMX setup in an installation with multiple N4 Hubs. An N3 Satellite in KNet 1 wirelessly relays DMX commands to groups in both KNet 1 and KNet 2. Fig. 2 shows the same setup slightly altered to be invalid.

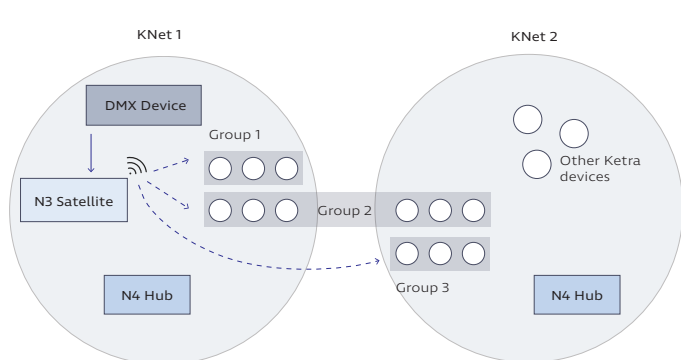


Fig. 1

Fig. 1's DMX wireless setup is valid. Neither KNet receives DMX data from more than 1 N3 Satellite

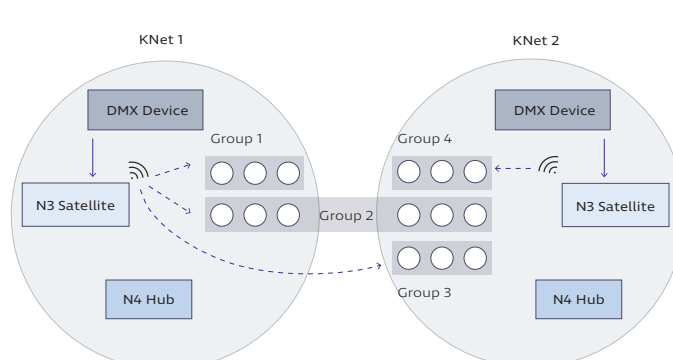


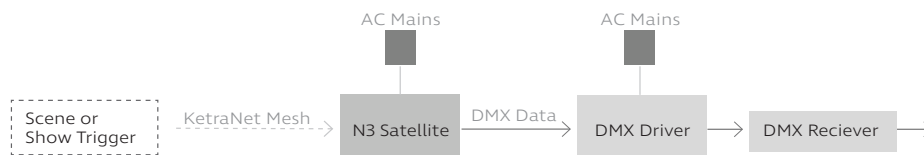
Fig. 2

Fig. 2's DMX wireless setup is invalid. KNet 2 receives DMX input from 2 different N3 Satellites.

Any groups that violate this rule will not appear in Design Studio as available groups for patching DMX data to.

DMX Master

When an N3 Satellite is configured as DMX master, it enables the Ketra system to control an external DMX system. Using Design Studio, you can program DMX output values into Ketra scenes and shows. When one of those scenes or shows is triggered through the Ketra system (e.g., by a button press on a Ketra or Homeworks QS keypad), the N3 Satellite sends the corresponding DMX levels to the external DMX system.



The N3 Satellite's DMX output port supports a full DMX universe at 44 Hz frame rate.

Workflow

- 1 Physically install and connect power to Ketra's products.
- 2 Run the Design Studio software and create an installation file.
- 3 Create groups and add devices as required for project application.
- 4 Configure profile ranges for DMX output in Ketra Tech Tool and save configurations.
- 5 Sort each profile into a Ketra group in Design Studio.
- 6 Customize each group as part of a scene in Design Studio.
- 7 Assign the scene to an input source, i.e., a Homeworks QS keypad button, Ketra keypad button, contact-closure input, or time trigger in a show.
- 8 "Publish" Ketra installation data.
- 9 Set up 3rd party DMX receiver(s) to listen to the appropriate channels.

For instructions on steps 2-8, see the Design Studio user manual.

Performance

There is virtually no lag between input (e.g., keypad button press) and DMX receiver response.

Ketra DMX Profiles

Ketra offers a huge variety of DMX profiles applicable to master and slave applications.

Notes:

- All profiles have 8-bit and 16-bit options. 16-bit offers extremely fine control and takes up twice as many channels. 8-bit is sufficient for the vast majority of applications.
- Dimming requires either:
 - A profile with RGB (including RGB, RGBA, RGBW, etc.), or:
 - A profile with I (Intensity).
- For a parameter key, see **Ketra DMX Parameters**, page 207.

Ketra DMX Profiles

RGB Control Profiles			
Profile	Channels (8-Bit)	Channels (16-Bit)	Notes
RGB	3	6	
RGBA	4	8	DMX Master only
RGBAF	5	10	DMX Master only
RGBAI	5	10	DMX Master only
RGBAIF	6	12	DMX Master only
RGBF	4	8	
RGBI	4	8	
RGBIF	5	10	
RGBW	4	8	
RGBWF	5	10	
RGBWI	5	10	
RGBWIF	6	12	
CCT Control Profiles			
Profile	Channels (8-Bit)	Channels (16-Bit)	Notes
Cct	1	2	Dimming not supported
CctDuvI	3	6	
CctDuvIF	4	8	
CctDuvIV	4	8	
CctDuvIVF	5	10	
CctF	2	4	Dimming not supported
CctI	2	4	
CctIF	3	6	
CctIV	3	6	
CctIVF	4	8	
CctV	2	4	Dimming not supported
CctVF	3	6	Dimming not supported

X/Y Control Profiles (CIE 1931)			
Profile	Channels (8-Bit)	Channels (16-Bit)	Notes
XYIV	4	8	
XYIVF	5	10	
Non-Color Control Profiles			
Profile	Channels (8-Bit)	Channels (16-Bit)	Notes
I	1	2	
IF	2	4	
IV	2	4	
IVF	3	6	
Masteri	1	2	
MasteriF	2	4	
V	1	2	Dimming not supported
VF	2	4	Dimming not supported

Ketra DMX Parameters

Every Ketra DMX profile contains a set of parameters, each corresponding to a channel.

Example: An RGB profile with starting channel 1 consists of the following:

- A Red value, outputting on channel 1
- A Green value, outputting on channel 2
- A Blue value, outputting on channel 3

When selecting a profile in Design Studio or Tech Tool, use the table below as a reference for each parameter.

Ketra DMX Parameters

Color Parameters			
Symbol	Parameter Name	Range (Min = 0, Max = 255 8-bit or 65535 16-bit)	Implementation Notes
R	Red	Min: Off, Max: Red LED to full intensity	
G	Green	Min: Off, Max: Green LED to full intensity	
B	Blue	Min: Off, Max: Blue LED to full intensity	
W	White	Min: Off, Max: White LED to full intensity	
A	Amber	Min: Off, Max: Amber LED to full intensity	Ketra lights do not have an Amber emitter, so profiles with this parameter are unavailable for DMX Slave.
X	CIE 1931 x coordinate	Min: 0.0, Max: 1.0	
Y	CIE 1931 y coordinate	Min: 0.0, Max: 1.0	
Cct	Color Temperature	Min: 2000K, Max: 9970K or 10000K (8-bit vs. 16-bit)	
Duv	Tint (distance from black body locus)	Min: -0.05, Max: +0.0496	At 50% (127 for 8-bit, 32768 for 16-bit), tint is +0.00, meaning the color temperature is on the black body locus.
Intensity Parameters			
Symbol	Parameter Name	Range (Min = 0, Max = 255 8-bit or 65535 16-bit)	Implementation Notes
I	Intensity	Min: 0%, Max: 100%	Use if at least one scene will set the receivers' intensity to a <100% value.
Masteri	Master Intensity	Min: 0%, Max: 100%	Use if all scenes will leave the receivers' intensity at 100% unless dimmed from a keypad or other input.

Other Parameters			
Symbol	Parameter Name	Range (Min = 0, Max = 255 8-bit or 65535 16-bit)	Implementation Notes
V	Vibrancy	Min: 0%, Max: 100%	At 0%, the current color point is powered more by the W emitter. At 100%, the color point is powered more by the RGB emitters. Objects illuminated at higher vibrancy typically appear more saturated.
F	Fade	Min: 0 seconds, Max: 255 seconds or 6553.5 seconds (8-bit vs. 16-bit)	If N3 is DMX slave, 'F' parameter is required for fades. If N3 is DMX master, 'F' parameter should only be used if receivers require fade times be sent as a parameter.

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