Design Studio 2.0

USER MANUAL

Contents

Introduction

About Design Studio

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 and assign scenes and shows to Ketra 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.

This comprehensive manual will help you get the most out of Design Studio and Tech Tool. The writing here is intended for users of a range of skill levels and experience with lighting systems; terms can be referenced in the Glossary on page 114.

> **Note:** This manual is for Design Studio 2.0 and firmware 1.15 or above. It assumes the current software and firmware versions and is not retroactive.

Additional tutorial videos are available at **www.ketra.com**. Contact Ketra's technical support staff and application engineers with any additional questions, available Monday through Friday, 9 AM-5 PM, Central Standard Time. Call **1-512-872-4357**, or email **support@ketra.com**.

What's New in Design Studio 2.0

Design Studio 2.0 introduces essential new features that support programmers and encourage users to take advantage of customized light scenes in their space. Some of the major new features include:

Offline System Commissioning
In Design Studio 2.0, you can create, commission, and publish an installation without Internet access. This feature provides crucial support for programmers operating in new construction environments with no accessible network.

> **Note:** Internet connection is required for API authentication and remote access. For installations created without Internet, these two features can (and, in the case of API authentication, should) be enabled once a connection is established.

Discrete Zone Control for Keypads*
Ketra keypads can now control independent zones. From a single keypad, an end user can trigger scenes and adjust intensity for multiple rooms, a single room, or a single zone. For example, a user can adjust individual lighting zones in their home's entryway and use the same keypad to turn on/off all the lights in their home.

Keypads now illuminate multiple buttons at once to represent the states of multiple zones. This enables an end user to see the status of their lighting through a quick glance at their keypads.

For more details, see **Configuring Discrete Zones on One Keypad**, page X.

Easy Commissioning with Curated Content

Design Studio 2.0 includes curated content and recommended groups for residential and office installations. This enables you to easily commission a Ketra system with scenes and shows tailored for your space. Our expertly-generated lighting content will automatically map to your keypads and recommended groups. Just provision your Ketra devices into groups and then click Publish in Design Studio.

Efficient Scene-Building

You can now assign a single scene to multiple points in the installation, including keypad buttons, shows, and analog input triggers. This enables you to reuse content without having to create copies of existing scenes.

Additionally, you can now save substantial amounts of time by applying **tags**, or **descriptors**, to groups and using the descriptors in scenes. For example, if you want to build a scene including ten groups that use the same color setting, give the ten groups a common descriptor and then apply the desired setting to that one descriptor. This single operation will affect all ten groups, eliminating the need to address each group individually.

For more details, see **Global Scenes, Local Applications**, page X.

Automated Keypad Relationships*

Design Studio 2.0 automatically determines how commands from one keypad should affect associated keypads. For example, pressing the "Power Off" button on a "Whole House" keypad will set all of the house keypads to "Power Off." If a resident then triggers a scene from the "Dining Room" keypad, 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.

For more details, see **Automatic Button Linking**, page X.

Improved Organization Workflow

Design Studio 2.0 supports nested grouping for rooms and zones. For example, a "Home Office" group may contain subgroups like "General," "Task," and "Accent." Figure 1 compares a simple grouping structure in Design Studio 1.8 vs. 2.0.

DS 1.8
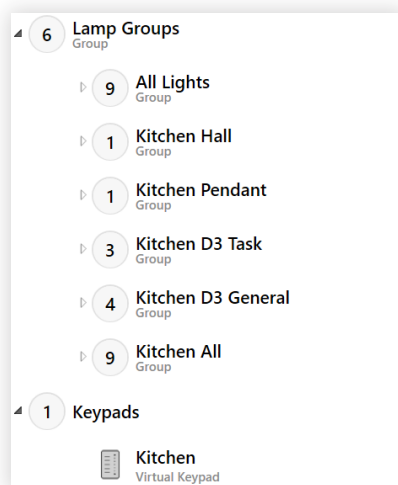
DS 2.0
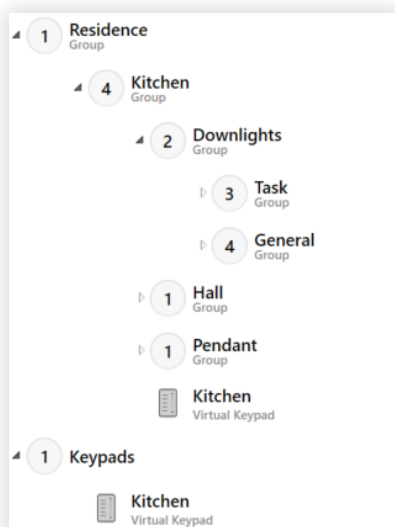
fig. 1

Ketra keypads, virtual keypads, and third-party outputs can now be provisioned into groups, just like lamps and luminaires. Not only is this more intuitive visually, but also it removes the need for manual group assignments when configuring keypads. For example, the "Kitchen" keypad in figure 1 can control the "Kitchen" group and all subgroups.

For more details, see **Building Groups**, page X.

Other improvements

- Improved group API returns the true state of groups.*

- Shows can be triggered from contact-closure inputs.

- A single Publish button to reduce confusion.

- Intuitive integration of third-party outputs into Ketra scenes.

* Requires firmware version 1.15.

Getting Started

Before You Start

Before using Design Studio, follow these three steps:

1   **Confirm that you have the following components:**

    – **A Windows 7 or later Windows operating system.**

    – **At least 30 MB of free storage on your computer.**

    – **A Ketra N1 USB Interface, OR at least one Ketra N4 Hub.** These devices will allow Design Studio to communicate with the installation.

2   **Confirm that the Ketra products are installed according to the installation instructions and powered on.**

3   **Confirm that the following are true:**

    – **If using N1 instead of N4(s), the N1 (plugged into the computer) is in range of at least one Ketra device in the installation.** The N1's communication range is approximately 50 feet indoors, but thick walls and other obstructions can impact wireless range. Any wireless Ketra device will relay the N1's signal to other devices over the same distance.

- If using N4(s) instead of N1:

  - **Each N4 has a wired (Ethernet) connection to the modem or router.** As discussed in the **N4 Installation Guide**, the N4 should be directly connected to the modem or router via Ethernet cable in a "home run" configuration.

  - **The computer and N4(s) are connected to the same network with Internet access.** Alternatively, the computer could be connected to the same subnet as the N4(s), not requiring Internet access.

  - **Each N4 is within 50 feet of at least one Ketra device in the installation.** The N4's communication range to Ketra devices is approximately 50 feet indoors, but thick walls and other obstructions can impact wireless range. Any wireless Ketra device will relay the N4's signal to other devices over the same distance.

Installing Design Studio

Ketra Design Studio and Tech Tool can be downloaded for free from **www.ketra.com**. Go to **Products** > **Interfaces** > **Design Studio**, and click the link that says **Download Design Studio**. A straightforward install wizard will help you install Design Studio and Tech Tool on your Windows operating system.

Note: To install Design Studio, you must have a Windows 7 or later Windows operating system with at least 30 MB free.

Updating Design Studio

When Design Studio needs to be updated to a new release, an **Update Available** notification will appear in the top-right corner of the program, as in fig. 2. You can begin your update by clicking **Update Now** or you can update Design Studio from the website. Design Studio and Tech Tool will update together.
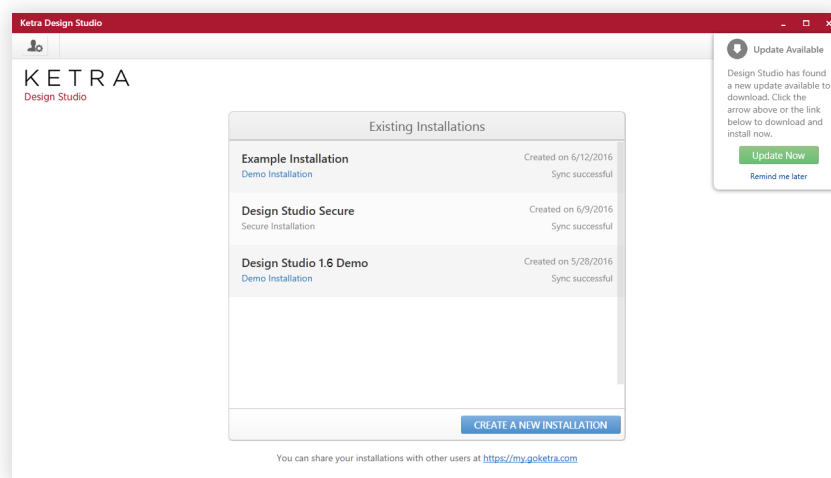
fig. 2

Note: This notification will only appear when you open Design Studio. So if you leave Design Studio open at all times, you'll never see it.

Account Management

If you have Internet connection, Design Studio will ask you to either create an account or log in to an existing one.

Note: If you don't have an Internet connection and can't log in, Design Studio will take you directly to a blank **Existing Installations** list. Installations you create when not logged in will be saved locally and automatically linked to your account once you log in.

All of the following account management features require an Internet connection.

Creating an Account

When prompted, enter your name and a valid email address, create and verify a password, and click **Create Account**. See fig. 3.

fig. 3

Logging In to an Existing Account

Enter your Design Studio account's email address and password, and then click **Log In**. See fig. 4.
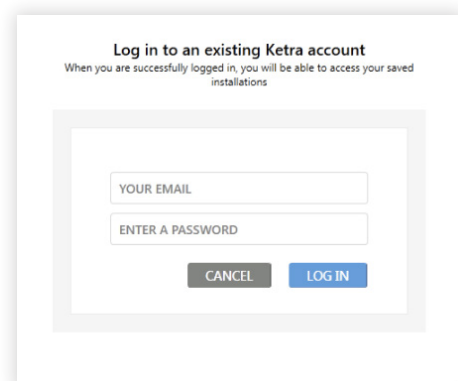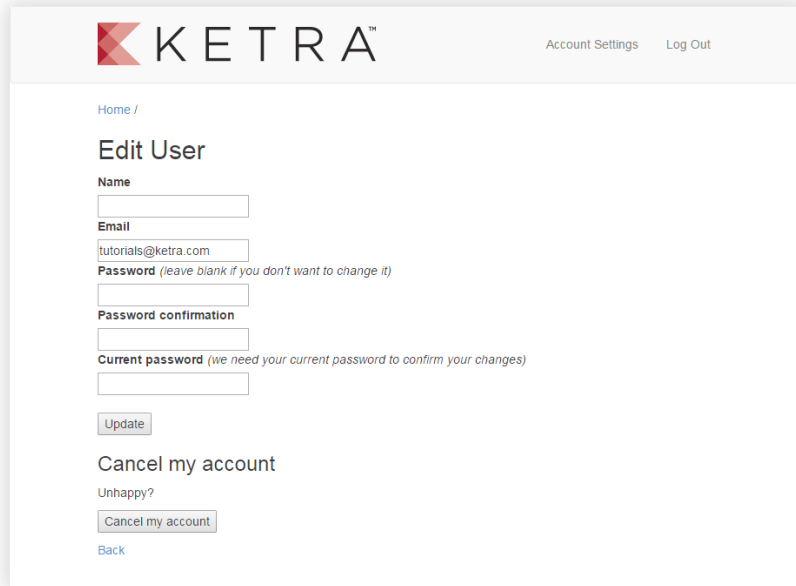
fig. 4

Modifying an Existing Account

You can change your account name, email, and password at **http://my.goketra.com/users/edit**, as in fig. 5.

fig. 5

> **Note:** You will need to log out of Design Studio and log back in before you can see your changes.

On the same page, you can also cancel your account.

Logging Out of Design Studio

Open the **sidebar**. To do this, click the **user icon** in the top-left corner of the **Existing Installations** screen, shown in fig. 6.
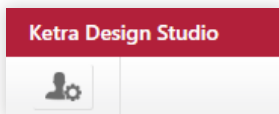
fig. 6
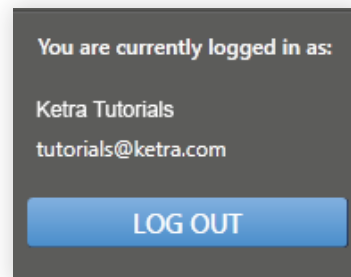
fig. 7

In the sidebar, click **LOG OUT**. The **LOG OUT** button is at the bottom of the sidebar. See fig. 7.

Installation Management

Existing Installations List

After logging in to Design Studio, you will be presented with your **Existing Installations List**, as in fig. 8. If you've just created an account, this list will be blank.
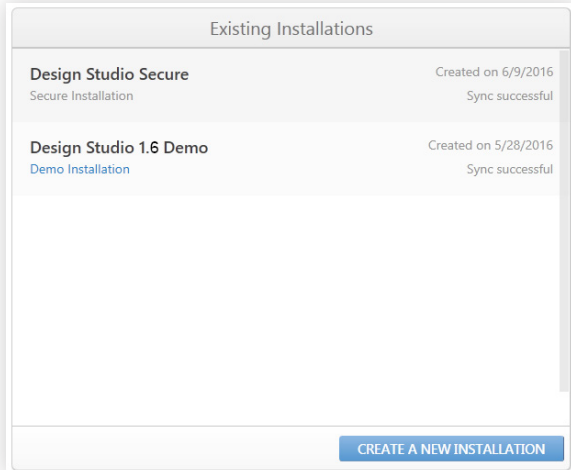
fig. 8

Under the listing for each installation is a brief summary that includes:

- Security level

- Sync status (see **Saving and Syncing**, page 15)

- The time it was created

> **Note:** Right-clicking on any installation gives you the options to manually sync or to share it.

Sharing Installations with Other Users

Sharing allows you to grant another Design Studio user access to an installation. There are two requisites for sharing:

1   You must be the originator of the installation.

2   You must have an Internet connection.

> **Note:** The person you share the installation with will be able to see whatever configurations you've set in Design Studio, but they won't be able to operate the installation unless they are within range of its lights, keypads, and satellites. They would have to remote in (see **Enabling Remote Access**, page 100) or be on the same network as the N4(s) to operate it.

You can share an installation in one of two ways:

- **Right-clicking in the** Existing Installations **List.**

  i   Choose Share. You will get a prompt asking for the email address of the first user with whom you wish to share, as in fig. 9.

  ii   Enter the email address of their Design Studio account, and click Share. A green Success message will appear below the email address field to confirm that the installation shared successfully.

  iii   Enter any additional addresses—one at a time—to which you'd like the installation sent.

  Designated users will now have access to the installation in their Existing Installations list.
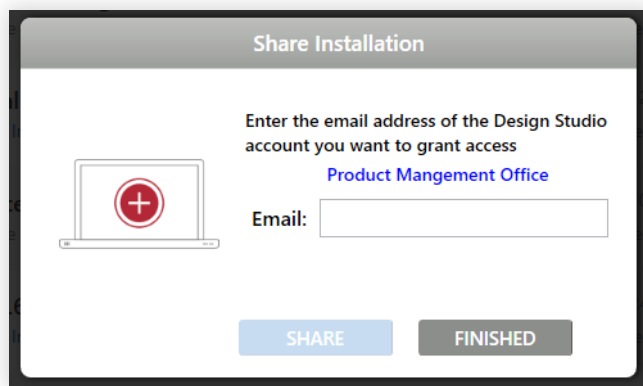
fig. 9

- **Going to the Customer Web Portal at** https://my.goketra.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.

Existing Installations Screen: Additional Options

Clicking the user icon in the top-left corner of the Existing Installations screen (shown in fig. 10) will open a sidebar with some additional options:

- **Sync All Installations.** This allows you to sync all your installations at once rather than one at a time. For more information on syncing, see **Saving and Syncing**, page 15.

- **Open Online Support.** The link will direct you to the **Support** page of Ketra's website.

- **Log Out.** See **Logging Out of Design Studio**, page 8.
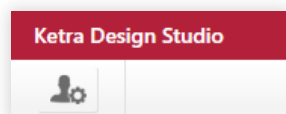
You can close the sidebar by clicking the user icon again.

fig. 10

Creating a New Installation

At the bottom of the **Existing Installations** menu, click the **CREATE A NEW INSTALLATION** button. (See fig. 11.)
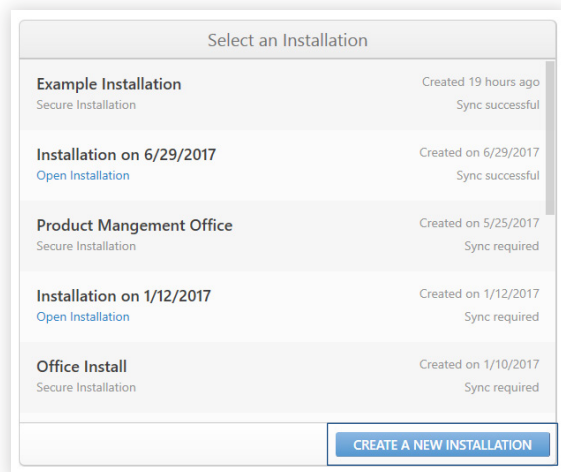
fig. 11
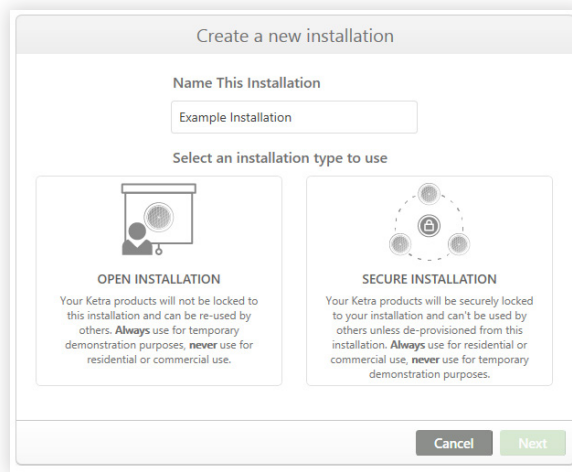
fig. 12

Design Studio will then ask you to enter some basic information, as illustrated in fig. 12:

1   **Name the installation.**

2   **Set the installation type.**
    Design Studio offers open and secure installations.

   – **Secure installations**: Permanent installations should be programmed as secure to protect their devices from being accessed by other users and installations. In a secure installation, all devices get set to a private network unique to that installation, meaning they cannot be discovered by other installations.

   – **Open installations**: Open installations allow use of the same products for multiple installations (e.g. if you and another user both need access to the same devices). Use this for temporary demonstration purposes; do not use open installations for permanent installations. Devices in an open installation remain discoverable to other installations even after you've provisioned them for your own installation. Open installations are limited to 50 devices.

> **Note:** Open installations give you the complete range of control options over your devices—however, they don't give you exclusive control. Any nearby user who clicks **Add New Devices**—even in a totally different installation—can discover them and give them commands.

   Open installations can be converted to secure installations at any time. See **Converting to a Secure Installation**, page 99.

3   **Click Next.**

4   **Set the communication type.** Almost all installations use the N4 Hub for communication. The N1 Network Dongle is used only for technical support and demonstration purposes.
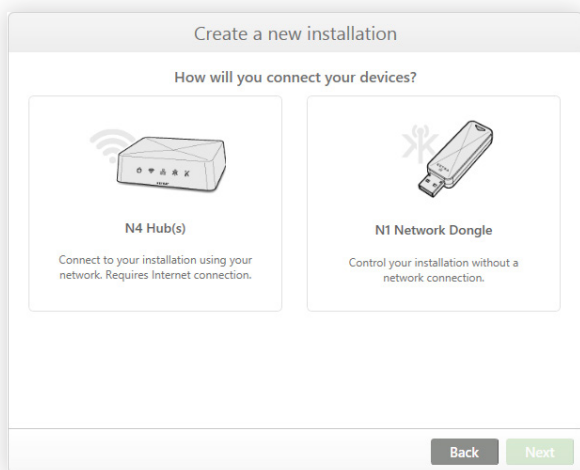
fig. 13

An N4 installation requires Internet access on creation and each time you log in with a new device. Your computer or mobile device must be on the same LAN (Local Area Network) to access an N4 installation.

5   **Click Next.**

6   **Set the installation's location.** See fig. 14. This step can be skipped, and any location information you enter now can be modified later. Setting the installation location allows Design Studio to create a default natural light (circadian) show for your convenience. The show will be usable with the Ketra mobile app as soon as you create the installation.
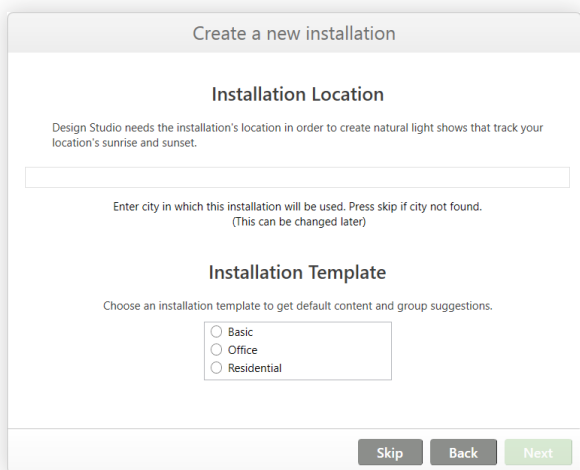
fig. 14

7   **Choose an installation template.** See fig. 14. This step can be skipped, but it is important in determining the default content that will come with your installation, including the content that will be assigned to Ketra keypads as soon as you provision them. Picking a template will therefore help you streamline programming after creating the installation. We recommend picking either Office or Residential.

8   **Select an N4 from the list.** See fig. 15. Selecting an N4 will cause it to identify itself by flashing its indicator lights, so you can tell which hub you're addressing.
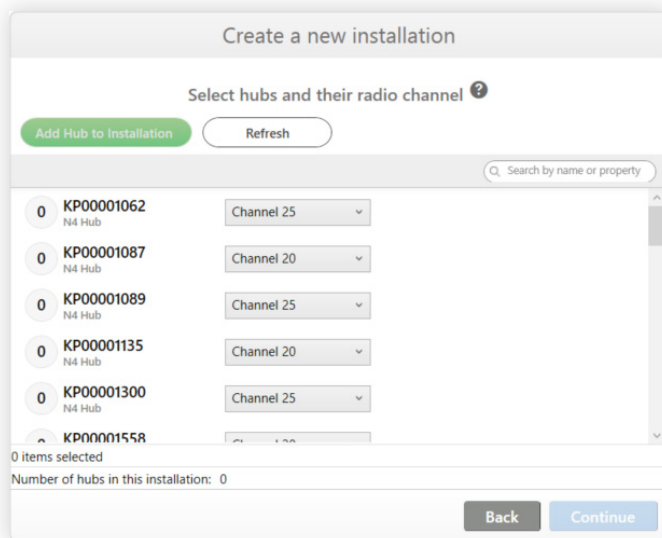
fig. 15

If your N4 doesn't appear in the list, click Refresh; if it still doesn't appear, make sure that your N4 and computer are connected to the same network.

9   *Optional:* **Change the N4's channel**. You only need to do this if you have multiple N4s that will be positioned close together in the installation. In that case, you would want the N4s to be on different channels from one another to ensure ideal communication. Otherwise, leave the N4s on their default channels.

10   **Click** Add Hub to Install**.** If provisioning was successful, you'll see the N4 disappear from the list of returned devices

11   **Repeat for any of your other N4s, then click** Open Install**.**

> **Note:** If creating an installation without Internet access, Ketra strongly recommends that you enable API authentication as soon as an Internet connection is established. This important security measure is disabled by default for new installations without Internet. For details and instructions, see Toggling API Authentication, page 33.

Accessing an Existing Installation

After you select the installation from the **Existing Installations List**, Design Studio will reestablish connection to the devices in your installation.

> **Note:** If this is an open installation (as opposed to a secure installation), Design Studio will also automatically republish settings to some of your devices, in case they were discovered and commissioned by other installations since you last opened the program. It is recommended that you go to the Device Control tab in your installation and click Publish to fully restore your settings.

Possible Error Messages

- **Could Not Connect to Network** with prompt to connect remotely:
  You are not on the N4s' LAN, but remote access is enabled for the installation. Clicking **YES** will connect you to the N4s via Internet, ensuring that changes you make in the installation will be reflected in the physical installation space.
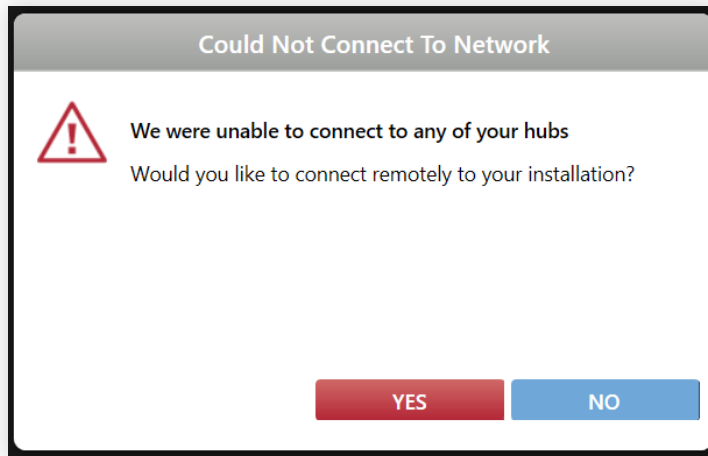
fig. 16

- **Could Not Connect to Network** with warning that hubs are not available:
  One or multiple of the N4s are not working as expected. You should make sure all N4s are powered on and connected to the same network as your computer (or connected to Internet if accessing remotely). If they are, make sure your computer has Internet access. Then click **TRY AGAIN**. (If the problem was that your N4s were powered down, you may need to wait a minute while they boot up.)
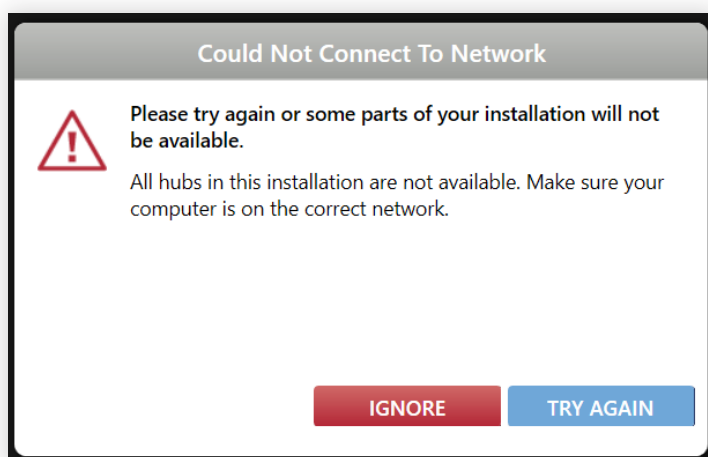
fig. 16

Saving and Syncing

In Design Studio, installations tied to your account are autosaved locally on your PC and also synced to the cloud, provided that you have Internet access. Design Studio autosaves when you provision or deprovision devices, publish settings, or close the installation; and it automatically syncs when you close the installation, log out, or exit the program, assuming you have Internet.

> **Note:** If commissioning an installation without Internet access, your changes will not be synced to Ketra's servers. The best way to save your progress is to publish frequently, since publishing saves configurations in a local file.

Saving always happens automatically, but syncing can be performed manually. For seeing whether an installation needs to be synced, see **Viewing an Installation's Sync Status**, below; for performing a manual sync, see **Syncing Manually**, below.

> **Note:** Syncing can overwrite changes in cases where two computers are simultaneously editing a single installation. Even if the users are making changes to different parts of the install, the computer that syncs last will overwrite any changes made on the other machine. For this reason, we strongly recommend against having two people edit an installation at the same time.

Viewing an Installation's Sync Status

You can see the sync status of your installations in the Existing Installations menu, beneath each installation's name. There are three possible statuses:

1   **Sync successful:** Your installation has successfully synced and is completely up to date.

2   **Sync pending:** Changes to your installation have been saved locally on your computer, but not pushed to Ketra's server. This can happen if you have made changes but don't have Internet access required to sync. If your installation is marked "**Sync pending**," any other computer— regardless of who is signed in—trying to access the installation will not see your changes.

> **Note:** If commissioning an installation without Internet access, your changes will not be synced to Ketra's servers. The best way to save your progress is to publish frequently, since publishing saves configurations in a local file.

3   **Sync required:** Ketra's server has more recent configurations for your installation, and you must sync before you can access the installation. This can happen if an installation is modified on another computer.

Syncing Manually

Installations can be synced individually or all together.

- **Sync individually from Existing Installations:** To sync one installation, locate it in the Existing Installations menu, right-click, and select Sync Now. (See fig. 17.)
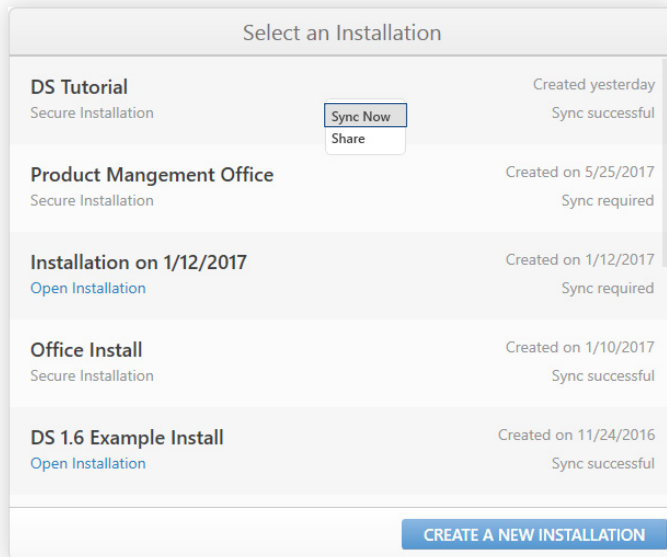
fig. 17

- **Sync all together from the Existing Installations sidebar:** Starting on the Existing Installations screen, click the user icon in the top-left to open the sidebar, then click Sync All Installations.

Organization

Core Concepts of the Organization Tab

The Organization tab is where you add devices you want to control.

Adding to KNets

On the Organization tab, you'll add Ketra devices—lights, keypads, and satellites—to a **KNet**, which is short for **Ketra Network**. Devices on a KNet communicate with one another by radio signal; this is how they receive and transmit wireless commands.

> **Note:** A single N4 creates a single KNet. It then relays commands to devices on that KNet.

If your installation has multiple N4s, you can think of each KNet as being like a bin for Ketra devices. You'll be filling up one bin at a time, until every one of your devices has been placed in a bin. Fig. 18 shows you the end result. Note that everything is divided between the installation's four N4s. For best radio performance, group devices that are close together in your space into the same KNet.
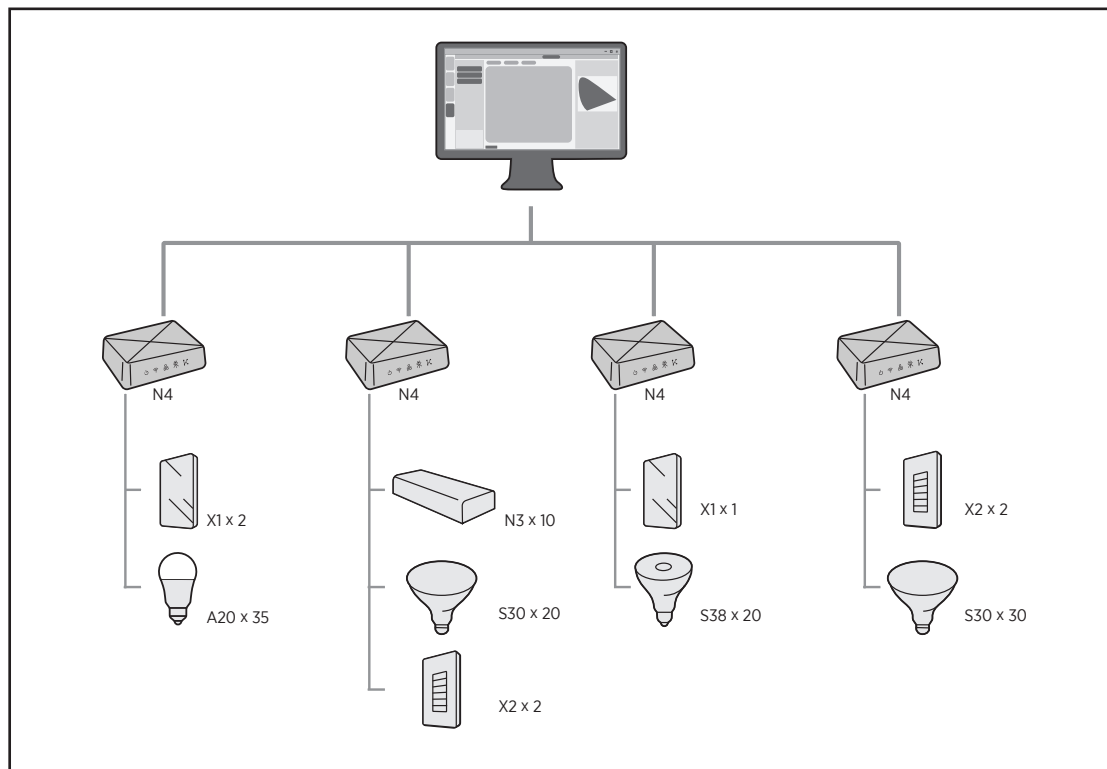
fig. 18

Required Steps and Optional Steps

This part of the manual contains steps you must complete as well as steps you have the option to complete. The sections are listed below.

> **Note:** Grouping, Discovery, and Provisioning are required for every installation. The other steps are optional.

* Building Groups (p. 18)
– Building groups and a grouping hierarchy

Adding Descriptors to Groups (p. 21)
– Tagging similar groups to receive the same scene content

* Discovery: Searching for Available Devices (p. 22)
– Searching for powered-on Ketra devices

* Provisioning: Adding Devices (p. 24)
– Provisioning found devices to your installation

KNet Guidelines (p. 28)
– Advanced guidelines for adding devices

Managing Devices (p. 29)
– Adding/removing devices from groups; deprovisioning devices from the installation

Managing N4 Hubs (p. 30)
– Adding N4 Hubs and changing their channels to fix signal interference

Diagnostics (p. 31)
– Checking for problems with your devices

Building Groups

Building groups is the first step in any new installation. 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.

This section explains groups and how to build them.. To skip straight to the instructions on how to build groups, click here.

About Groups: The Basics

What are groups?
Groups are collections of devices—Ketra lights, third-party lighting loads connected to a configured N3 Satellite, and other third-party outputs—put together to be controlled as a unit. In addition to those devices, groups may contain subgroups and Ketra keypads. When a keypad is a member of a group, it can control that group as well as any subgroups.

For now, our groups will be empty.

Why build groups?
Grouping devices allows you to control some of your devices differently from others. Two separate rooms might call for two separate groups: you could customize lights in a "**Lobby**" group to emit a warm color to make guests feel at home, and other lights in an "**Office**" group to emit a bright and energizing color.

"Office"   "Lobby"
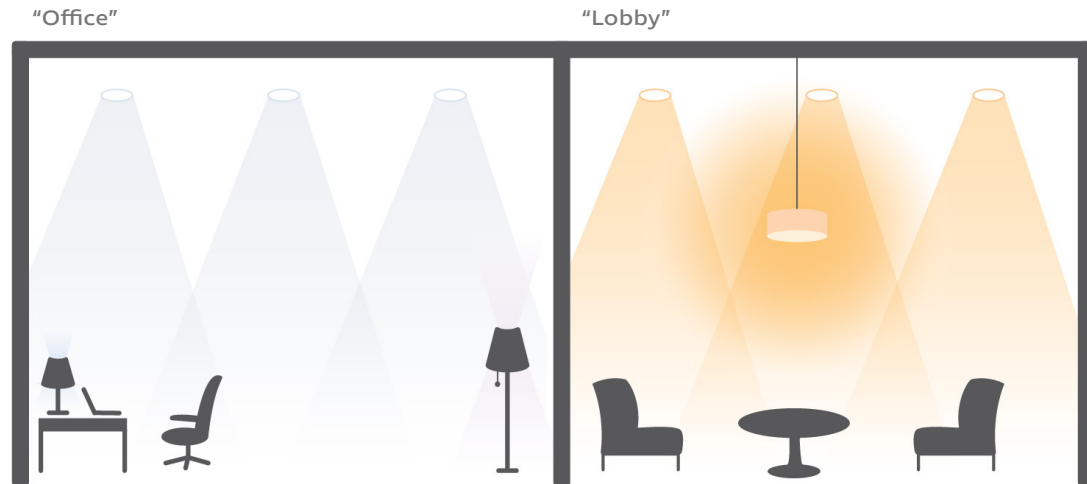
fig. 19

Subgroups are also beneficial, because they allow you to divide a suite into separate rooms, or divide a single room into separate zones. Figs. 20 and 21 show examples in residential and commercial spaces.

fig. 20

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. 21

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

Could be controlled by different occupancy sensors
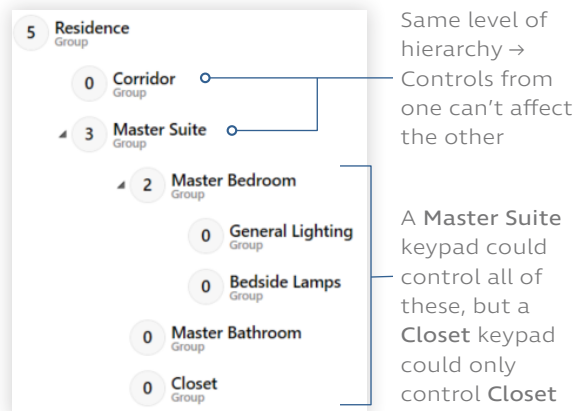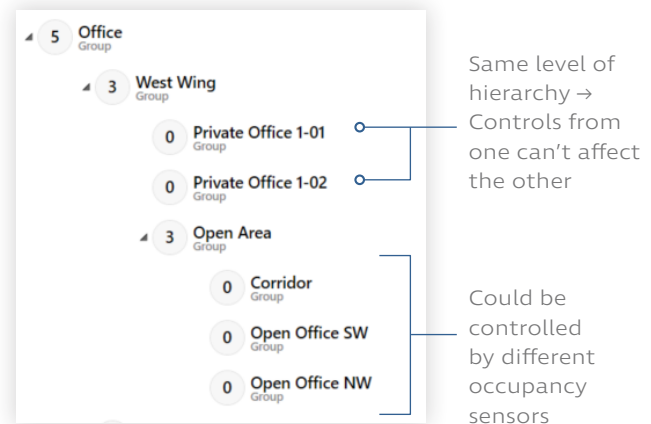
How do I control just one light?
Put it in its own group, as in fig. 22. In Design Studio, configurations and commands are never issued directly to lights; rather, they are issued to groups. The only devices you can control directly are X2 Keypads, N4 Hubs, and N3 Satellites. When controlling lights, you customize the group, not the individual light.

fig. 22

About Groups: Advanced

Can a single group contain devices from multiple KNets?
Yes. When you're adding devices, just highlight a pre-existing group and add the devices to it like normal. When Design Studio issues a command to the group, the command will just be routed to multiple N4s, which will relay it to the relevant devices on their KNets.

Can one device be in multiple groups?
Depending on the device, yes. Any device that receives commands (as opposed to broadcasting them) can belong to multiple groups. This includes Ketra lights and third-party devices (typically lighting loads) attached to an N3 Satellite configured for output.

One example application of this feature is emergency lighting. Under normal conditions, Group A and Group B might have no overlapping devices. But when the power goes out, a generator turns on some lights in Group A and some lights in Group B to ensure that anyone in those areas can find an exit. This is accomplished by putting the lights in either Group A or Group B as *well as the emergency group*, Group C.

> **Note:** 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.

A device that broadcasts commands, like a Ketra keypad, can only belong to one group. However, they are able to control their own group and any number of subgroups.

How to Build Groups

To add groups to the installation hierarchy, use the top-right panel of the **Organization** tab.
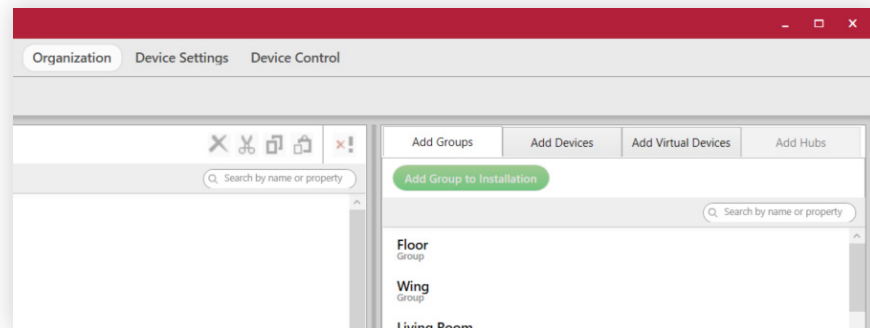
fig. 23

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. The user 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 recommended group or scroll down and select Custom Group.

2   **Highlight the parent group in the** My Devices **panel.** This could be the highest-level group in the installation or a group lower down the hierarchy.

3   **Click** Add Group to Installation.

4   **Rename the group as needed by clicking the** pencil icon **next to its name.**

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.

Adding Descriptors to Groups

Note: This step is optional and intended for power users. Descriptors are complicated and, if used incorrectly, may not do what is expected. They are not needed in most applications.

Descriptors are tags for groups. When building scenes in template view (see **Template View**, page 88), 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

For example, say an installation has multiple bedrooms, each with the same three zones: overhead lights, standing lights, and bedside lights. Say you want every bedroom to have a scene where the overhead lights have one setting, the standing lights have another, and the bedside lights have a third.

The quickest way to accomplish this would be to select each zone in the grouping hierarchy and assign a custom descriptor (like "**br overhead**", "**br standing**", or "**bedside**"). When you build the scene, you can assign content to anything with the descriptor "**br overhead**", "**br standing**", or "**bedside**". You can then assign that single scene to any bedroom in the installation.

How to Add Descriptors

To add descriptors, follow these steps:

5   Select a group in the group hierarchy (in the My Devices panel).

6   In the Details pane (bottom-right), write a descriptor name in the text box.

7   Click +.

> **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.

You can also delete a descriptor by clicking the X button next to its name in the same pane. For reasons detailed below, we recommend against deleting descriptors.

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 88.

Discovery: Searching for Available 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.

Performing a Search

To add devices to groups in the installation hierarchy, use the top-right panel of the Organization tab.

To perform discovery, follow these steps:

1   On the Add Devices tab, click Find New Devices.

> **Note:** In an installation with only one N4, skip to Viewing the Search Results, page 24.

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 of itself. When you add devices, you'll be adding to this N4's KNet.

As discussed in **Adding to KNets**, page 17, installations with more than one N4 have more than one KNet. We're going to add devices to those KNets one at a time, starting with the one whose N4 you've selected.

3   Set the discovery range. This affects the number of devices that Design Studio tries to return in its search results. 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 close to your N4.

4   Click **Find Devices** to begin the search.
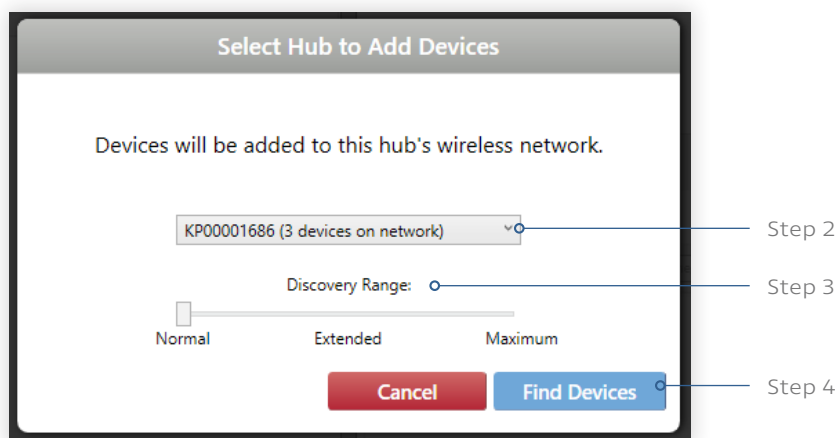
fig. 24

After you begin the search, the N4 will spend about thirty seconds searching. Any lights it finds will go to a dim blue. Then Design Studio will show you the serial numbers.
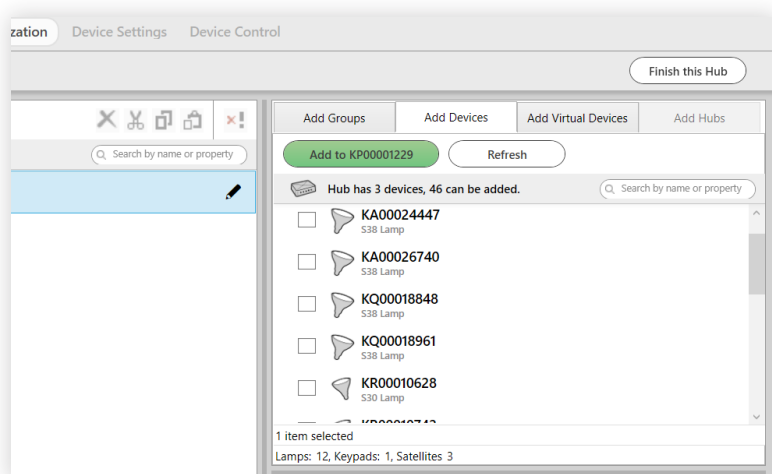
fig. 25

Viewing the Search Results

Discovered devices will appear in the top-right part of the screen, as in fig. 26.

> **Note:** An N3 with linear attached will look roughly the same as an N3 without linear attached. (See fig. 26.) Read the description beneath the serial number to tell them apart.
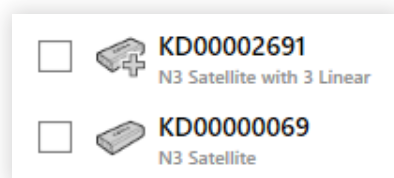
fig. 26

How can I tell which serial number belongs to which device?
Highlighting a light's serial number will cause the actual device to shine a bright blue. Likewise, controllers will flash their indicator lights when highlighted. (N3 Satellites' indicator lights are beneath the hood.)

To keep track of which device is which, you can also rename any device by clicking on the pencil icon once you've highlighted it. The new name will only apply in this installation.

What should I do about a missing device?
If a device seems to be missing from the list of serial numbers, click Refresh to repeat discovery of available devices. Make sure the device is powered on. Devices won't appear if they're a) powered off or b) not on the default network (i.e. if you've already assigned them to an N4, or if you've previously provisioned them for a separate secure installation).

When you're ready to start adding, read **Provisioning: Adding Devices**, below, the next necessary step in provisioning an installation.

Provisioning: Adding Devices

Now that you've found available devices, it's time to add them to a KNet so your installation will be able to control them.

> **Note:** Each KNet can support 50 devices. The N4 Hub counts as one device. That means you can add 49 devices to the KNet. As you add, keep an eye on the counter in the top-left corner; it'll tell you how many you've added so far.

For additional guidelines on adding devices to KNets, see **KNet Guidelines**, page 28.

Adding Devices

To add devices to groups in the installation hierarchy, use the top-right panel of the **Organization** tab.
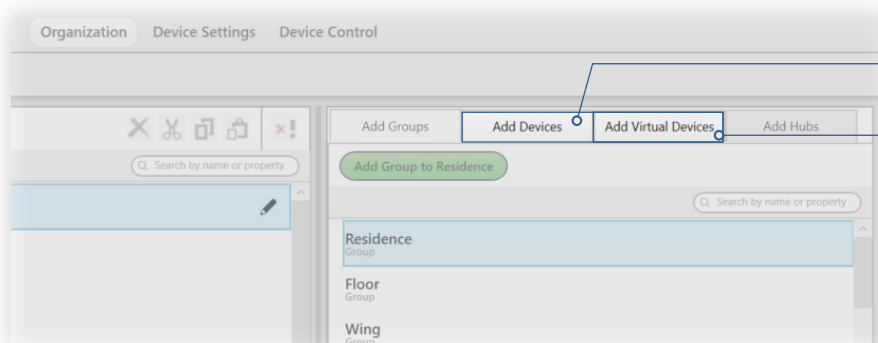
fig. 27

The Add Devices tab lets you add lights, satellites, and keypads

The Virtual Devices tab lets you add virtual keypads (page 26); and the Add Hubs tab lets you add N4s

Note: When you provision a keypad or virtual keypad, Design Studio automatically assigns content based on the button labels. To change what scenes are assigned to each button label, we recommend setting default button content before provisioning your 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 94.

To add devices, follow these steps:

1   **Highlight the destination group(s) in the grouping hierarchy.**

2   **Check the boxes next to devices.** The checked devices are the ones you will add to the KNet. We recommend checking devices you intend to group together.

Remember that highlighting a device will cause it to identify itself in your space: lights will shine a bright blue, while keypads and satellites flash their indicator lights. When you check the box next to a light it will turn yellow so you know which ones are checked.

Note: Keyboard shortcuts will help you here. Use the **up arrow** and **down arrow** to go through the list of found devices; each device will identify itself as you come to it. Use the **spacebar** to check the box for the highlighted device.

3   **Click the green Add button. (See fig. 28)**
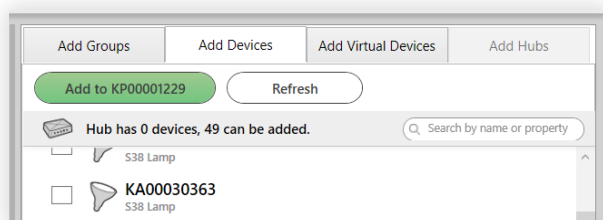
fig. 28

Clicking that button makes the devices disappear from the right-side panel and reappear in the **My Devices** panel, on the left. Lights will temporarily shine a green color to show they've been added.

Note that lights, keypads, virtual keypads, and analog outputs can all be provisioned directly into the group hierarchy. Hubs, however, are not provisioned into the hierarchy.

4   **Finalize your additions.** In the top-right corner, click **Finish This Hub**.

5   **In the dialogue box, click Choose Hub to add devices for another N4, or Proceed to finish your additions.** If you click **Choose Hub**, you can select another N4 to find devices for. If you click **Proceed**, read **Next Steps**, page 27.

Note: If you click **Proceed** and then decide to add more devices, you can click **Find New Devices** in the top-right corner at any time.

Adding Virtual Keypads

A virtual keypad is one that does not exist physically but that you can control through Design Studio or the Ketra mobile app. 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. 29.)
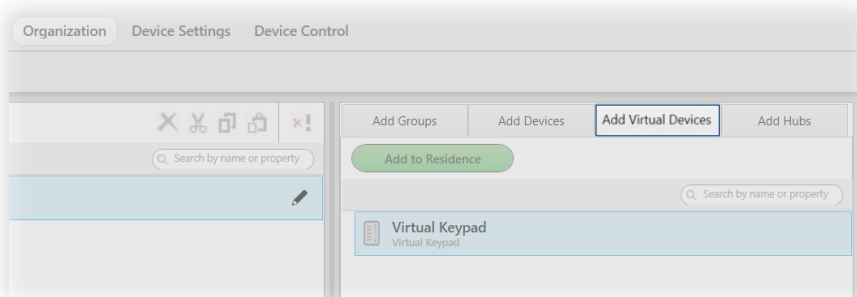
fig. 29

2   **Highlight the destination group in the grouping hierarchy and click Add to Group.** (See fig. 30.)
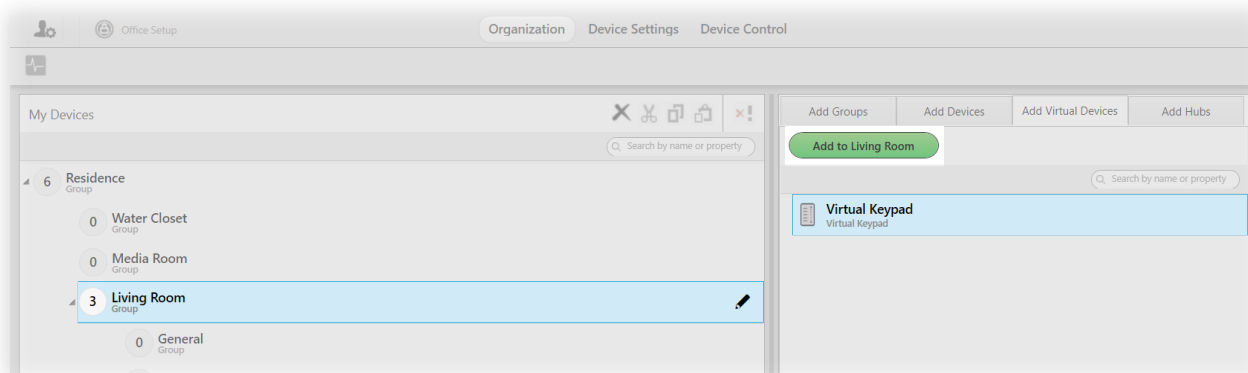
fig. 30

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 (see **Device Control and Keypads**, page 41).

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.
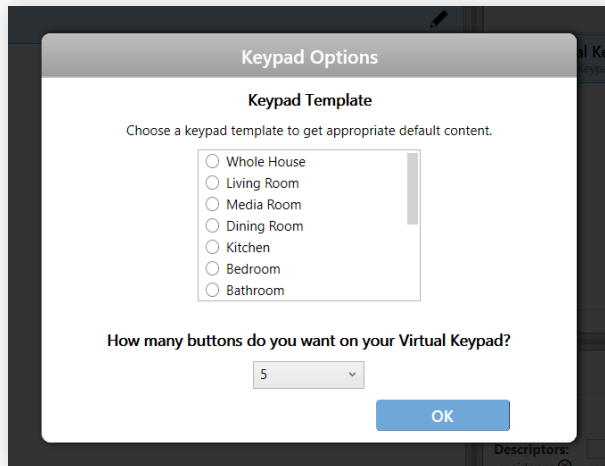
fig. 31

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 **Device Control and Keypads**, page 41.

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

Next Steps

Once you've added devices, you've completed what you need to do on the **Organization** tab. You can either check out the **Organization** tab's optional features or skip straight ahead to either of the sections below:

• The **Device Settings** tab, where you can set static hub IPs, enable API authentication, or configure emergency mode for your lights (see **Device Settings**, page 32)

   or

• The **Device Control** tab, where you can change your groups' colors, configure keypads to transform your lighting at the click of a button, set up N3 Satellites for integration with sensors or third-party devices, and program shows so that your lighting automatically shifts over the course of a day or a period of time, and build scenes for use elsewhere in the installation.

KNet Guidelines

This section provides some advanced guidelines to keep in mind as you add devices to your KNet(s). It's divided into two subsections: one deals with fundamental rules that apply to every KNet, and the other offers a suggestion for handling multiple adjacent KNets.

Observing the Fundamental Rules

Due to limitations in wireless communication, there are a few rules that govern KNets. You should keep these in mind as you add devices to them.

- **Each KNet can only support 50 devices.** Remember that the N4 is one of these devices, so you can really only add 49.

- **Wireless signal can only travel 50 ft.** Note that 50 ft is an ideal figure, only possible if there are no obstructions between devices. (A metal can counts as an obstruction.)

- **Wireless signal can only hop between 12 devices.** Each device on a KNet can relay wireless signal to other devices on the KNet. When the signal bounces from one device to another, it's referred to as a hop. For each device on the KNet, there should be no more than 12 hops between it and the N4.

Fig. 32 shows an example KNet. The dotted line represents wireless signal. The signal originates at the N4, and by hopping between devices, it's able to reach every device. Note that no hop is more than 50 ft, and that each device can be reached by less than 12 hops.
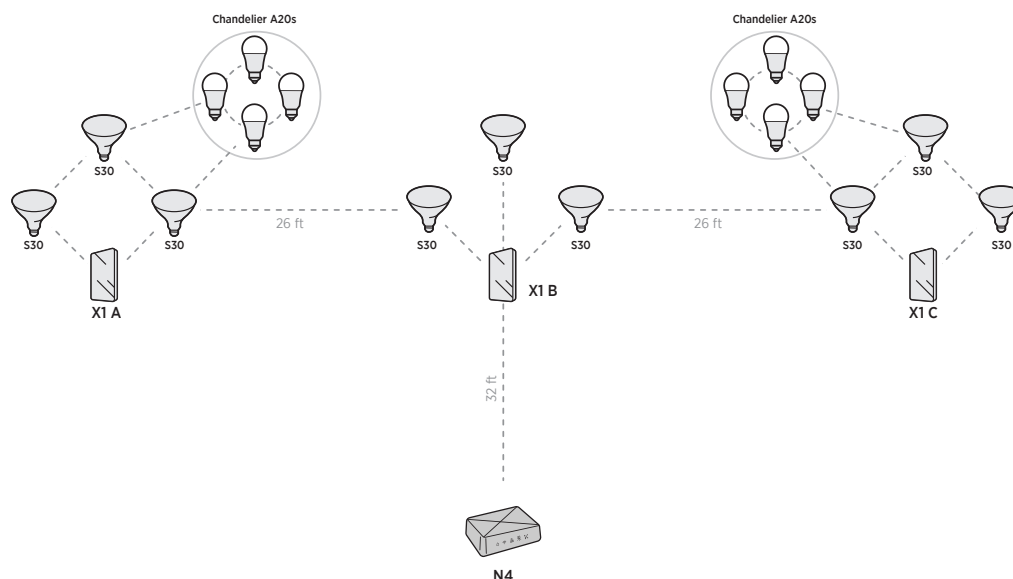
fig. 32

Handling Adjacent KNets

When KNets are physically close together, they can cause mutual interference if they are on the same **channel**. (A channel is a frequency band for the radio communication that takes place on a KNet.) For example, two adjacent N4s that are both on channel 20 can cause mutual communication problems because of their proximity.

You could easily fix both problems by changing the channel of one of the KNets in Design Studio. Instructions for doing so can be found in **Changing a Hub's Channel**, page 30.

Managing Devices

Regrouping Devices

At the top of the **My Devices** panel, Design Studio offers several features that enable you to regroup devices, remove them from groups, and remove them from the installation.
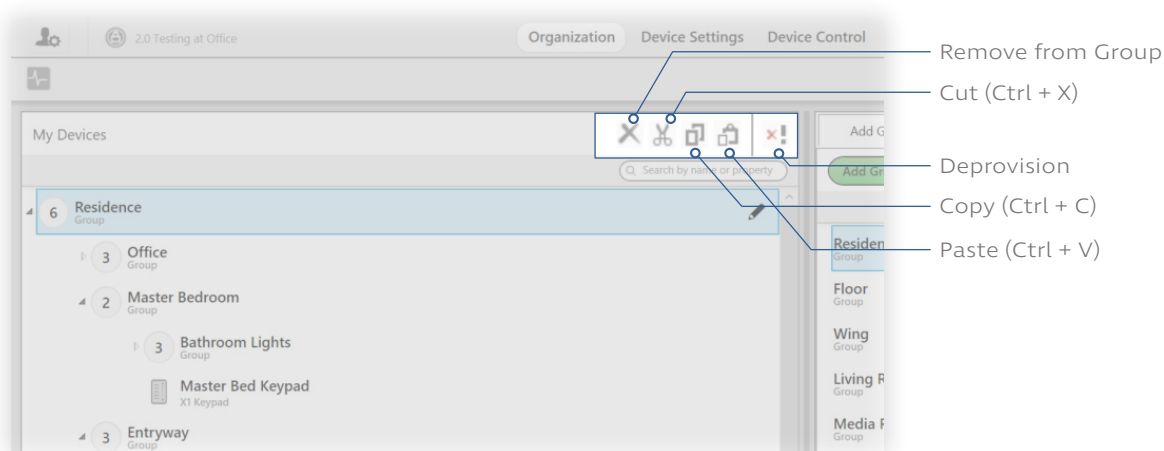
fig. 33

Removing Devices from the Installation

Deprovisioning removes 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. Deprovisioning can also be used to delete virtual devices.

Note: To deprovision an N4 Hub, you need to first deprovision all of its devices. Then expand the **Hubs** section in the **My Devices** panel, select the hub, and click the **Deprovision** button.
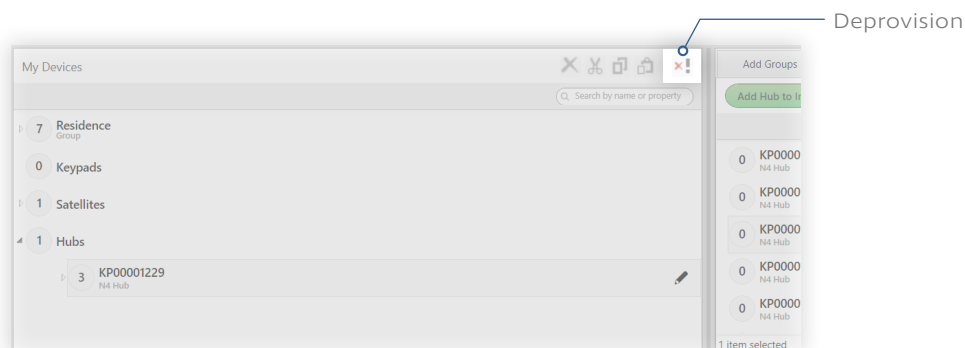
fig. 34

Managing N4 Hubs

Adding Hubs

The Add Hubs tab (pictured in fig. 35) displays any N4s connected to your LAN (Local Area Network).
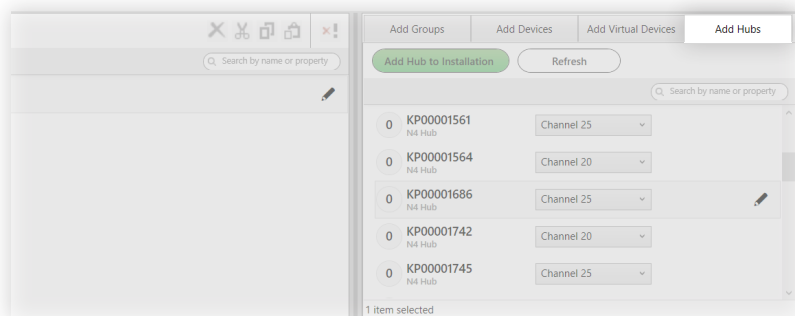
fig. 35

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.

> **Note:** 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 **Find a Missing Device**, page 113.)

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

1   Confirm that the KNet's devices respond to wireless control.

    i   Navigate to the 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   **Select Change Network Channel.**

4   **Select the hub and a new channel, then click** CHANGE. Pick a channel that is at least two channels away from any adjacent KNets.

Diagnostics

In the top-left corner of the Organization tab, you'll see the heartbeat icon to open your first-line diagnostics tool. After opening the tool, click Start. Diagnostics will display a list of every wirelessly-communicating device in your installation. (See fig. 36.) Clicking on any device in the list will cause that device to identify itself: a light will turn to a bright blue, while a controller will flash its indicator lights.
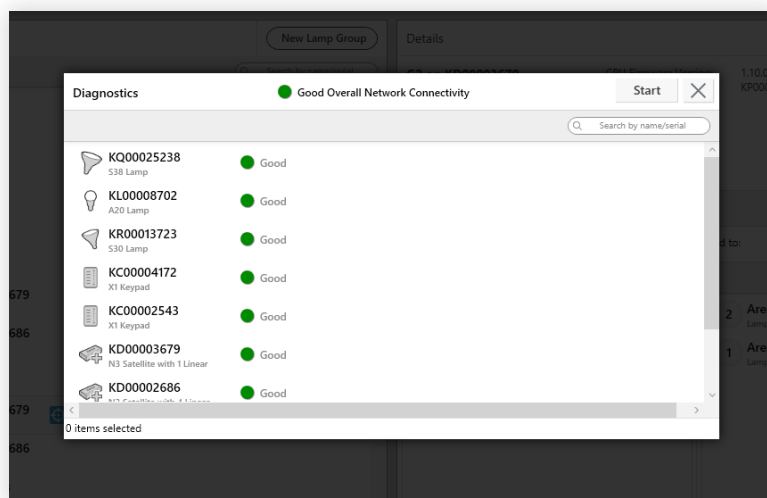
fig. 36

Depending on its signal strength, each device will be marked **green**, meaning good; **yellow**, meaning fair; **red**, meaning poor; or **dark**, meaning unknown. Poor connection indicates that you may need an N2 wireless repeater. Unknown connection could mean your device is not powered on or that it is completely out of range.

Diagnostics will display an alert messages next to any device that has a problem. You can click on the problem's label to open a small dialogue box with more information.

Device Settings

To access Device Settings, click on the Device Settings tab in the top bar. The Device Settings tab, shown in fig. 37, offers you the ability to set static IP addresses for N4s, enable API authentication, and enable Emergency Mode for any quantity of lights in your installation.

> **Note:** This feature may require firmware updates on your devices. See Tech Tool: Updating Device Firmware, page 103.
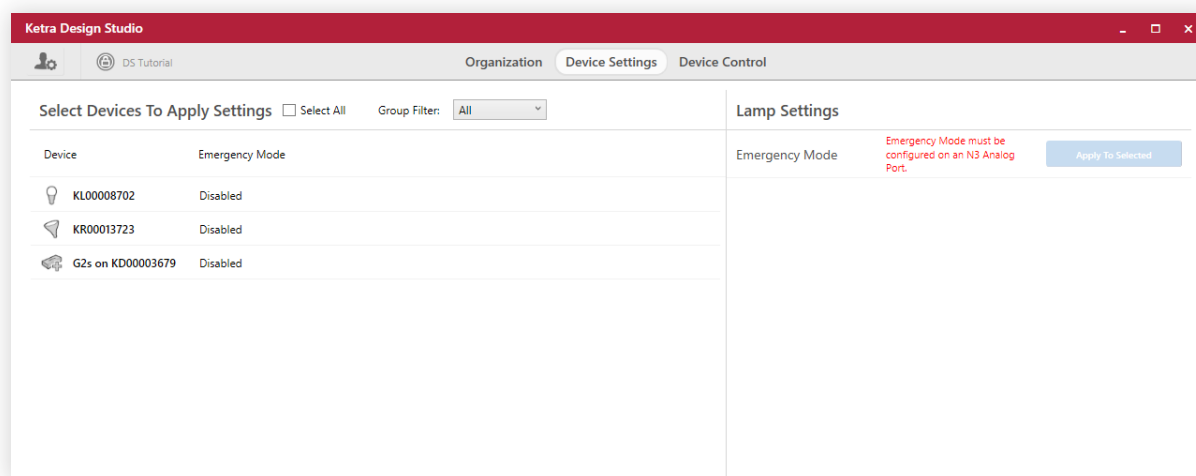
fig. 37

Enabling Emergency Mode

This will only be necessary in buildings with emergency lighting protocols (e.g. protocols to highlight points of egress in case of a power-outage that triggers an emergency generator).

Understanding Emergency Mode

When a third-party emergency device sends a signal to a properly-configured Ketra N3 satellite, the satellite relays that command to any Ketra lights you have enabled emergency mode on.

Upon receiving the signal, these lights will do two important things:

1. **They will automatically revert to their most recent published default.** That means they'll go back to how they were the last time you published new configurations.

    If you're unsure what your lights' most recent published default is, you can go to Device Control > Lamps, select the group in the My Lamp Groups panel (left), and look at the Default Lamp Color Setting.

    If you've never published any changes to your lights, they'll go back to their factory default setting: 3000K at 100% intensity.

2. **They will ignore any state-change commands until the emergency signal has ceased.** That means they can't be changed by Design Studio or a keypad or any time triggers set to occur on a schedule.

Enabling Emergency Mode on Lights

Just follow these steps:

1   Go to Device Control > Integration. Before applying emergency mode to your lights, you have to configure an N3 satellite to receive the emergency signal. This is done in the Device Control tab. You can find the Device Control tab at the top of the screen; the Integration subtab will appear directly beneath it.

2   **Configure a contact-closure analog input on an N3 satellite for emergency mode.** Configure your port so it looks like the example in fig. 38—but note that whether it should be "normally open" or "normally closed" will depend on the emergency device.

    For instructions on configuring contact-closure inputs, see **Setting Up Contact-Closure Inputs**, page 55.
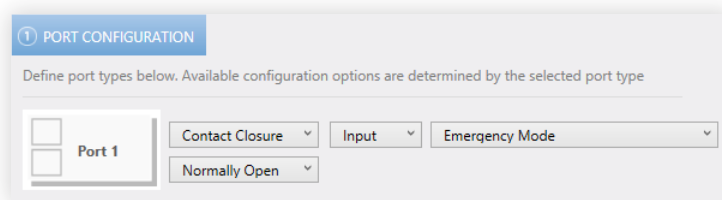
fig. 38

3   Click Publish in the top-right.

4   After returning to the Device Settings tab, select lights to configure for emergency mode. Select lights individually or in bulk from the "Select Devices To Apply Settings" list on the left side of the screen.

5   Set Emergency Mode to Enabled and click Apply to Selected. This takes place in the Lamp Settings pane (see fig. 39). Clicking Apply to Selected will automatically publish emergency mode to the selected lights.
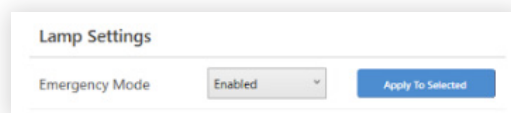
fig. 39

Problems while publishing? See **Problems while Publishing**, page 96.

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	• 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**

> **Note:** 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.

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 can be a security risk since any user on the Wifi network will be able 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.

Configuring Hub IP Address

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

Note: Each N4 on the network requires its own IP address.

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 at left.

4   In the panel at 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.
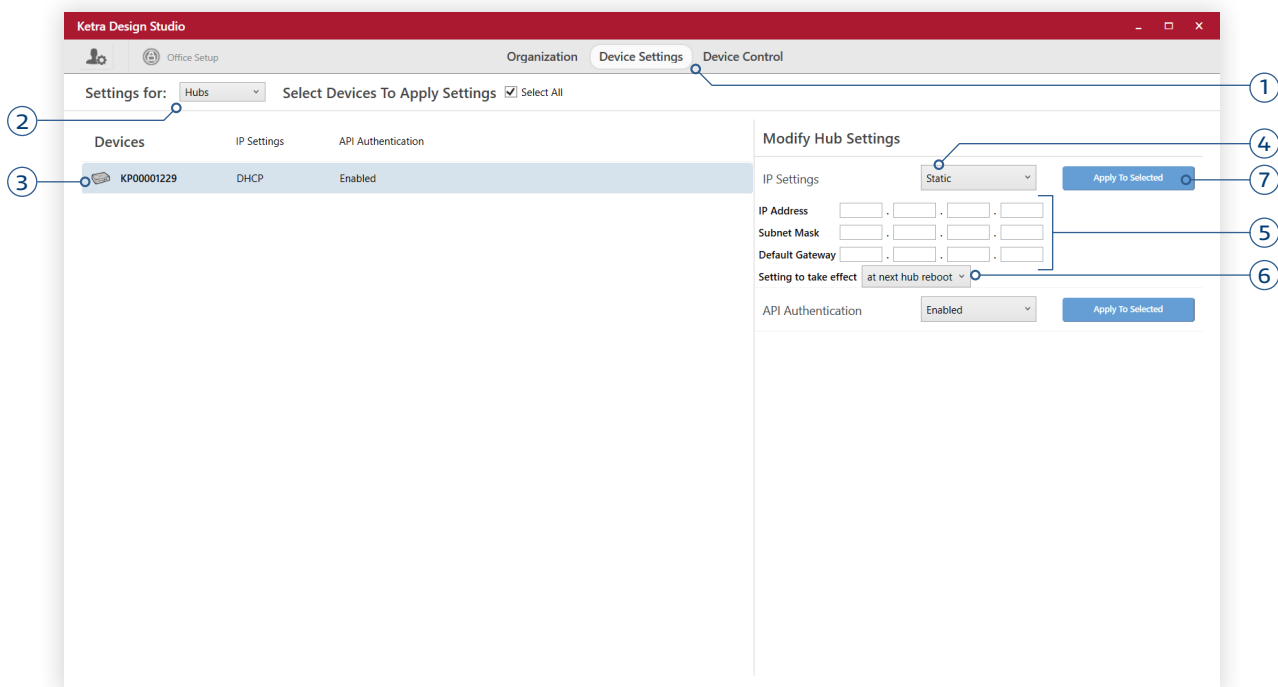
fig. 40

Device Control and Lamps

This section of the manual will deal with the Lamps category, pictured in fig. 41. In Lamps, you set default states for Ketra lights in groups by publishing custom configurations. Your lights will return to their published default states when power-cycled rather than returning to factory settings.

> **Note:** If your installation has a keypad, you will be able to configure groups by scene with all of the same controls available in the Lamps tab. You can skip this section and see **Device Control and Keypads**, page 41.
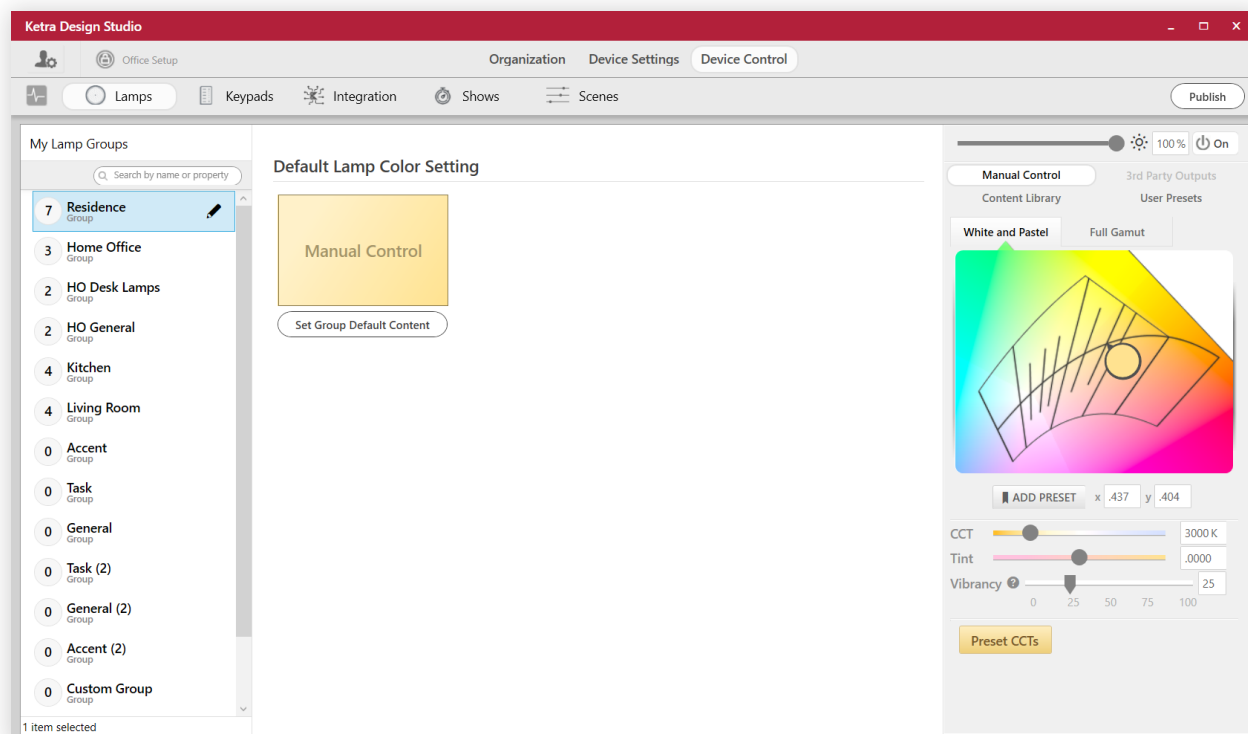
fig. 41

The Lamps tab offers you the ability to:

- **Emulate classic lighting styles and dimming curves.** For easy lighting customization, select from popular presets in the Content Library. Presets include natural and colored light, warm dimming curves, and common lights like incandescents. See **Content Library**, page 40.

- **Control specific parameters of your light.** For advanced customization, use Manual Control instead of the Content Library. In Manual Control, you can select your own color from a color diagram, as well as specifying values for hue, vibrancy, and other parameters. See **Manual Control**, page 38.

- **Save your own presets for later use across installations.** See **User Presets**, page 40.

To get started with configuration, first click on a group in the My Lamp Groups panel.

In the panel on the right side of the screen in fig. 41, you can choose between **Manual Control**, **Content Library**, and **User Presets**. Each of these is discussed in detail below:

- **Manual Control**, page 38

- **Content Library**, page 40

- **User Presets**, page 40

Notice that above all of these options is a sliding scale that controls intensity. You can access that scale from any of the three options.

> **Note:** 3rd Party Outputs 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.

fig. 42

> **Note:** 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. 43.

fig. 43

Manual Control: Custom-Tuning Your Light

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

White and Pastel

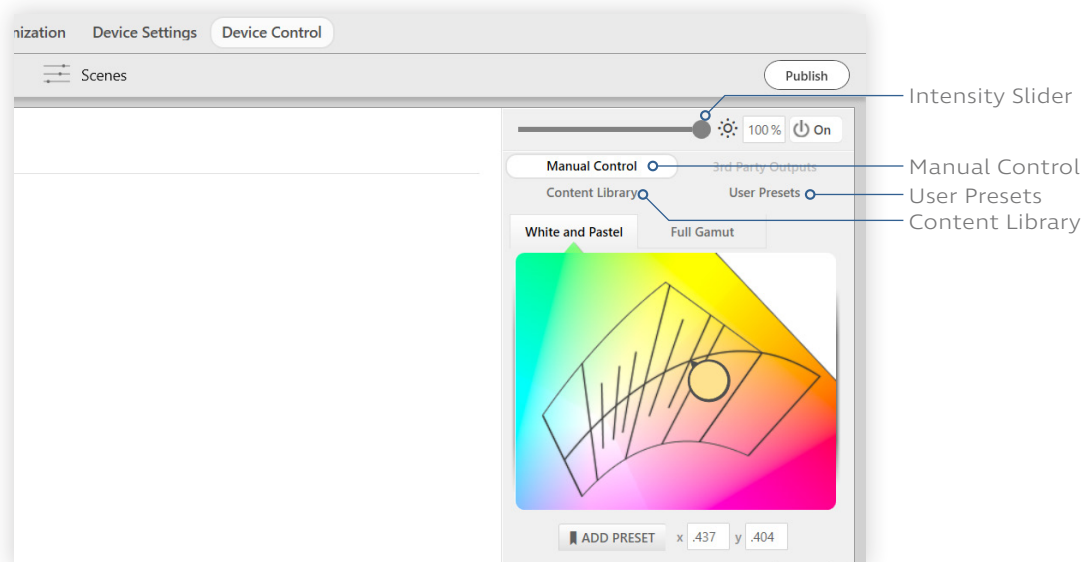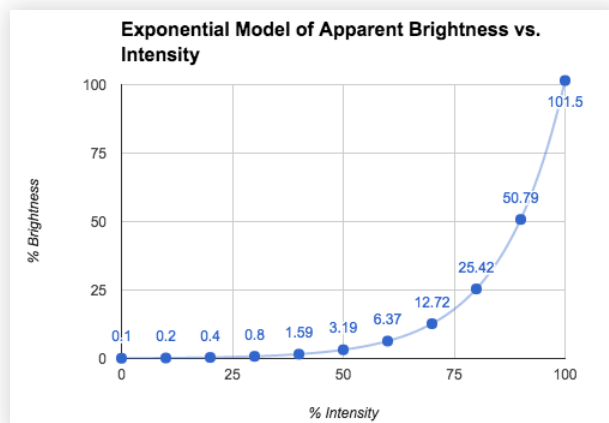White and Pastel, shown in fig. 44, offers you the softer hues at the heart of a chromaticity diagram, which all Ketra lights can match with guaranteed accuracy. The curve at center is the black body locus, representing the changing color of a theoretical black body radiator as its temperature increases in units of Kelvin.
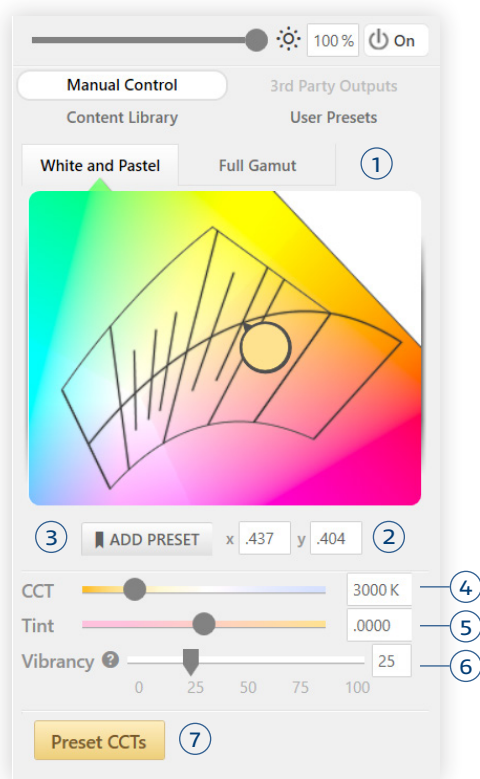
fig. 44

In this section, 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 1700 K, Design Studio may scale down your lights' 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:** To understand vibrancy, be aware that every Ketra emitter has four 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's generated more by the W LED. In either case, the color points and intensity are the same, while the SPD output and CRI change. When vibrancy is closer to 100%, illuminated objects can appear more vibrant.

To save the configurations to the group, click **Publish**. For more information on publishing, see **Publishing**, page 95.

Full Gamut

Full Gamut, shown in fig. 45, offers you coordinates in Ketra's extended gamut of color possibilities.

> **Note:** If any light in your installation shipped before **April 2015**, it may not be able to match colors outside of the restricted gamut, i.e. the dotted lines in the center of the chromaticity diagram. If so, those dotted lines will become a hard boundary for your entire installation.
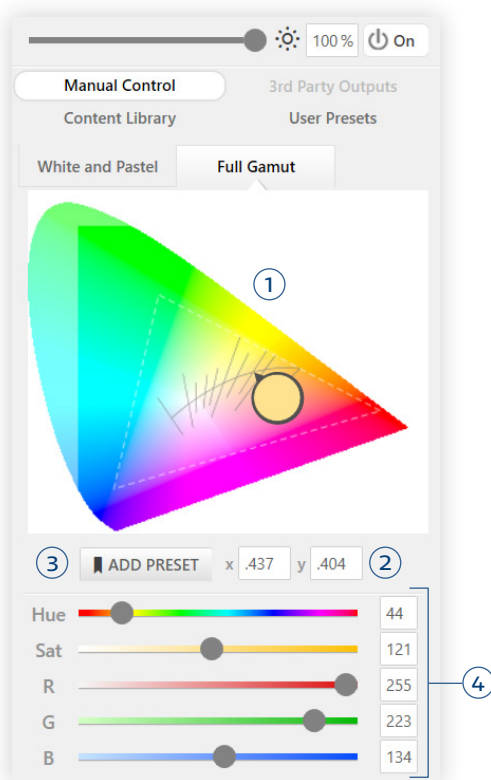
fig. 45

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, Ketra does not guarantee 100% accuracy. You may notice some very slight variation in the color of your lights.

To save the configurations to the group, click **Publish**. For more information on publishing, see **Publishing**, page 95.

Content Library: Selecting from Popular Presets

The **Content Library** displays categories of presets 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. Many Ketra keypads have a "**Natural**" button whose default content setting is a natural show. Alternatively, you can create your own natural shows in the **Shows** tab; see **Creating a Natural Show**, page 69.

As shown in fig. 46, hovering over a preset will give you three icons:

1   **Bookmark a setting**. This saves it 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 published the group.

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

fig. 46

To save the configurations to the group, click **Publish**. For more information on publishing, see **Publishing**, page 95.

User Presets: Selecting from Your Saved Presets

This 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**.

To save the configurations to the group, click **Publish**. For more information on publishing, see **Publishing**, page 95.

Device Control and 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 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.
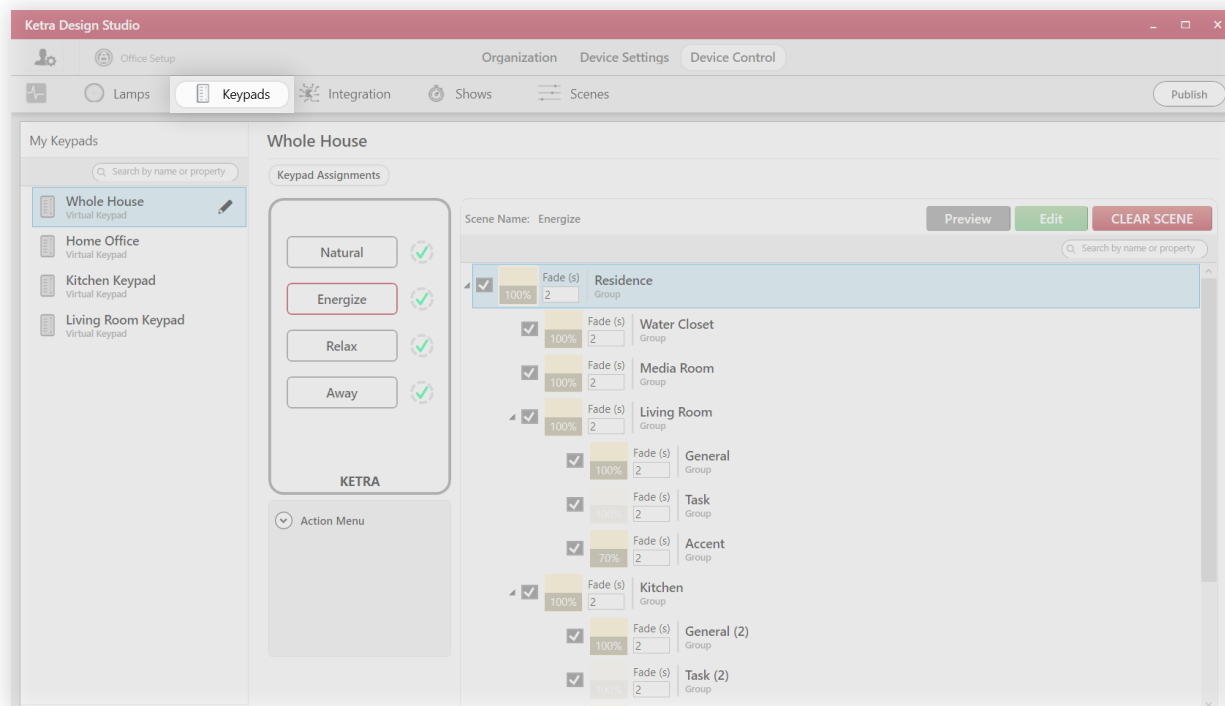
fig. 47

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 Kitchen devices as well as 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.

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.** See fig. 48.
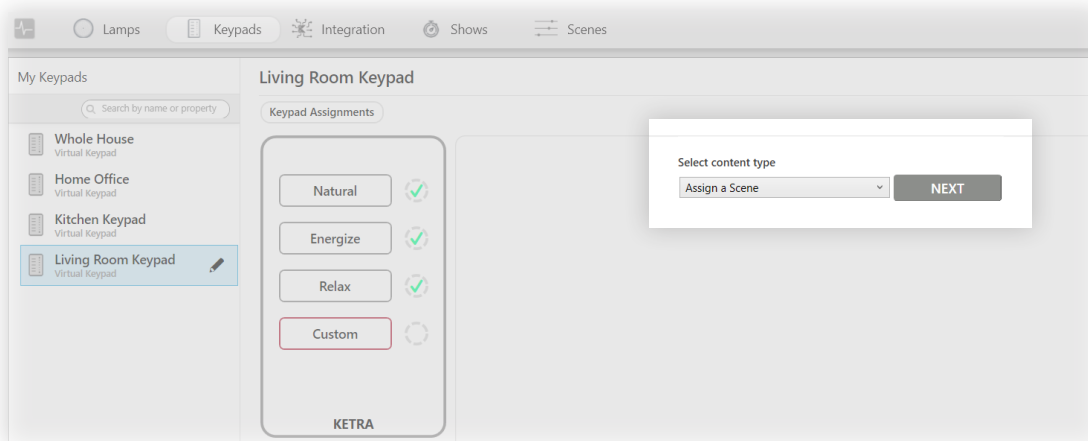
fig. 48

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.
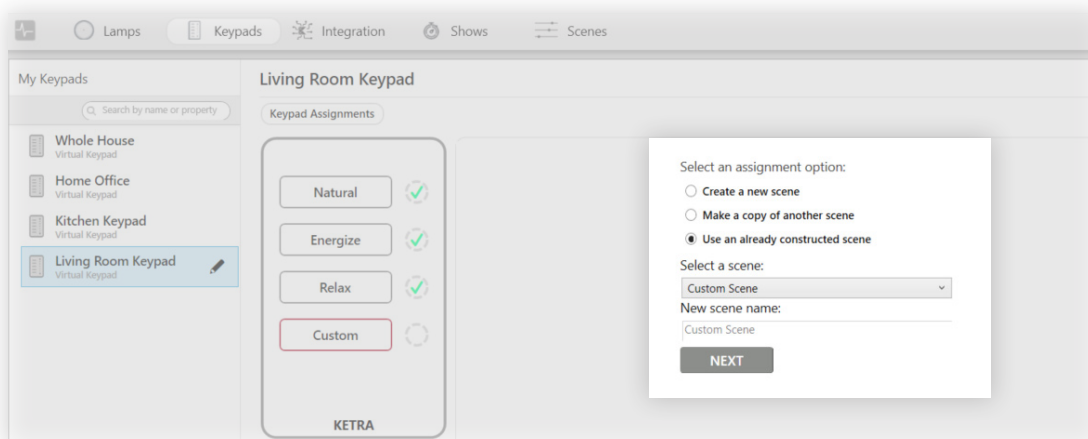
fig. 49

4   **Select or name the scene and click NEXT.**

5 *Optional:* **Use the checkboxes to set which groups can be controlled by the button.** If a group does not have a checkmark, it will ignore any commands from the given keypad button, including activation (when the user triggers the scene), dimming, and deactivation (when the user presses the button for a second time, turning the scene off).

> **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**.

> **Note:** The groups that appear on this screen represent the keypad's place in the grouping hierarchy. Keypads can control their own groups plus any subgroups. If the keypad should control additional groups, return to the **Organization** tab and move the keypad to its appropriate place in the hierarchy.

fig. 50

6 **Publish your settings.** This saves your configurations to your keypad. Click **Publish** in the top-right corner of the screen. For more information on publishing, see **Publishing**, page 95.

Assigning a Show

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

1 On the **Shows** tab: Make sure that the show has been created and assigned to a show group. For details on show groups, see **Show Control**, page 73.

2 On the **Keypads** tab: 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**.

3   Select "Assign a Show" in the content type dropdown, then click **NEXT**. See fig. 51.
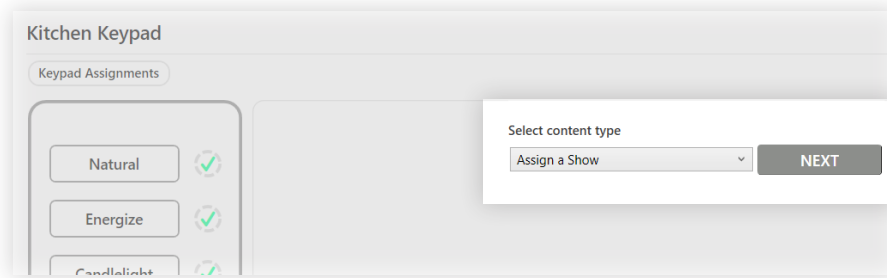
fig. 51

4   **Select a show group ID to assign.** See fig. 52.

5   **Optional: Use the checkboxes to set which groups can be controlled by the button.** If a group does not have a checkmark, it will ignore any commands it receives for the given keypad button: triggering the show will not affect the group.

> **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.

> **Note:** The groups that appear on this screen represent the keypad's place in the grouping hierarchy. Keypads can control their own groups plus any subgroups. If the keypad should control additional groups, return to the **Organization** tab and move the keypad to its appropriate place in the hierarchy.
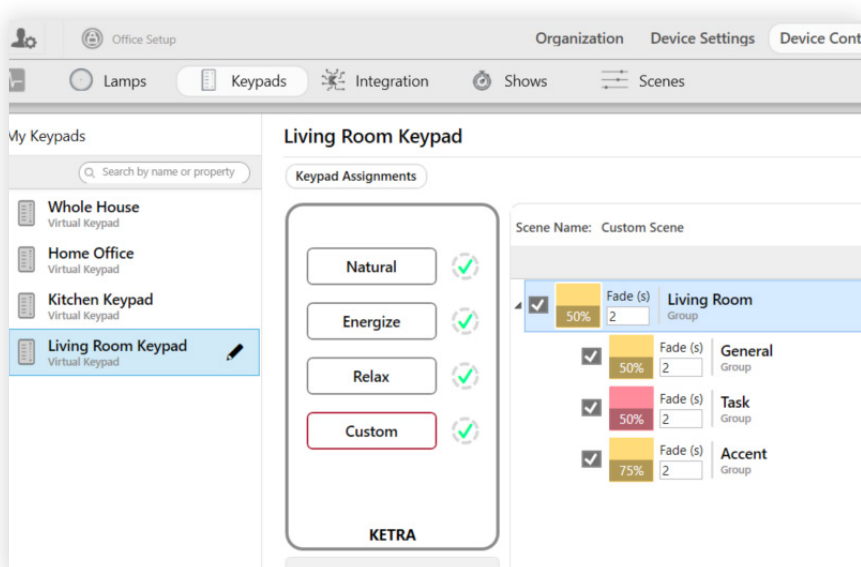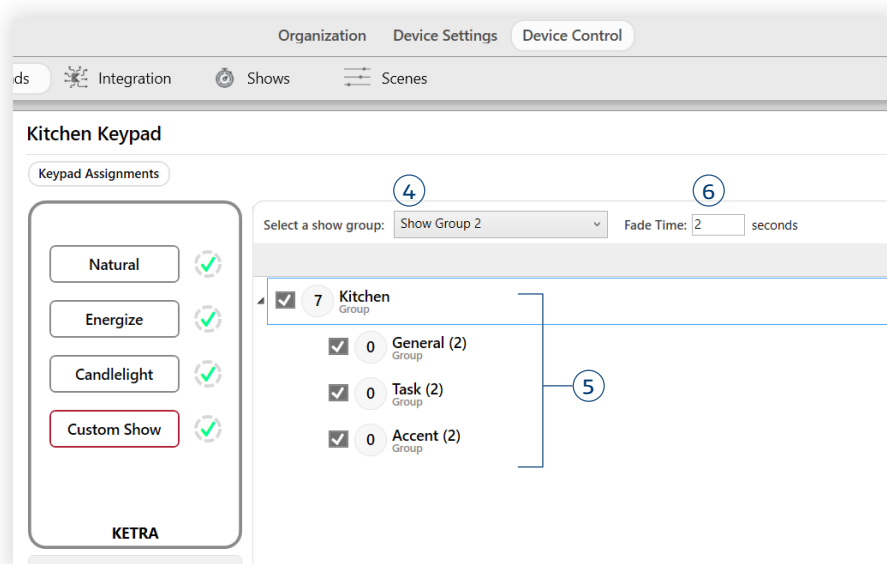

fig. 52

6   *Optional:* Adjust the time it takes to fade between scenes in the show.

7   **Publish your settings.** This saves your configurations to your keypad. Click **Publish** in the top-right corner of the screen. For more information on publishing, see **Publishing**, page 95.

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.

There are several forms of linking:

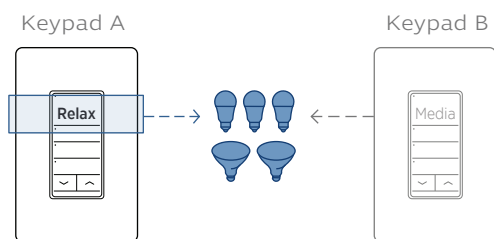- **Cascading:** The buttons control all the same groups using different scenes. Pressing one button causes the other(s) to go dark. See Scenario 1 in fig. 53.

- **Mirroring:** The buttons control all the same groups using the same scene. Pressing one button highlights the other(s). See Scenario 2 in fig. 53.

- **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.

Design Studio links two buttons when it detects a) overlap in the groups they control, or b) overlap in their content settings. For example, see fig. 53.

Scenario 1: Cascading   **Scenario 2: Mirroring**

Keypad A   Keypad B   Keypad A   Keypad B

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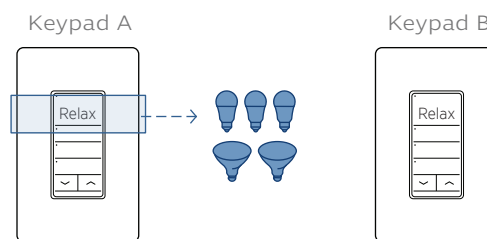
These keypad buttons control the same groups with the same content. Selecting **Relax** on Keypad A causes the **Relax** button on Keypad B to light up.

fig. 53

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.

Use Cases

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.

fig. 54

2 Go to **Device Control** > **Keypads** and select the keypad at left.

The Entryway keypad is in the top-level group, in this case Residence.

fig. 55

3   Program the **Master On/Off** button according to what you want it to do.
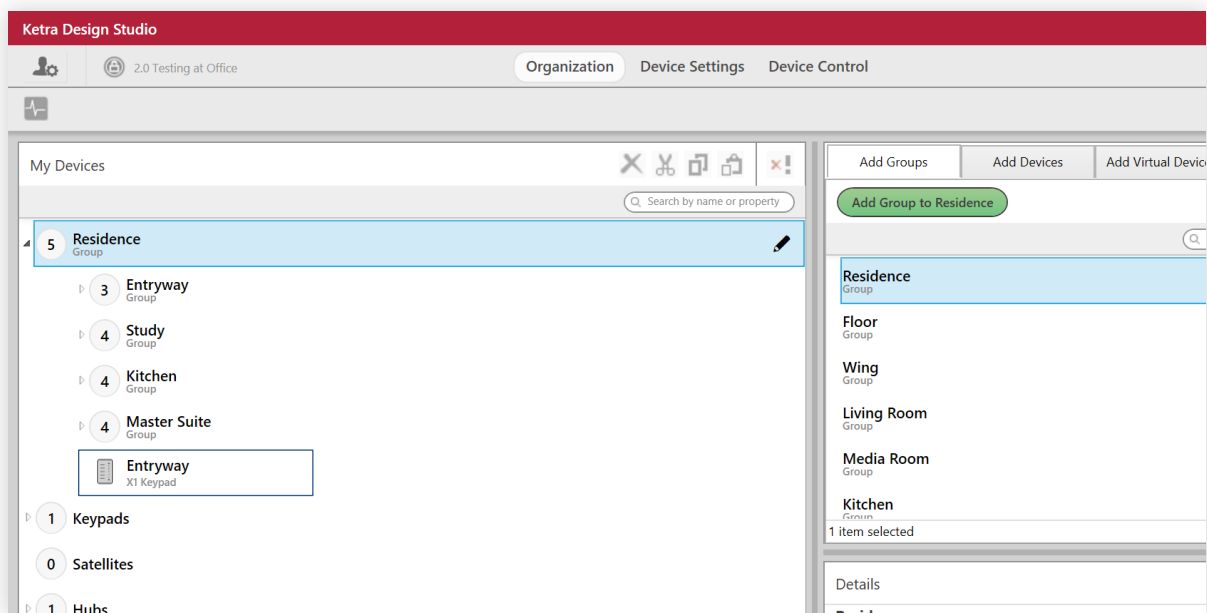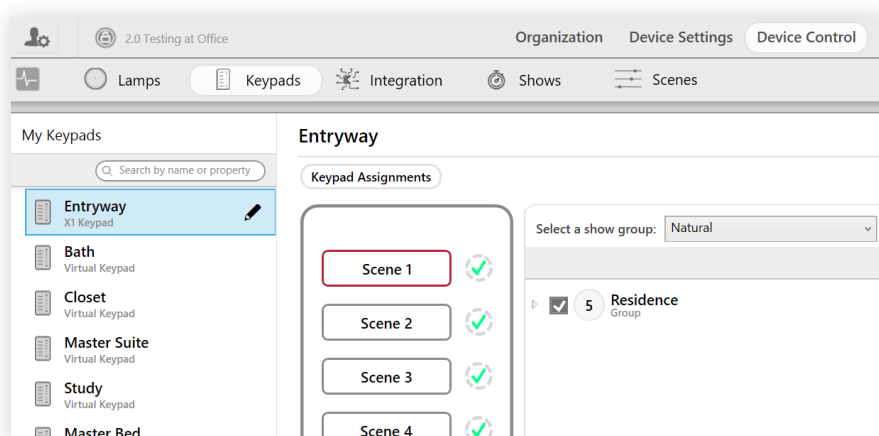
  –   If you want the button to turn on and off every group in the installation, make sure every group is checked. (Pictured, fig. 56)

  –   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.

fig. 56

Note: To exclude a group from a scene, select the scene button in the **Keypads** tab and uncheck the group. (See fig. 57.) 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.
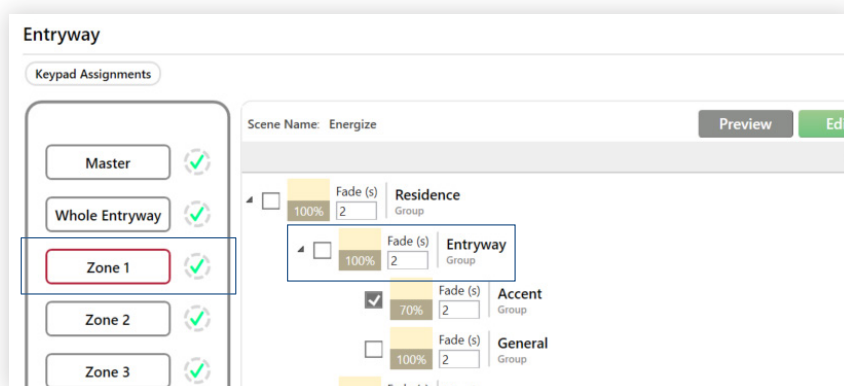
fig. 57

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. See fig. 58. 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.
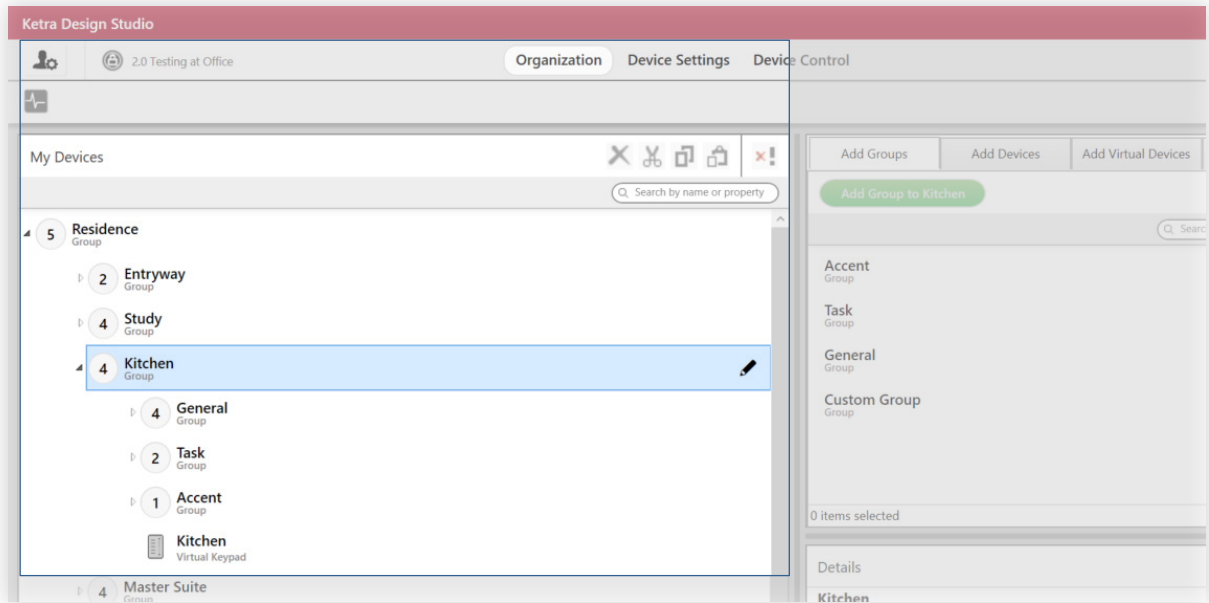
fig. 58

2   Go to **Device Control** > **Keypads** and select the keypad at left. See fig. 59.
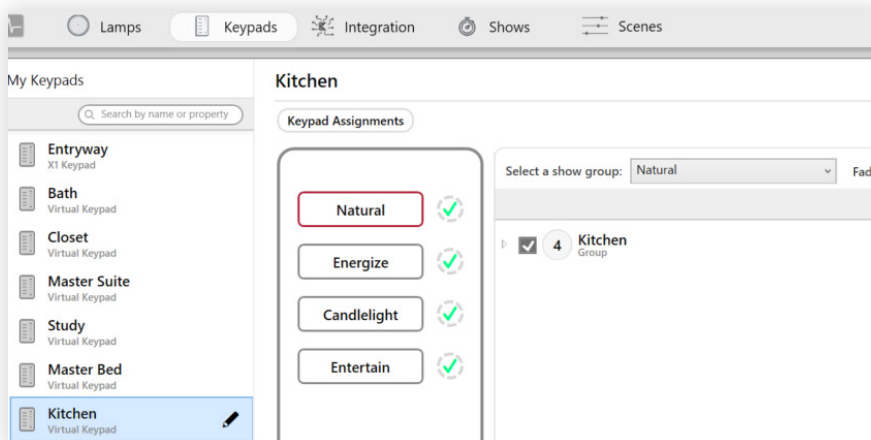
fig. 59

3   **For each button, ensure that only the corresponding zone (group) is checked.** See fig. 60. 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.
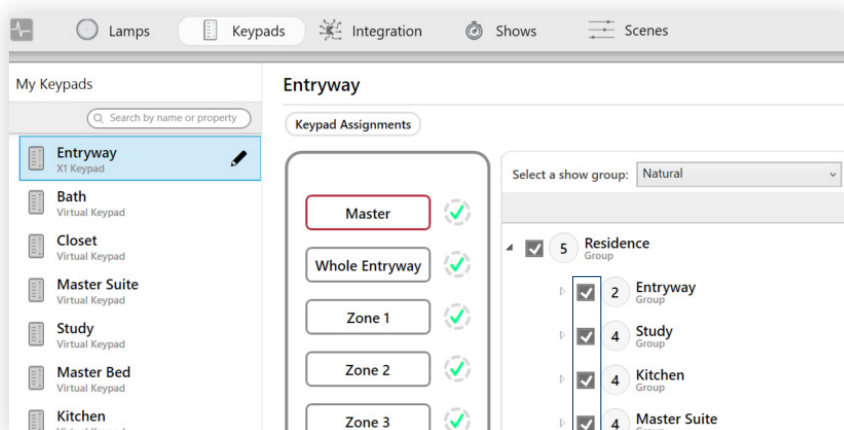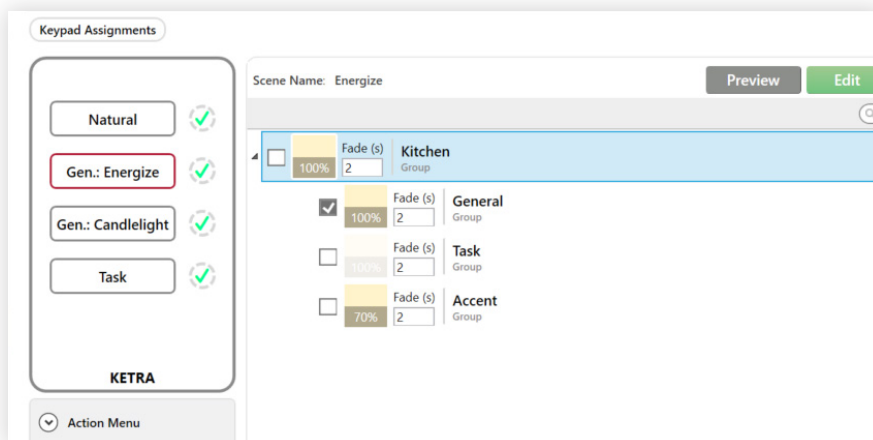

fig. 60

Note: To exclude a group from a scene, select the scene button in the **Keypads** tab and uncheck the group. (See figure 60.) 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 will also be affected by the keypad's dimming controls.

4   *Optional:* **Customize the zone's scene or show.** See fig. 61.
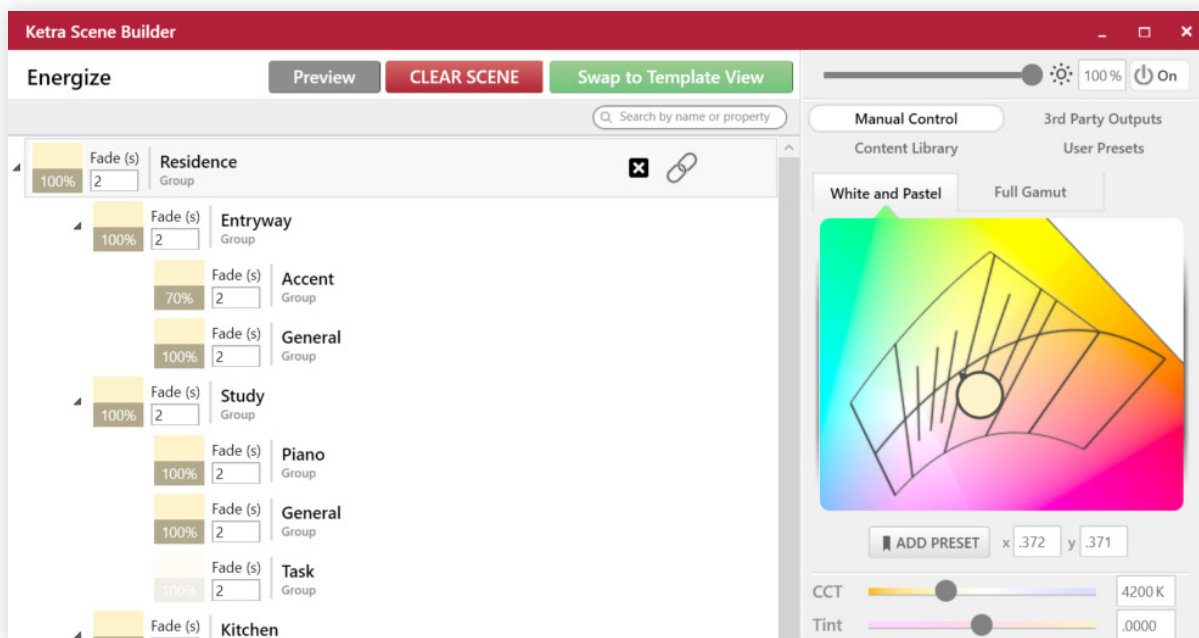
fig. 61

Note: Changing a pre-curated scene affects the scene template, thereby changing other instances of the scene in the installation.

End User: Controlling Discrete Zones on One Keypad

Design Studio 2.0 introduces changes to the keypad interface for X2s.

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. The active zone's button will shine brighter than the other buttons to help the user identify it.

Keypad Button Interactions in 2.0

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 2.0

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

Device Control and Integration

In the Integration tab, you can configure N3 satellites and X2 dimmers. For dimmers, see Dimmer, page 64. Most of this section will walk you through getting the most out of the N3 Satellite, with which you can integrate other companies' lighting systems into a universal Ketra solution. DMX settings and Analog I/O ports are covered in detail here.

> **Note:** Even if a satellite has luminaires attached, it will be available for configuration in the Integration tab.

Configuring DMX Input

The Ketra N3 Satellite can receive a full universe of DMX512-A from an external controller, and relay that control to groups (including lights, analog outputs, and X2 dimmers) in your installation.

In relaying DMX input, the N3 may send a wired signal to attached luminaires or onboard analog outputs, or it may send a wireless signal to unattached groups or other Ketra devices. If your installation requires multiple N3 Satellites to wirelessly relay DMX input, be aware that certain restrictions apply to the number of N3 Satellites that can do so. For more details, see DMX Input Wireless Restrictions, below.

If the installation does not call for multiple N3 Satellites to wirelessly relay DMX input, skip to Instructions: Configuring DMX Input, page 53.

DMX Input Wireless Restrictions

In any Design Studio installation, any number of N3 Satellites can receive DMX Input. Additionally, any number of N3 Satellites can relay that input by wire to attached luminaires, or to analog outputs onboard the same N3.

However, there are restrictions on the number of N3 Satellites that can relay DMX commands *wirelessly* to unattached groups or other Ketra devices.

The restrictions are as shown in fig. 62 (below):

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

Installation a single N4 Hub	Installation uses multiple N4 Hubs
No more than one N3 can wirelessly relay DMX commands.	• 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.)

fig. 62

> **Note:** The rest of this section illustrates the restrictions for installations with multiple N4 Hubs. Skip the rest of this section if your installation uses only one N4 Hub.

Fig. 63 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. 64 shows the same setup slightly altered to be invalid.
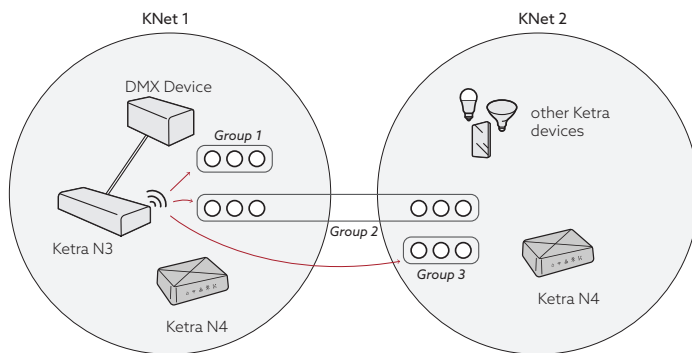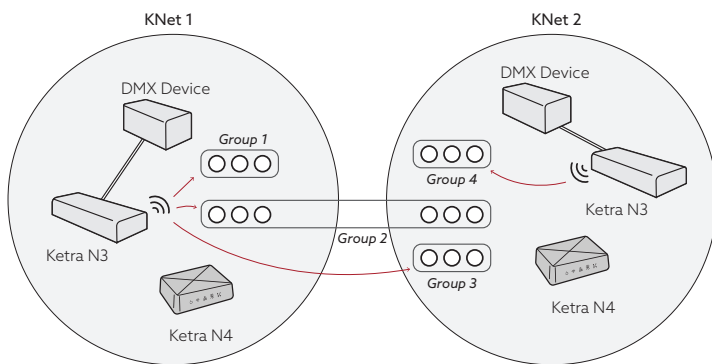

fig. 63

fig. 64

Fig. 63's DMX wireless setup is valid: it meets both rules for installations with multiple N4 Hubs, as described in fig. 62.

Fig. 64'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.

Instructions: Configuring DMX Input

1   On the Integration **tab, select the N3 Satellite you want to configure.** Your list of N3 Satellites can be found in the **My Control Devices** panel, shown in fig. 65.

Integration Tab

My Control
Devices panel
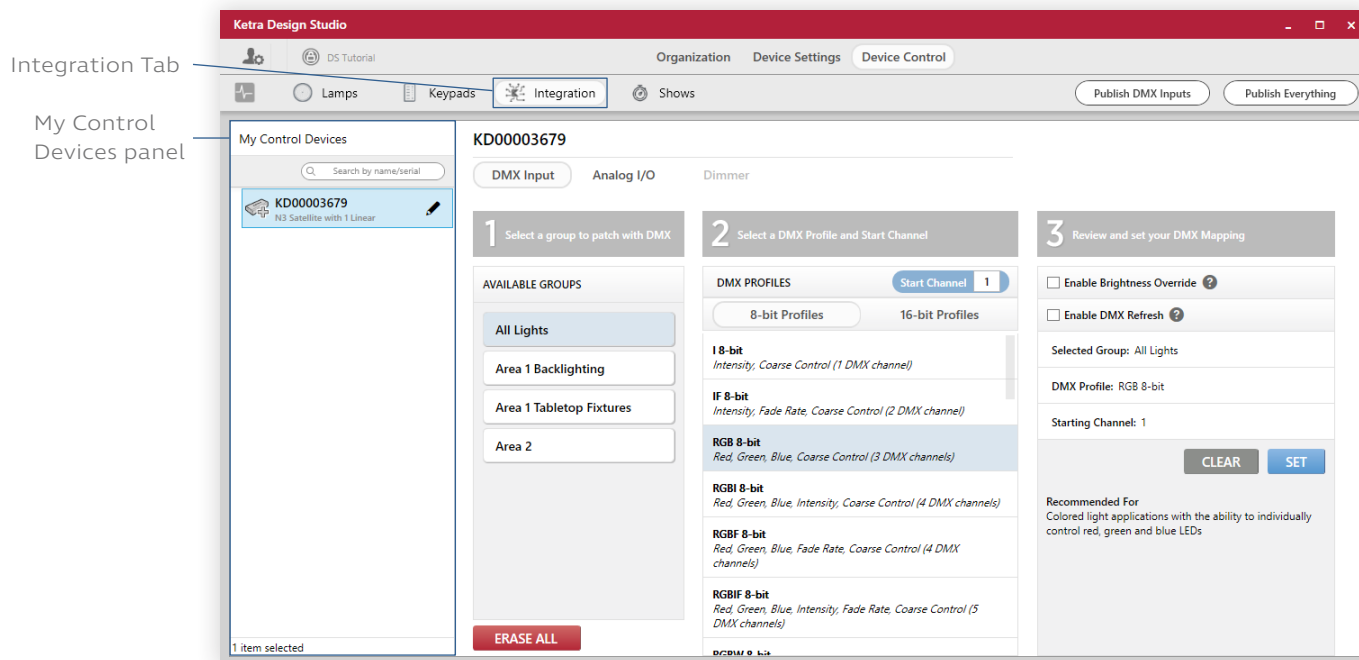
fig. 65

Note: At this step, satellites will not identify themselves by flashing indicator lights when selected.

2   **Select a group to patch with DMX.** In the first enumerated panel, you can find your groups in the pane labeled Available Groups. Groups that contain analog outputs or dimmers, or whose subgroups contain analog outputs or dimmers, can only be controlled by DMX input intensity profiles, meaning the profile list in the second panel will be shorter for them.

Note: If a group is missing from the Available Groups pane, the group may not be adhering to one of the DMX restrictions discussed in **DMX Input Wireless Restrictions**, page 51.

3   **Select a DMX profile and a start channel.** In the second panel, a variety of profiles are listed, each of which is displayed with additional information. You will see the profile's required number of channels, as well a description of the profile and specific details on the right-hand side.

Note: If using a DMX controller to perform fades on your Ketra devices, choose a profile with a **Fade Rate** parameter. If you don't choose a Fade profile, then performing quick fades on the DMX controller side will result in lag time and "steps" in intensity and other parameters. For more information, see Ketra's app note on DMX, **DMX Control Support with Ketra**.

For each type of profile (e.g., RGB), Design Studio offers 8-bit and 16-bit options, accessible using the buttons at the top of the panel. 16-bit takes up two channels per parameter but gives you finer control over your devices. Most applications will only require 8-bit.
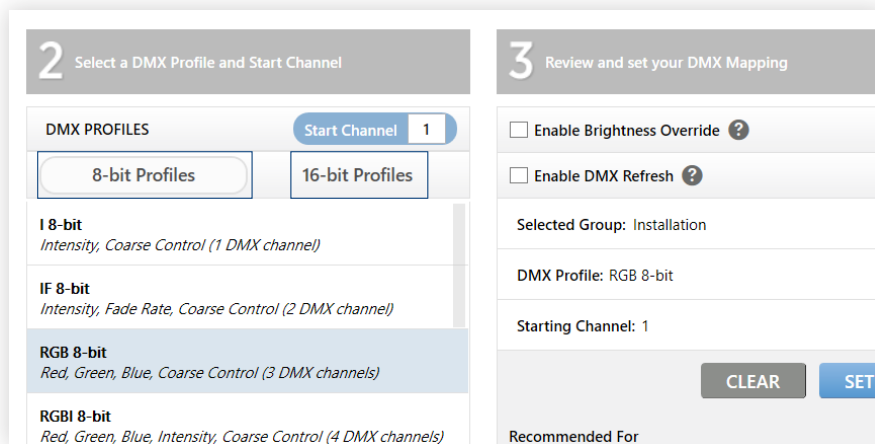

fig. 66

Also select a starting channel for your profile. Make sure your group's starting channel lines up with the DMX controller programming. If the DMX controller is sending out an RGB 8-bit profile starting at channel 212, then your group's starting channel should be 212.

4   **Review your DMX mapping.** In the third panel, your configurations are summarized for you to confirm. There are also a couple of additional options:

–   **Enable Brightness Override:** If you check this box, the N3 Satellite will allow the external DMX controller to have full control of your group's intensity. Intensity commands from the external controller will override any from Ketra devices, such as a keypad running a show.

–   **Enable DMX Refresh:** If you check this box, the N3 Satellite will refresh your group's settings to match the currently active DMX profile every ten seconds.

5   **Click Set.** You will see a checkmark appear next to the group, so you know the setting has been saved.

6   **Set configurations for another group.** Select another group, choose another profile, and select the new starting channel. Click Set to save that setting.

7   **Publish your configurations.** Click Publish. Your information will be sent to your Ketra products, which will begin responding to DMX input. When valid DMX input data are coming in, your N3 Satellite's DMX indicator light will flash.

For more information on publishing, see **Publishing**, page 95.

> **Note:** 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.

Configuring Analog I/O

Analog input and output ports on an N3 can be individually configured. Analog inputs can control groups in your installation based on input from a third-party control device, while analog outputs can be controlled by keypads and relay signals to third-party devices.

Setting Up Contact-Closure Inputs

Ketra only supports sustained contact-closure inputs; momentary contact-closures will not work.

1   **Select the N3 Satellite you want to program.** Your list of N3 Satellites can be found in the **My Control Devices** panel.

> **Note:** At this step, satellites will not identify themselves by flashing indicator lights when selected.

2   **Next, choose the** Analog I/O **tab in** Integration**.** The tab is pictured in fig. 66.

> **Note:** If that tab is grayed out, update your devices' firmware. See **Tech Tool: Updating Device Firmware**, page 103.

3   **For at least one port, expand the** Select Port Type **dropdown and select the Contact Closure option.** See fig. 66 for location.

As soon as you set the port type, three other dropdowns appear, as in fig. 67.

4   **Using the dropdown that defaults to Normally Open, select the closure's normal state.** Each contact-closure port has two states—open and closed—depending on its input. Determining whether the port should be normally open or normally closed should be done with consideration to the external device triggering the contact closure. Some occupancy sensors consider an occupied port to be open; others consider it to be closed.
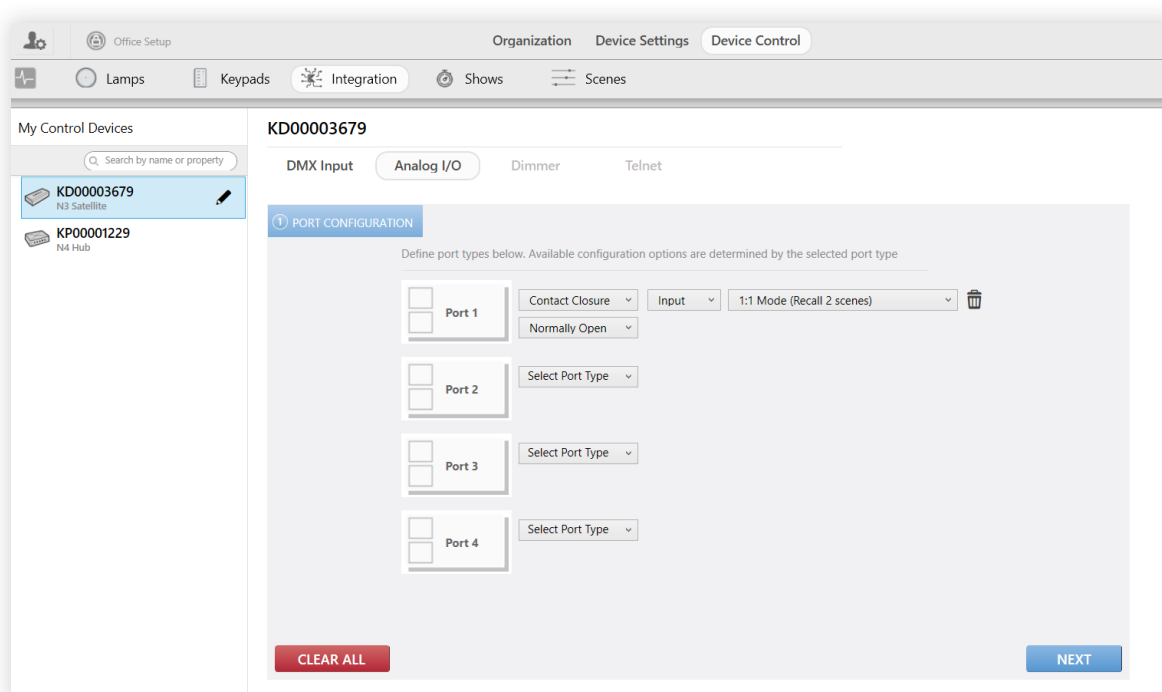

fig. 67

5   **Use the dropdown at right to select a profile for the input.** For an explanation of the options, see the list below.

–   **1:1 Mode:** This allows customization of two scenes: one for the open state, and one for the closed state. Use this profile if the device is not an occupancy sensor or vacancy sensor and it only requires control of two scenes.

–   **Linked Mode:** Linking ports allows customization of more than two scenes: one scene per combination of port statuses. For example, in **3 Port Linked Mode**, you might build a scene each for **Normal-Normal-Normal**, **Switched-Normal-Normal**, etc. Use this profile if the device is not an occupancy sensor or vacancy sensor and it requires control of more than two scenes.

–   **Vacancy Mode (Configure 1 scene):** This allows customization of one scene that will play when the vacancy sensor detects vacancy. (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.) Use this profile if the vacancy sensor will control a space that does not have a keypad.

–   **Vacancy Mode (Linked to Keypad):** This turns off a single keypad (and the keypad's associated groups) when vacancy is detected. All scene buttons will be deselected. If the keypad is an X1 with a power button, the power button will be highlighted. The keypad will remain responsive to touch-based control even while vacancy is detected. Use this profile if the device is a vacancy sensor and the groups to be controlled have been assigned to a keypad.

–   **Occupancy Mode (Configure 2 scenes)**: This allows customization of two scenes: one for when occupancy is detected and one for when it is not. Use this profile if the occupancy sensor will control a space that does not have a keypad.

–   **Occupancy Mode (Linked to Keypad):** This syncs the port to a particular scene button on a particular keypad. The button should already have been assigned a scene or show in the **Keypads** tab. When occupancy is detected, that button will highlight and the associated groups will go to that scene or show. You are also able to set the intensity for the scene or show.

–   **Master Intensity Off Trigger:** This ensures that the selected group(s) go to 0% when the closure is switched, effectively turning the lights off. Use this profile if the device only needs to turn the lighting off.

> **Note:** If using a master intensity trigger on group(s) that are also part of a show, you need to return to the **Shows** tab, select the show, and check **Enable Master Intensity Override** in the show's configuration. See **Setting Important Configurations: Master Intensity Override**, page 76.

–   **Master Intensity On/Off Trigger:** This ensures that the selected group(s) go to 0% intensity when the closure is switched and 100% when it is normal. Use this profile if the device only needs to turn the lighting on and off.

> **Note:** If using a master intensity trigger on group(s) that are also part of a show, you need to return to the Shows tab, select the show, and check Enable Master Intensity Override in the show's configuration. See **Setting Important Configurations: Master Intensity Override**, page 76.

- – **Automated Demand Response:** This profile enables the N3 to dim the entire installation's Ketra lighting (as well as any outputs that control intensity) by a scale factor determined by the programmer. Use this profile if the device is intended for converting a DR signal into a contact-closure output to the Ketra system.

- – **Emergency Mode:** This profile enables the N3 to relay an emergency signal to devices in the installation. Use this profile if the device is an emergency device.

6   Click **NEXT**.

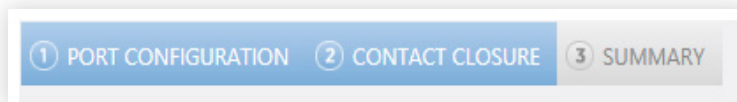> **Note:** The progress bar at the top of the configuration pane should now look like fig. 68.

fig. 68

7   If applicable, customize the scenes, shows, or settings to be triggered by the closure.

> **Note:** If you selected the 1:1 Mode profile, the Default trigger is for the port's normal state, while Trigger 1 is for the port's switched state.

> **Note:** If you chose a linked-ports profile, the trigger numbers correspond in binary to the statuses of the ports for that scene. In binary, 0 signifies the port's normal state, and 1 signifies the port's switched state. For example, Trigger 4 in binary is Trigger 100—that 100 can be interpreted as **Switched-Normal-Normal**. So the scene built for Trigger 4 will be played when Port 1 is switched and Ports 2 and 3 are normal.

8   Click **NEXT**.

9   **Review the summary and publish your settings.** Click Publish in the top-right to save your configurations to your devices. Your changes will take effect as soon as they're published. You can also click EDIT to return to port configuration.

For more information on publishing, see **Publishing**, page 95.

Setting Up 0-10V or 0-24V Inputs

To configure your N3 Satellite for 0-10V or 0-24V inputs, follow these steps:

1   **Select the N3 Satellite you want to program.** Your list of N3 Satellites can be found in the **My Control Devices** panel, as in fig. 69.

> **Note:** At this step, satellites will not identify themselves by flashing indicator lights when selected.

2   **Choose the** Analog I/O **tab in** Integration.

> **Note:** If that tab is grayed out, update your devices' firmware. See **Tech Tool: Updating Device Firmware**, page 103.
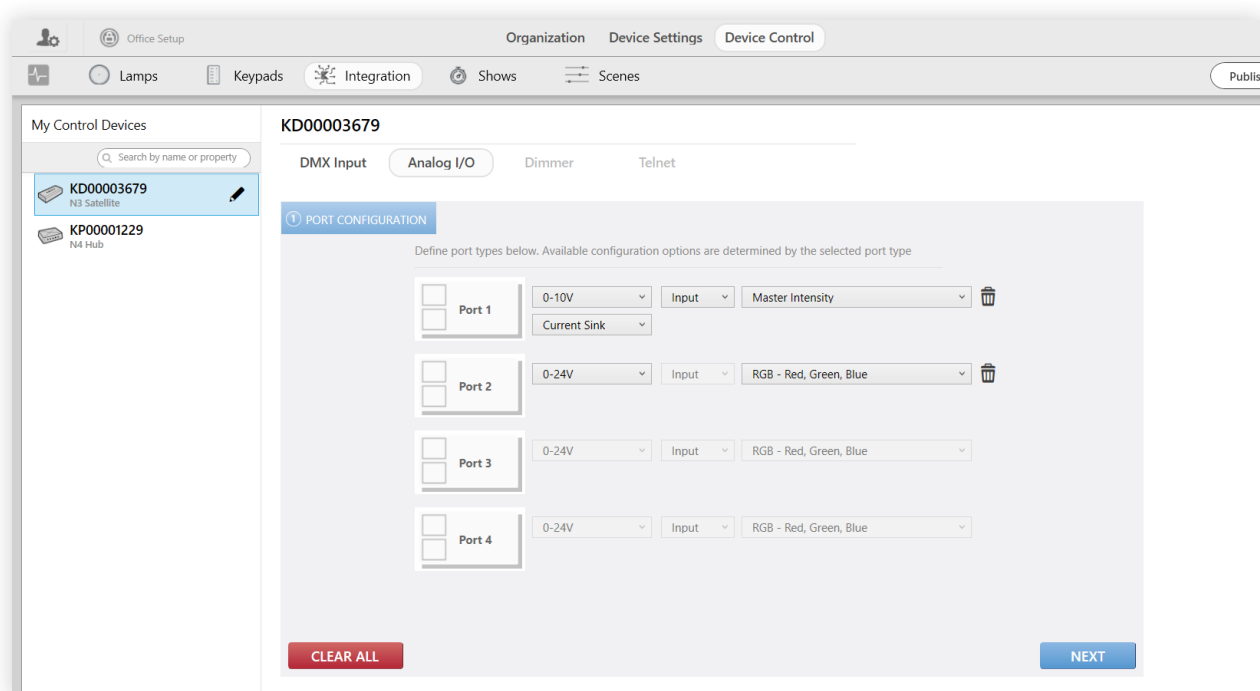

fig. 69

3   For at least one port, expand the Select Port Type dropdown and select 0-10V or 0-24V.

As soon as you set the port type, additional dropdowns appear, as in fig. 69.

4   *0-10V only:* **Using the dropdown that defaults to Current Sink, select the port's current.** Current source should be used when connecting to dimmers, photosensors, or other similar devices. Current sink should be used when interfacing with theatrical consoles.

5   **Use the dropdown at right to select a profile for the input.** For an explanation of the options, see the list below.

–   **Master Intensity:** This profile makes the master intensity of the selected groups proportional to the amount of voltage received at the port. **Use this profile if** the device is not a photosensor, occupancy sensor, or vacancy sensor and you do not intend to control the lighting's color, vibrancy, or tint.

> **Note:** If using a master intensity trigger on group(s) that are also part of a show, you need to return to the Shows tab, select the show, and check **Enable Master Intensity Override** in the show's configuration. See **Setting Important Configurations: Master Intensity Override**, page 76.

–   **RGB, RGBI, RGBW, CCT, CCTI, CCTDuvI:** These profiles make the color, intensity, vibrancy, and/or tint of the selected groups proportional to the amount of voltage received at each port. **Use one of these profiles if** you want to control the lighting's color with the external device.

•   **RGB:** Requires three ports. Syncs the Red, Green, Blue values to the voltage received at the respective ports.

•   **RGBI:** Requires four ports. Syncs the Red, Green, Blue, and Intensity values to the voltage received at the respective ports.

•   **RGBW:** Requires four ports. Syncs the Red, Green, Blue, and White (vibrancy) values to the voltage received at the respective ports.

•   **CCT:** Requires one port. Syncs the CCT (color temperature, range of 2000K-9970K) value to the voltage received at the port.

•   **CCTI:** Requires two ports. Syncs the CCT (range of 2000K-9970K) and Intensity values to the voltage received at the respective ports.

•   **CCTDuvI:** Requires three ports. Syncs the CCT (range of 2000K-9970K), Duv (tint), and Intensity values to the voltage received at the respective ports.

–   **Occupancy Mode (Configure 2 scenes):** This allows customization of two scenes: one for when occupancy is detected and one for when it is not. **Use this profile if** the occupancy sensor will control a space that does not have a keypad. If the space does have a keypad, use **Occupancy Mode (Linked to Keypad)**.

–   **Vacancy Mode (Configure 1 scene):** This allows customization of one scene that will play when the vacancy sensor detects vacancy. (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.) **Use this profile if** the vacancy sensor will control a space that does not have a keypad. If the space does have a keypad, use **Vacancy Mode (Linked to Keypad)**.

–   **1:1 Mode:** This allows customization of two scenes: one for 0V and one for 10V. **Use this profile if** the device is not a photosensor, occupancy sensor, or vacancy sensor, and it only requires control of two scenes.

– **Linked Mode:** Linking ports allows customization of more than two scenes: one scene per combination of port statuses. For example, in 3 Port Linked Mode, you might build a scene each for 0V-0V-0V, 10V-0V-0V, etc. **Use this profile if** the device is not a photosensor, occupancy sensor, or vacancy sensor, and it requires control of more than two scenes.

– **Intensity:** This profile makes the intensity of the selected groups proportional to the amount of voltage received at the port. **Use this profile if** the device is a non-Ketra photosensor.

– **Master Intensity On/Off Trigger:** This ensures that the selected group(s) go to 0% intensity when the port receives 0V and 100% when it receives 10V/24V. **Use this profile if** the 0-10/24V device only needs to turn the lighting on and off.

> **Note:** If using a master intensity trigger on group(s) that are also part of a show, you need to return to the Shows tab, select the show, and check Enable Master Intensity Override in the show's configuration. See **Setting Important Configurations: Master Intensity Override**, page 76.

– **Master Intensity Off Trigger:** This ensures that the selected group(s) go to 0% when the port receives 0V, effectively turning the lights off. **Use this profile if** the 0-10/24V device only needs to turn the lighting off.

> **Note:** If using a master intensity profile on group(s) that are also part of a show, you need to return to the Shows tab, select the show, and check Enable Master Intensity Override in the show's configuration. See **Setting Important Configurations: Master Intensity Override**, page 76.

– **0-10V only: Ketra Dimming Photocell:** This grants a photosensor control over the selected groups' intensity (not master intensity). **Use this profile if** the device is a Ketra photosensor and the groups to be controlled have been assigned to a keypad.

– **0-10V only: Ketra Dimming Photocell (Master Intensity):** This grants a photosensor control over the selected groups' intensity (not master intensity). **Use this profile if** the device is a Ketra photosensor and the groups to be controlled have NOT been assigned to a keypad.

> **Note:** If using a master intensity profile on group(s) that are also part of a show, you need to return to the Shows tab, select the show, and check Enable Master Intensity Override in the show's configuration. See **Setting Important Configurations: Master Intensity Override**, page 76.

– **Vacancy Mode (Linked to Keypad):** This turns off a single keypad (and the keypad's associated groups) when vacancy is detected. The keypad's power button will be highlighted instead of any scene buttons. The keypad will remain responsive to touch-based control even while vacancy is detected. **Use this profile if** the device is a vacancy sensor and the groups to be controlled have been assigned to a keypad.

– **Occupancy Mode (Linked to Keypad):** This syncs the port to a particular scene button on a particular keypad. The button should already have been assigned a scene or show in the Keypads tab. When occupancy is detected, that button will highlight and the associated groups will go to that scene or show. You are also able to set the intensity of the scene or show for when the lights turn on. **Use this profile if** the device is an occupancy sensor and the groups to be controlled have been assigned to a keypad.

6   Click **NEXT**.

> **Note:** The progress bar at the top of the **configuration** pane should now look like fig. 70.

fig. 70

7   **Set additional configurations for your input profile.** The configurations on this screen will vary depending on the profile you chose.

> **Note:** If the device is a photosensor meant to control both primary and secondary daylit zones, use one group for the primary zone and another group for the secondary zone, then set different trims. For the primary daylit zone group, set a lower low trim than for the secondary zone group. For an explanation of trims, see the note below.

> **Note:** Depending on the profile, you may be asked to set a high and low trim for a group. The low trim is the intensity level when the port receives 0V, and the high trim is the intensity level when the port receives 10/24V. That means that if you set a low trim of 50%, receiving 0V will cause the group to go to 50% intensity.

8   Click **NEXT**.

9   **Review the summary and publish your settings.** Click **Publish** in the top-right to save your configurations to your devices. Your changes will take effect as soon as they're published. You can also click **EDIT** to return to port configuration.

For more information on publishing, see **Publishing**, page 95.

Setting Up Analog Outputs

Analog outputs are programmed through Design Studio for an N3 Satellite. The Ketra system treats each output as a device in the installation; enables outputs to be incorporated into scenes that can be triggered by keypads, shows, or analog inputs. When the N3 receives input from one of those sources, it delivers wired information to the external device.

To configure analog output, follow these steps:

1   **Select the N3 Satellite you want to program.** Your list of N3 Satellites can be found in the **My Devices** panel.

> **Note:** At this step, satellites will not identify themselves by flashing indicator lights when selected.

2   **Choose the** Analog I/O **tab in** Integration.

> **Note:** If that tab is grayed out, it is because your N3 Satellite needs a firmware upgrade. See **Tech Tool: Updating Device Firmware**, page 103.

3   **Configure the port(s).** Choose between contact-closure and 0-10V; then choose **Output**. If you are configuring a contact-closure output, choose whether it is normally open or closed. Conversely, if you are configuring a 0-10V output, choose whether the port is a current sink or a current source. See fig. 71.

You now have the option to name your output. We recommend renaming the output so you can distinguish between multiple if needed.
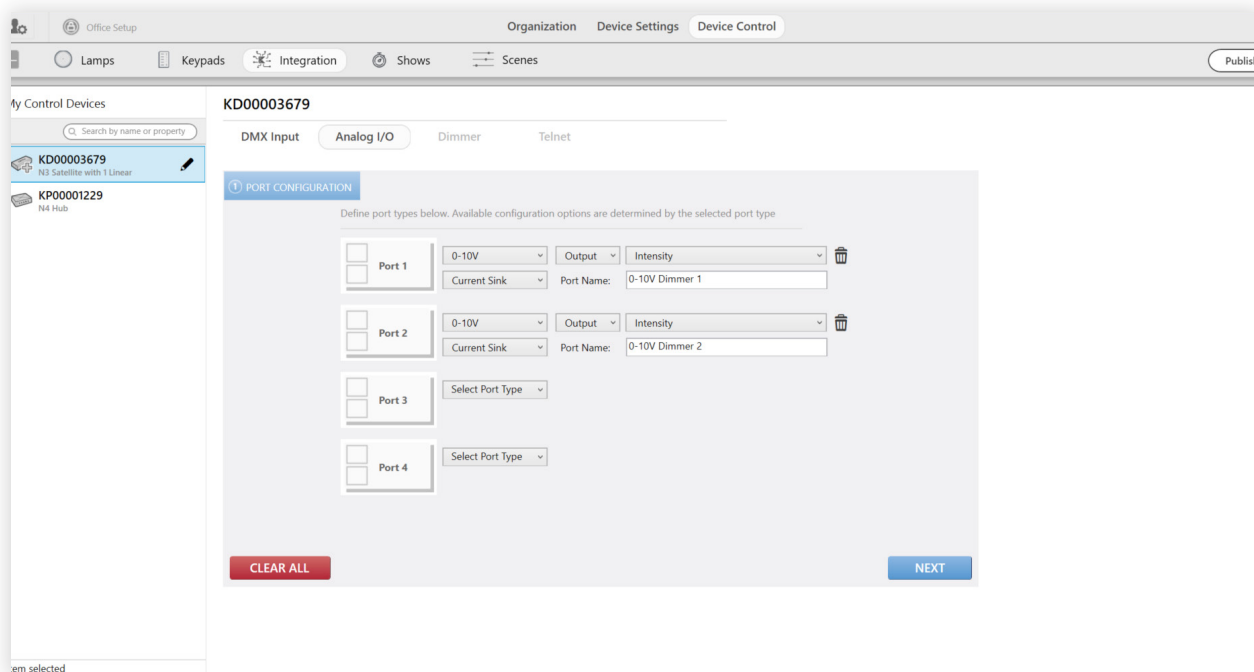

fig. 71

4   Click **Next**.

5   0-10V profiles only: Set the voltage thresholds at which the contact closure should turn on and off.
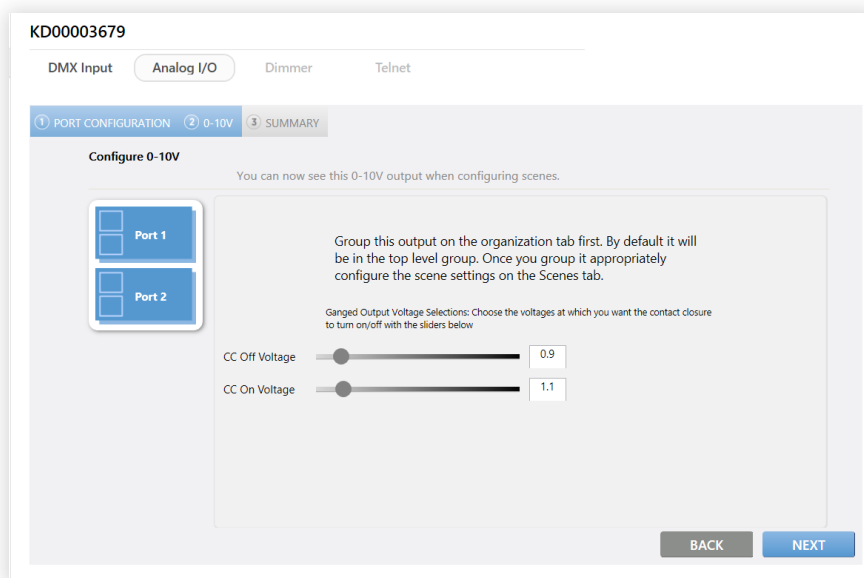
fig. 72

6   On the Organization tab, move the outputs to their appropriate place in the groups hierarchy. Use the Cut, Copy, and Paste buttons to move the outputs between groups.
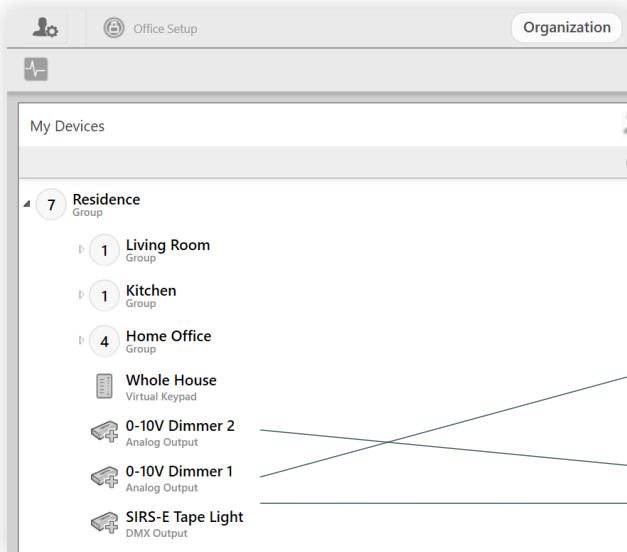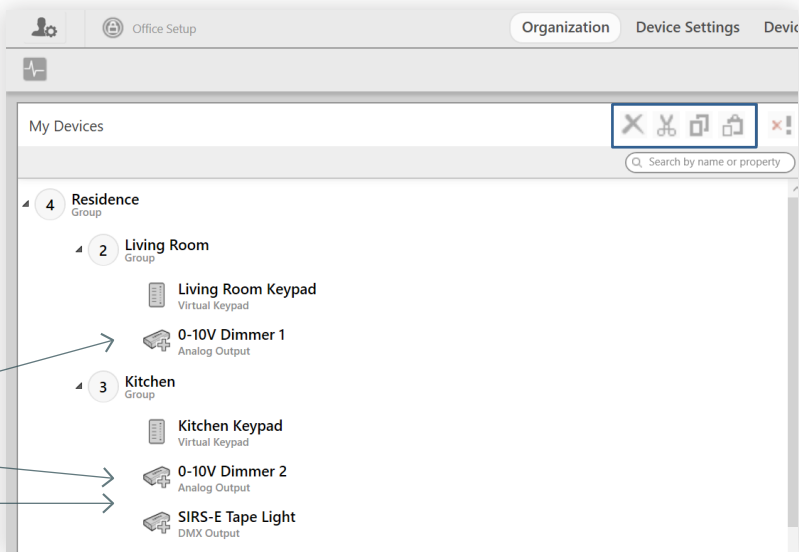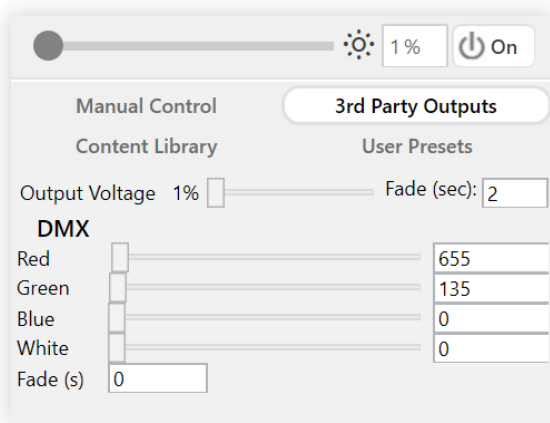

fig. 73

fig. 74

7   Return to Device Control and incorporate your outputs into scenes and shows. As in any other scene, you may use Tree View or Template View. You can use the Content Settings pane (right side of screen) to set lights' color and intensity as well as the third party outputs' settings.

Settings for 0-10V Output and DMX

fig. 75

8   Publish your settings by clicking Publish in the top-right. Your changes will take effect as soon as they're published.

For more information on publishing, see **Publishing**, page 95.

Configuring Dimmers

Ketra's X2s equipped with onboard dimmers are capable of modulating the power supply to incandescent loads. The Dimmer tab in Integration contains a couple of advanced and purely optional configurations. You will only need to use them if:

* You want to set high or low trims for non-Ketra lights.

* You want to use different dimming curves for non-Ketra lights.

To configure a dimmer, follow these steps in the **Dimmer Configuration** pane, which is pictured in fig. 76:

1   **Assign a new Dimmer Name.** This is *optional*. The name is what you will refer to the dimmer by when you are building a scene or show with it later.

2   **Set a Dim Curve.** Three curve options are available: **Ketra**, **Linear**, and Square Law. The default is Ketra. Certain load types look better with certain curves; for example, incandescents look best with square law.

   Linear dimming curves match input with voltage so that a 10% increase in intensity leads to a 10% increase in voltage. Square law dimming curves enhance the visibility of intensity adjustment at low levels. Ketra's dimming curve is exponential.
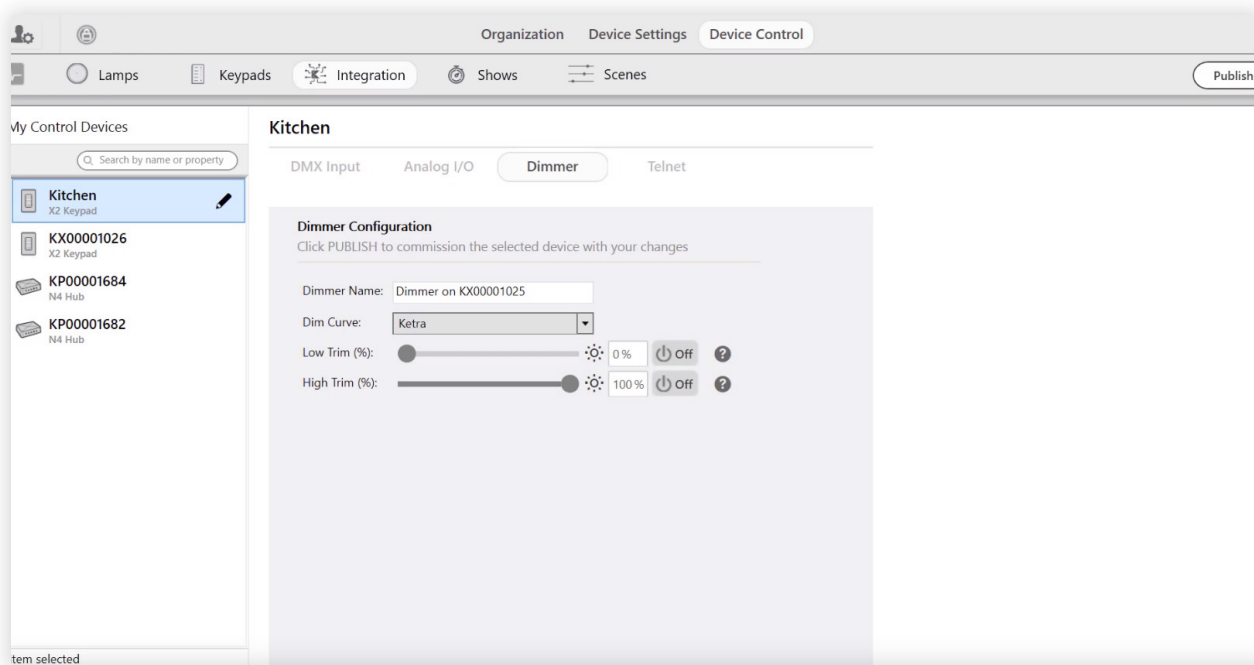

fig. 76

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

3   **Set 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. Dimming 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.

For some kinds of lights, low trims are necessary because the light is not capable of dimming 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.

4   **Publish your settings by clicking** Publish**.** Once published, your settings will take effect.

For more information on publishing, see **Publishing**, page 95.

Telnet Integration (Lutron)

N4 Hubs connect to the Lutron Homeworks QS processor by telnet. The Telnet tab in Device Control > Integration enables you to:

*   Export a Design Studio command set to a local file or files. Once imported into Homeworks QS, the command set enables Lutron control sources to play scenes and shows on Ketra groups, dim them, and toggle their power.

*   Enable an N4 for input over Telnet. This is how Lutron commands will reach your N4, which will in turn propagate the commands wirelessly to Ketra devices.

Note: It is only necessary to connect one N4 Hub to the Homeworks QS database even when utilizing multiple N4s. The telnet-enabled N4 will relay commands to the other N4s on the Ketra network, enabling HomeWorks QS to communicate with the entire Ketra system. If the exported command set is over 1500 commands it will be broken up into multiple lists. One N4 is required to be added into the HomeWorks QS database for each command list.
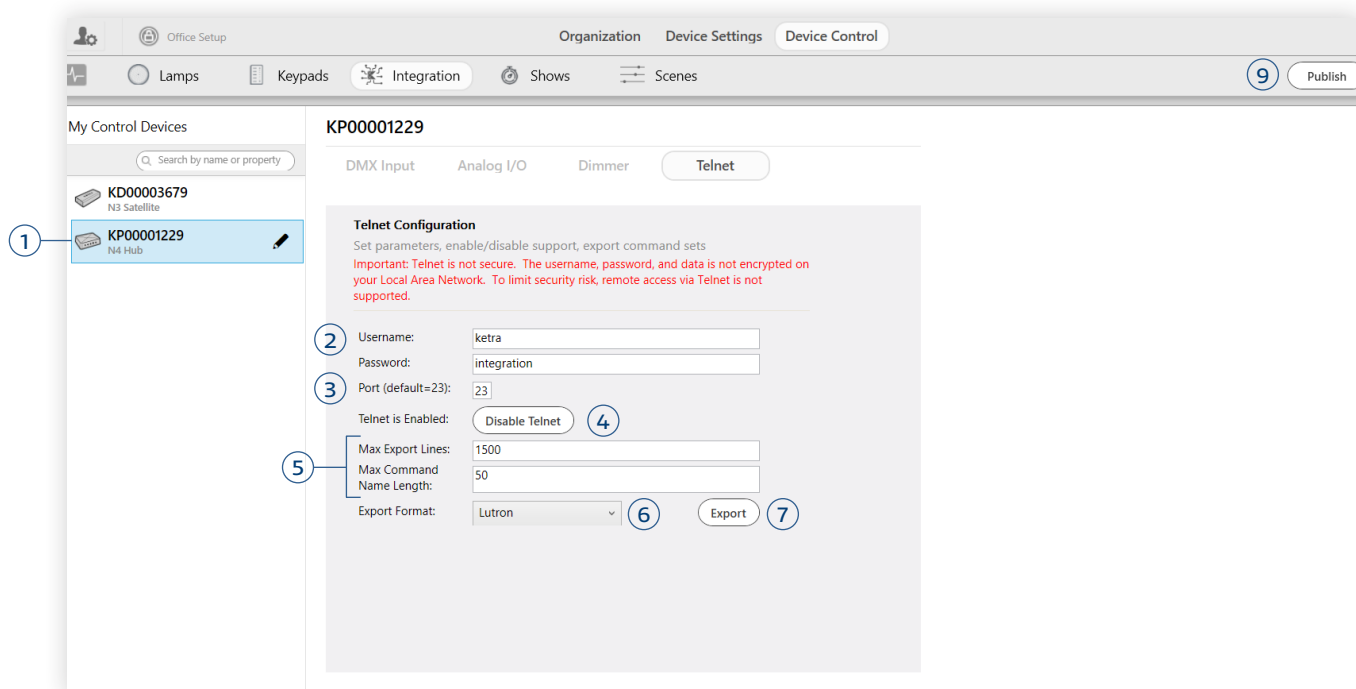
fig. 77

To integrate an installation with Lutron, follow these steps:

1   **Select the N4 Hub you want to configure.** Your list of N4 Hubs can be found in the **My Control Devices** panel.

> **Note:** The N4 must be on the same LAN as the Lutron Homeworks QS processor.

2   **Set a username and password for telnet input.** These should match the username and password you provide in Homeworks QS.

3   *Optional:* **Change the port number for the integration.** Use the default port, 23, unless told otherwise by a facility IT administrator.

4   Click **Enable Telnet**.

5   *Optional:* **Change the Max Export Lines or Max Command Name Length values.**

   –   Max Export Lines: The maximum number of commands that can be included in the exported CSV file. If the actual number exceeds the max, multiple CSV files will be created.

   –   Max Command Name Length: The maximum number of characters that can be used in a command name.

6   **Set the Export Format to "Lutron."**

7   Click **Export**.

8   **If the export produced multiple CSV files, either:**

   –   Increase the Max Export Lines and repeat

   –   Select additional N4s in the **My Control Devices** panel and repeat steps 2-4 for them

9   Click Publish in the top-right corner of the screen. This saves your configurations to your Ketra devices.

10   Refer to our Lutron Integration Programming Guide for instructions on configurations in Homeworks QS. You can find this document in the App Notes section of the Support page on Ketra's website.

Device Control and Shows

Shows—also referred to as "time trigger shows"—are dynamic lighting solutions that work by triggering changes in your lighting over a period of time. Whenever one of these "time triggers" takes place, your lights will play a different scene.

Creating shows can be as advanced or as easy as you want:

• You can craft every time trigger and scene yourself

• OR, you can simply import shows curated by Ketra, or generate natural shows that automatically evolve over the course of the day to match sunlight.

This section of the manual is divided into five parts:

1   **Getting Started:** What to do before creating the installation's first show. See page 68.

2   **Creating Shows:** The different kinds of shows—blank, natural, and imported—and how to make them. See page 68.

3   **Setting Important Configurations:** Telling your show when it should run and whether it should ever be overridden. See page 72.

4   **Setting Triggers and Scenes:** Crafting the content of your show: creating the time triggers and designing the scenes. See page 78.

5   **Published Preview: Previewing Transitions:** Previewing your show's scenes at a consistent step rate before assigning it to any input. See page 83.

6   **Exporting a Show:** Saving a show as a file, which you can import to other Design Studio installations. See page 83.

Getting Started

To get started working with shows, follow these steps:

1   Go to the Shows tab in Device Control, pictured in fig. 78.

2   **If prompted, enter your city and state in the field at center.** Design Studio will use this information to determine your precise location within your timezone, and then the exact time of sunrise and sunset in your city by the day. This allows Design Studio to create realistic and dynamic natural shows. After entering your information, click NEXT.
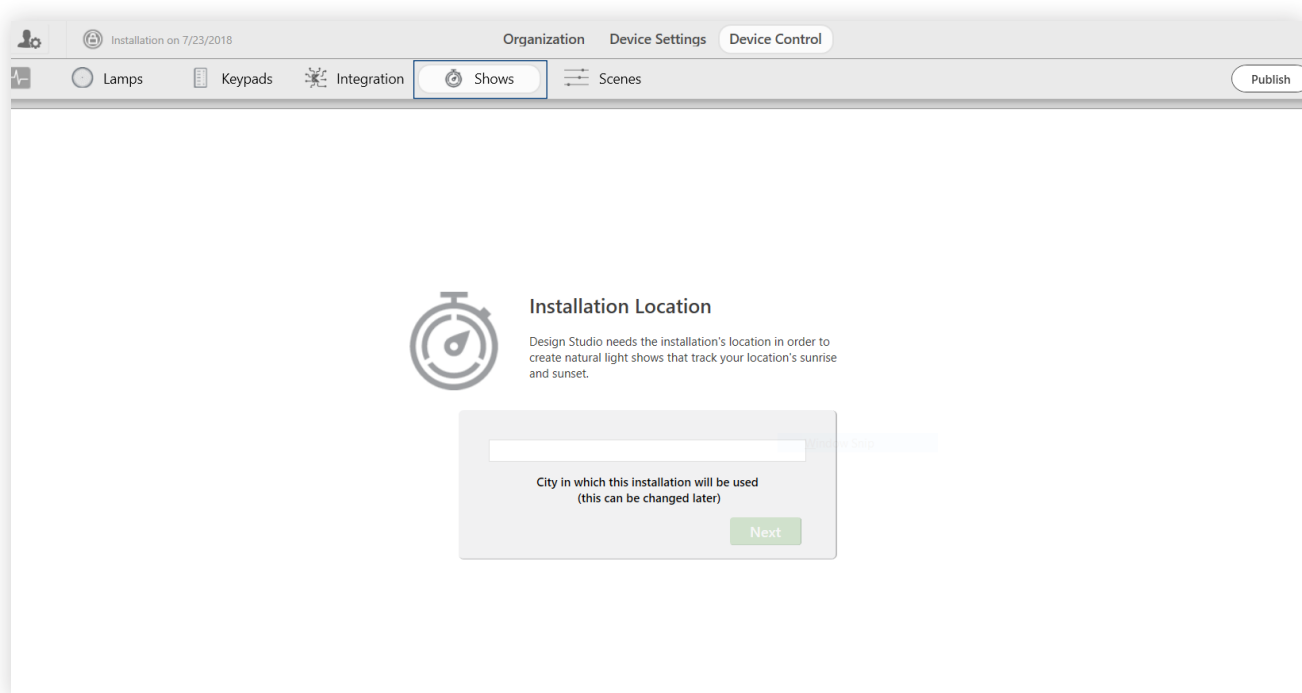

fig. 78

Creating Shows

To create a show, use one of the three options at the bottom of the My Shows panel at left:

• **Create Show:** This will make a blank show that you will program in full. Because of the complicated nature of programming shows, this option is recommended for advanced installations only. See **Creating a Custom Show**, below.

• **Create Natural Show:** A natural show comes with built-in time triggers and is pre-designed to be circadian. You will be able to edit any of these settings. See **Creating a Natural Show**, below.

• **Import Show:** Import shows you've exported previously, or import some of Ketra's pre-made shows. (In these pre-made shows, Ketra has already created individual triggers and set color configurations for you.) You will be able to edit anything you want after importing. See **Importing a Show**, page 70.

Creating a Custom Show

To create a custom show, click **Create Show** at the bottom of the **My Shows** panel at left. By default, the show will have no content, giving you full rein to customize it however you want. For optional (but important) configurations, see **Setting Important Configurations**, page 72; for programming time triggers and scenes, see **Setting Triggers and Scenes**, page 78.

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. You can create your own natural show as an alternative, or you can modify the curated show.

To create a natural show, first click **Create Natural Show**. This is found at the bottom of the **My Shows** panel at left.

Creating a natural show will open a small dialogue box with basic configuration options, as in fig. 79. You can change any configurations you set here later on, by using the corresponding controls in the show's configuration page.
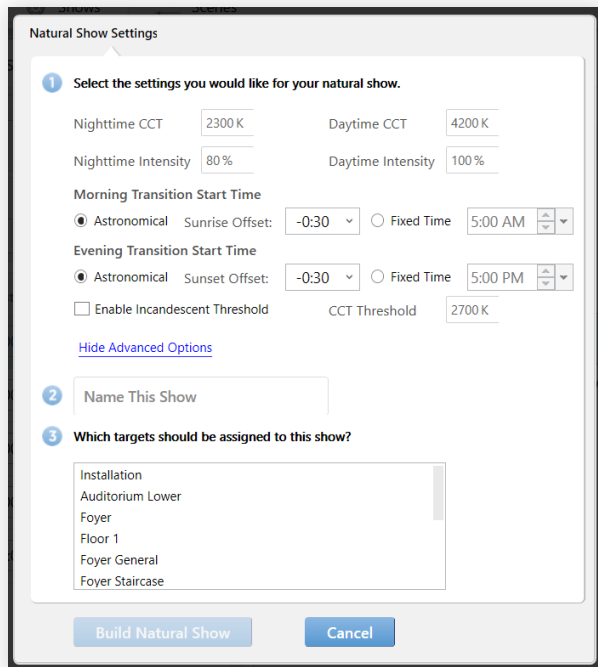
fig. 79

To fill out this dialogue box's forms, follow these steps:

1   **Select the settings you would like for your natural show.** Here you can:

   –   Set the poles of the spectrum your light will evolve upon over the course of the day. CCT refers to warmth of color; Intensity refers to brightness.

Note: CCT stands for Correlated Color Temperature and is measured in Kelvin. As CCT rises, your light follows the curve of a black body locus.

Your lights will peak in CCT and intensity 35 minutes after sunrise, and stay at that setting until 30 minutes before sunset. This can be changed once the show is created.

– Set Morning and Evening Transition Start Times. These can be configured as astronomical or fixed-time. Note that the time dropdown at right only applies if you pick Fixed Time.

Astronomical: In the natural world, sunrise and sunset happen at unique times every day. Ketra shows on the Astronomical setting will automatically retrieve these times, and configure each day's lighting to correspond to them: as the sun rises, the intensity of your lights will rise; at sunset, your lights will dim to match the light outside. You will notice this more as seasons change.

Fixed Time: A natural show configured as fixed-time will transition at times that are constant from day to day. The show will still be circadian, but it will not always match the light outside. For example, your lights might imitate sunset every day at 6 pm, even if sunset actually falls at 5 pm that day.

– Set an incandescent CCT threshold (optional). Use this 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.

2 **Name your show.** You can name your show to help differentiate it from others.

3 **Pick groups to apply the natural show to.** Select one or multiple from the list of all your groups.

> **Note:** The show will apply content to whichever groups you select, as well as all subgroups. If you intend to assign your show to a keypad or analog input trigger, we recommend selecting the highest-level group. As discussed in **Global Scenes, Local Applications** (page 84), 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.

4 **Click** Build Natural Show**.** This creates your show with time triggers programmed for you.

Once you've created your natural show, please skip ahead to **Setting Important Configurations**, page 72.

Importing a Show

You can import shows that you have exported previously, or shows that Ketra has designed for you. Clicking Import Show (found at the bottom of the My Shows panel) will open a small dialogue box, as in fig. 80 (next page).

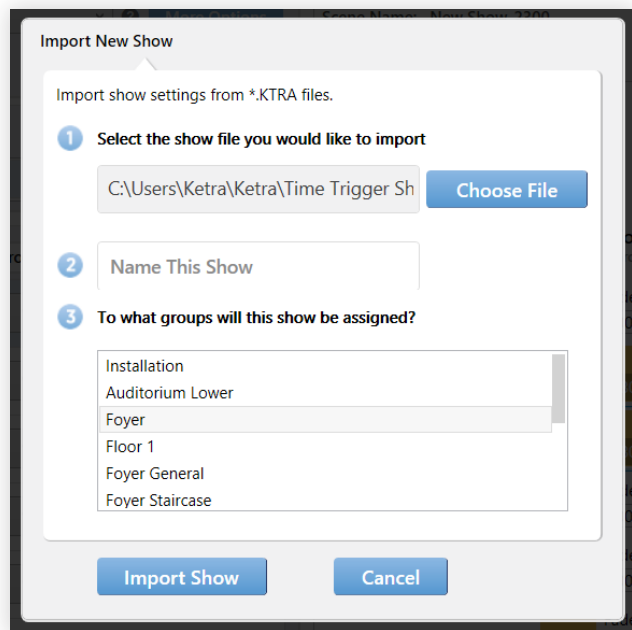fig. 80

1 **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.

2 **Name your show.** You can use the same name as before or give it a new one.

3 **Select groups to assign the show to.**

> **Note:** The show will apply content to whichever groups you select, as well as all subgroups. If you intend to assign your show to a keypad or analog input trigger, we recommend selecting the highest-level group. As discussed in **Global Scenes, Local Applications** (page 84), 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.

4 **Click** Import Show.

Once you've imported your show, please read **Setting Important Configurations**, next page.

Setting Important Configurations

In this part of the manual, we'll cover configurations you can set that tell your show when to run and whether it can be overridden by any other device.

Note: None of these configurations is actually required, because they all come with default settings. That said, we still recommend looking over the tables below; you may come to realize that your show requires something more than the default.

1   Telling your show when to run

Configuration	Purpose	Default Setting	Location & More Info
Show Control	Determine whether your show should run on its own or only upon being triggered	Show runs on its own	See Show Control, page 73
Run Frequency	Determine the days on which your show will operate	Show runs seven days a week	See Run Frequency, page 74

2   Telling your show whether it can override or be overridden

Configuration	Purpose	Default Setting	Location & More Info
Show Override	Let your show override another show	Show cannot override another show	See Show Override, page 75
Enable master intensity override	Let your show's master intensity be overridden by intensity commands from a DMX or 0-10V dimming signal	Show's master intensity cannot be overridden	See Master Intensity Override, page 76
Enable auto-off timeclock linked to keypads	Turn off the show's groups outside of normal business hours	Groups will stay turned on outside of normal business hours	See Auto-Off Timeclock Override page 76
Set min/max sunrise/sunset time for astronomical triggers	Restrict a show's astronomical triggers to operate only before and/or after certain times of day	No artificial restriction; i.e., show always runs in relation to sunrise and sunset	See Limiting Astronomical Triggers, page 78

Show Control

The **Show Control** feature (location in fig. 81) tells your show the circumstances under which it should run.
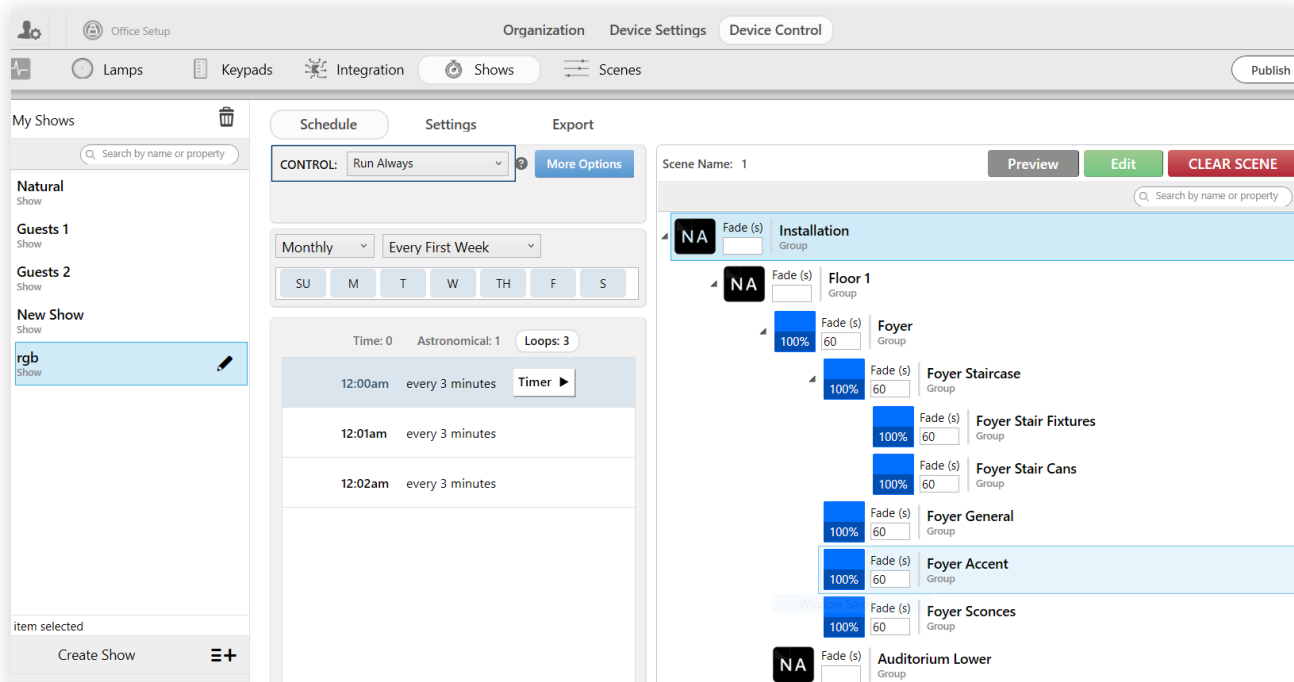

fig. 81

You have three options:

- **Disabled:** This saves your show but deactivates it. It won't run again until you change its **Show Control** setting to something else and re-publish. This is useful if you have a show reserved for a special occasion.

- **Run Always:** This tells the show to run without waiting for a trigger. By default, **Run Always** means the show will run 24/7. However, you can still use Run Frequency to tell a **Run Always** show to only operate on, say, Tuesdays and Thursdays.

> **Note: Run Always** shows are ideal for groups that are not also being controlled by keypad. If a group is being controlled by keypad, **Trigger with Show Group** is more appropriate, since **Run Always** shows can't be initiated or deactivated by a keypad button or other trigger.

The only way to deactivate a **Run Always** show is to open Design Studio, select the show in the **My Shows** panel on this screen, and set it to **Disabled**.

- **Trigger with Show Group:** This tells the show you are going to assign it to a keypad or analog input (e.g., an occupancy sensor). When the show is triggered by a keypad button press or analog input source, it will play on the keypad's or satellite's groups of Ketra devices.

If you choose **Trigger with Show Group**, pick a "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.

Note: 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. For keypads, see **Assigning a Show**, page 43; for inputs, see **Configuring Analog I/O**, page 55.

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.

Run Frequency

With the **Run Frequency** feature (location in fig. 82), you decide how often your show runs.
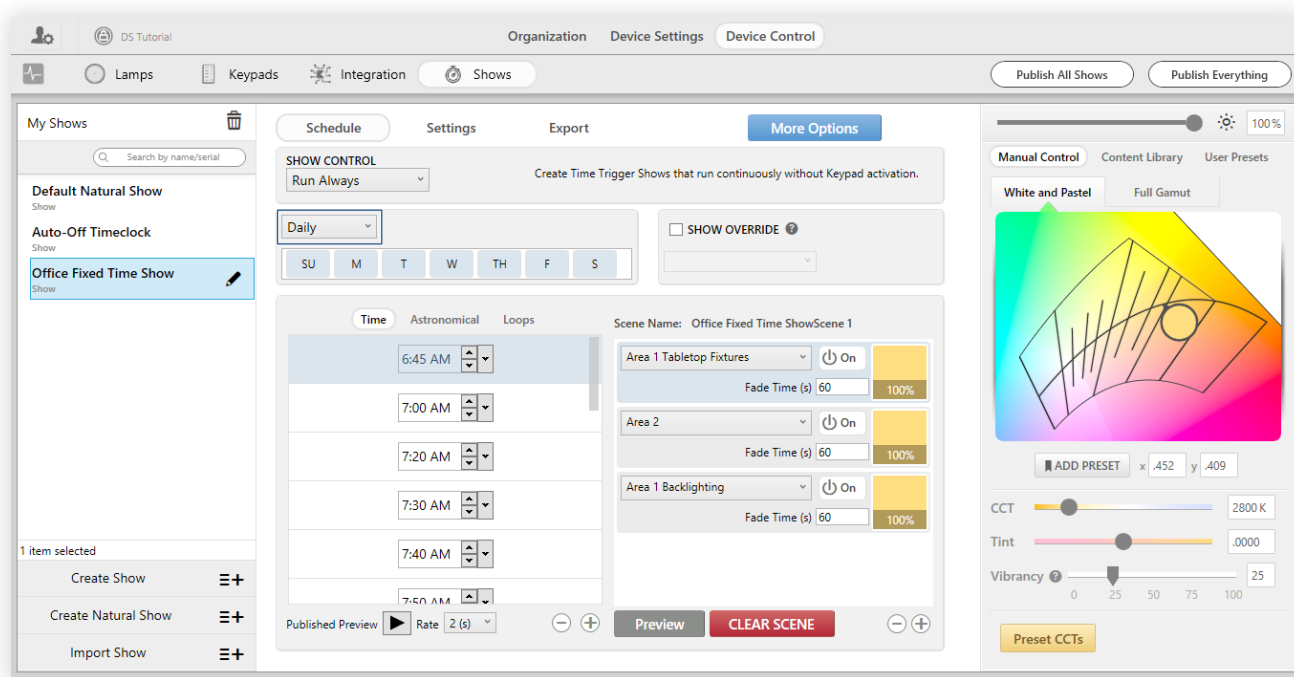
fig. 82

You can configure your show as one of the following:

- **Daily:** Determine which days of the week your show will run. Days of the week turn blue when they're selected, and white when they're deselected. For example, in fig. 83, Monday, Wednesday, and Friday are selected.

fig. 83

- **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 fig. 84, a show is configured to run every Monday, Wednesday, and Friday between June 13, 2016 and June 1, 2017.
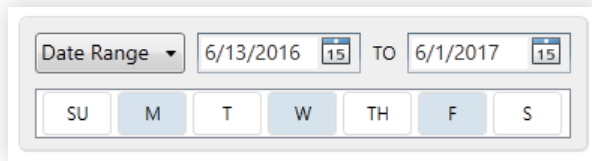

fig. 84

- **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, as in fig. 85. This show will run every Monday, Wednesday, and Friday in the first week of every month.

fig. 85

Show Override

fig. 86

With **Show Override** (location in fig. 86), 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, check the **Show Override** box, and select Show B from the dropdown.

Master Intensity Override

Check the box for **Enable Master Intensity Override** (location in fig. 87) to allow a third party's intensity commands to override your show. By default (with the box unchecked), shows will ignore intensity commands from DMX-enabled or analog-input devices.
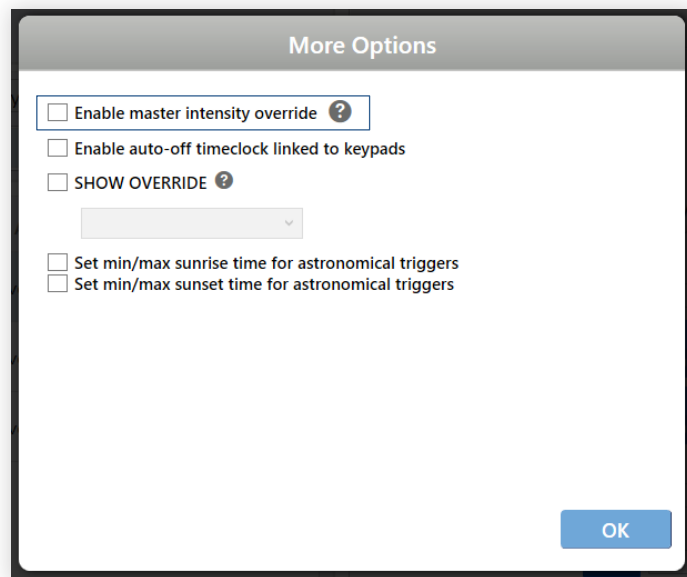

fig. 87

> **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 **Configuring DMX Input**, page 51, or **Configuring Analog I/O**, page 55.

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.

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.

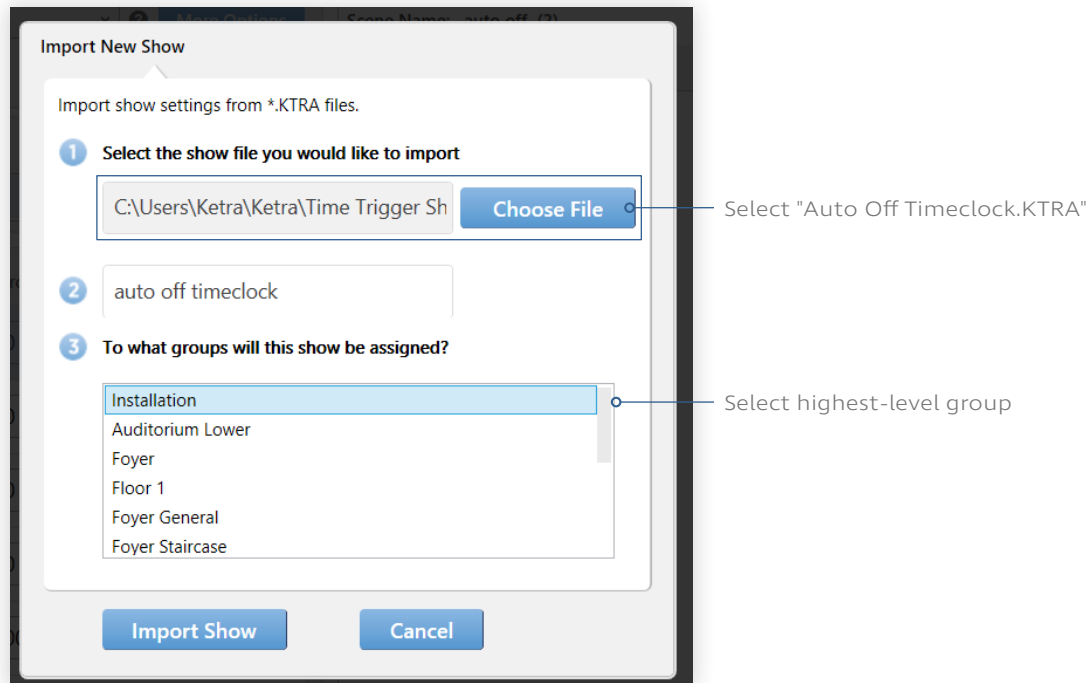Select "Auto Off Timeclock.KTRA"

Select highest-level group

fig. 88

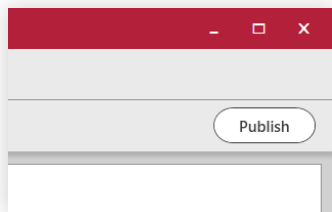6   In the upper-right, click Publish.

fig. 89

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.

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 northern or southern 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 circadian 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 fig. 90.

fig. 90

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.

Setting Triggers and Scenes

In the previous section, you told your show when to run and whether it could be overridden. You can think of that as the form of your show. In this section, you will program the content.

> **Note:** This section is important for blank shows only. Natural shows and imported shows come already programmed.

There are essentially two steps in programming a show's content: setting its triggers (the times at which changes will take effect) and designing its scenes (the actual lighting changes that will take effect.) Each of these takes place on a different part of the screen; see fig. 91 for locations.
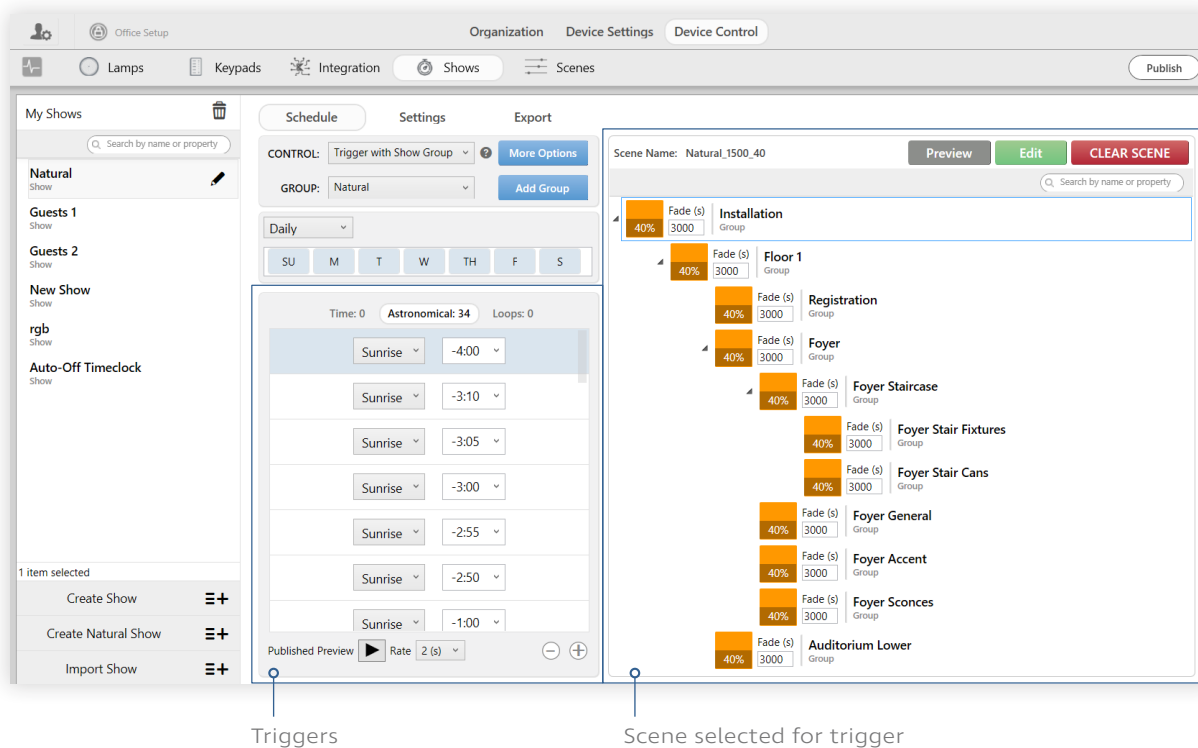

Triggers   Scene selected for trigger

fig. 91

Setting Triggers

You'll notice that there are three tabs in the triggers list: **Time**, **Astronomical**, and **Loops**. These are the three types of trigger you can set.

- **Time-Based Triggers:** See fig. 92. Each of these is a specific time at which your show will trigger light changes. Use the + button to add times; remove times by highlighting one and clicking - .
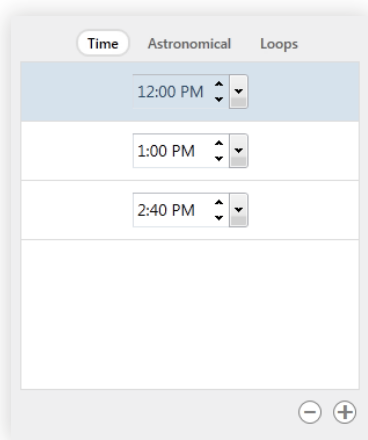

You can change the time of a trigger using the dropdown, the increment buttons (^ and ⌄), or by clicking on the time and typing a new one.

fig. 92

- **Astronomical Triggers:** Unlike time-based triggers, astronomical triggers don't require you to give specific times. Instead, your triggers have time offsets from sunrise and sunset; Design Studio will retrieve the exact times of sunrise and sunset in your city every day. This is ideal for circadian shows, where you want your light to evolve in parallel to the natural light outside.
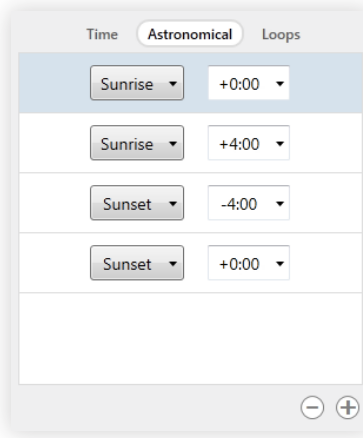

fig. 93

In fig. 93, the show will trigger changes at sunrise and at four hours after sunrise, then again at four hours before sunset and at sunset.

Use the + button to add times; remove times by highlighting one and clicking - .

Note: For accelerated creation of an astronomical-based show, click Create Natural Show at the bottom of the Shows list.

- **Looping Triggers:** 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.

To understand loops better, you might consider that time-based and astronomical triggers are essentially also looping triggers: they take effect at given times every 24 hours. There is only one functional difference when you're programming looping triggers: you get to decide the duration of the loop. There is an example below.

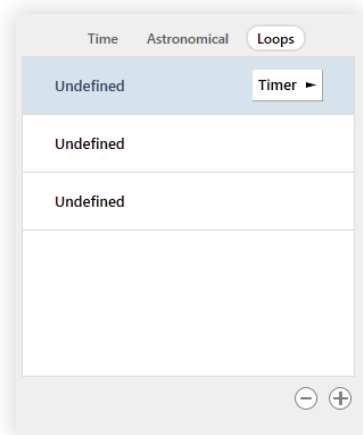Each of the undefined triggers in fig. 94 has just been added using the + button.

fig. 94

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*).

> **Note:** The runtime must be a factor of 60 minutes. For example, your runtime could be 6 minutes, but not 7.

Looping Triggers Example

For example, 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.

fig. 95

i   Starting with three undefined triggers, highlight the first trigger and click **Timer** (see fig. 95). Set Loop every to 6 mins. Since this is the first trigger, set *Start offset* to 0 mins: this means that the first trigger will become active zero minutes into the loop. *Starting at* and *Ending at* both default to 12 am, meaning the loop will run all day.

ii Highlight the second trigger and click **Timer** (see fig. 97). Again, set *Loop every* to 6 mins; *Starting at* and *Ending at* should remain the same. This time, change *Start offset* to 2 mins: this means that the second trigger will become active two minutes into the loop—i.e., after the first trigger gets its two minutes.

iii Highlight the third trigger and click **Timer** (see fig. 98). Configure *Loop every* as you have done in the previous two examples. For this last trigger, *Start offset* should be 4 mins.

Trigger 1

fig. 96

Trigger 2

fig. 97

Trigger 3

fig. 98

You now have a loop that repeats three triggers every six minutes, giving each trigger two minutes to run. Fig. 99 shows the finished product.
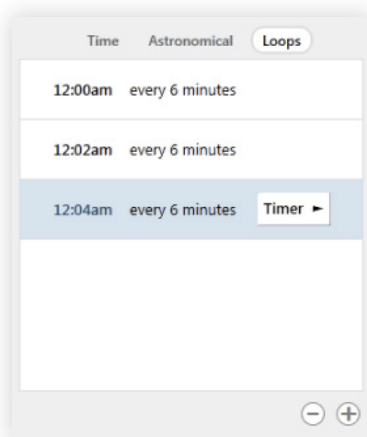

fig. 99

Assigning Scenes to Triggers

The second step in the show-building process is to assign a scene to every time trigger you've created. This step is required because it sets the content that will be triggered at the given times.

To assign scenes to triggers, follow these instructions:

1   Select the first trigger.

2   **Create a new scene, or copy from a previous scene.** See fig. 100.

   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 to made to the copy will not be reflected in the original.
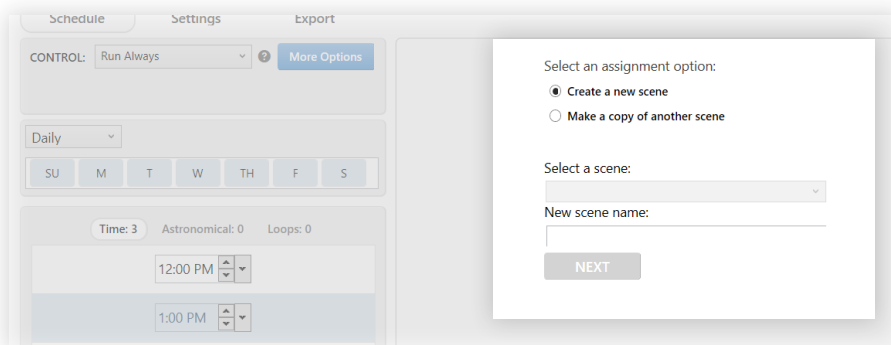

fig. 100

3   *Optional:* **Edit the scene.** If you created a new scene, a Ketra Scene Builder window will automatically open. If you copied a scene, click the green **Edit** button to open the window.

   Note: When customizing in the Ketra Scene Builder window, you have access to all the same features as on the **Scenes** tab. Refer to the instructions in **Building Scenes**, page 85.
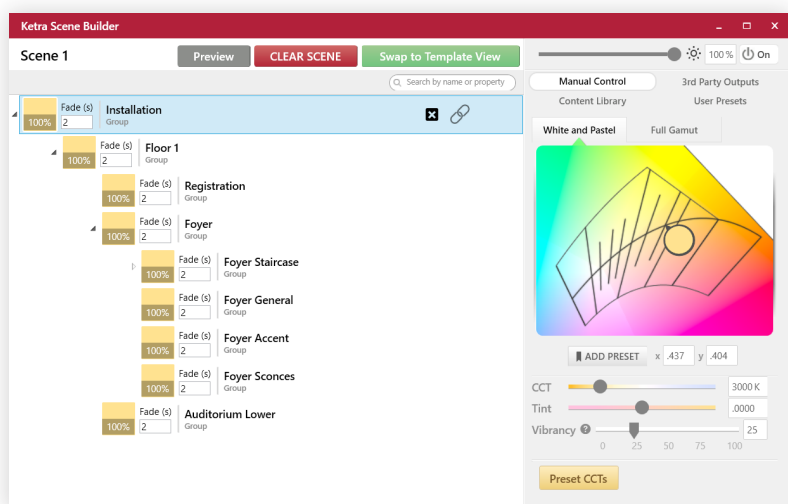

fig. 101

4   **Program the remaining triggers in the triggers list.**

5   **Publish your settings.** This saves your configurations. Click Publish. For more information on publishing, see **Publishing**, page 95.

Published Preview: Previewing Transitions

Note: This step will only be effective after you've published your show.

Published Preview is at the bottom of the Schedule tab's screen. When you click the play button, Design Studio will quickly play all of your show's triggers, one by one, at a consistent step rate set by you. This way you can get a sense for what the transitions might look like. (See fig. 102.)

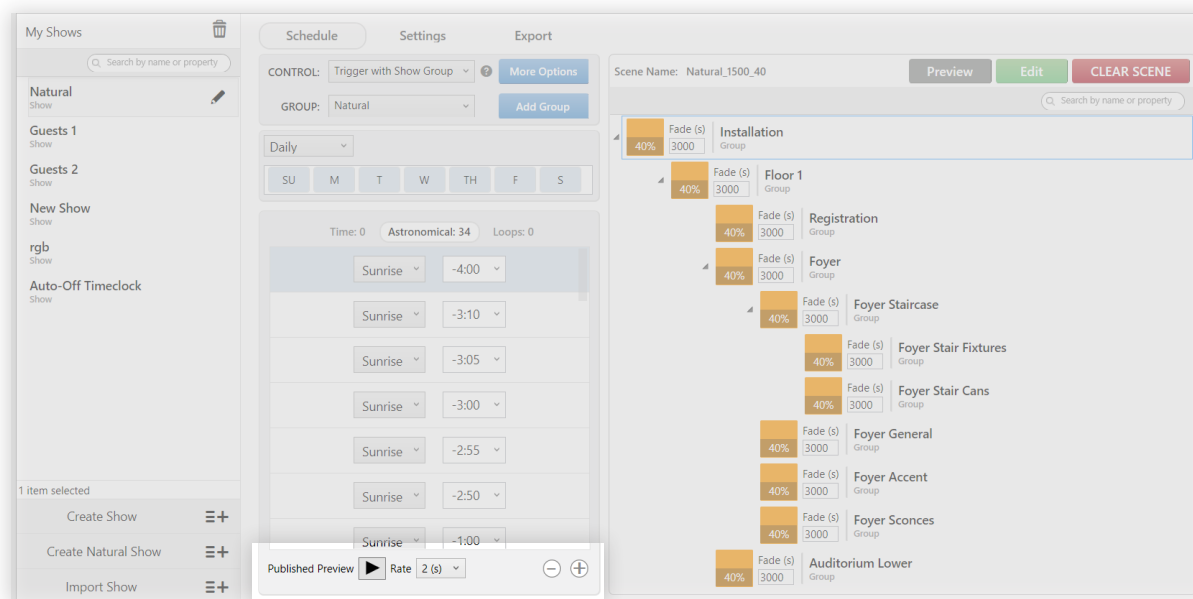
fig. 102

Exporting a Show

In the Export tab, Design Studio gives you the option to save shows to files. The default save location is Ketra > Time Trigger Shows, where you will find some of Ketra's pre-made shows. After exporting a show, you will be able to open it in other installations.

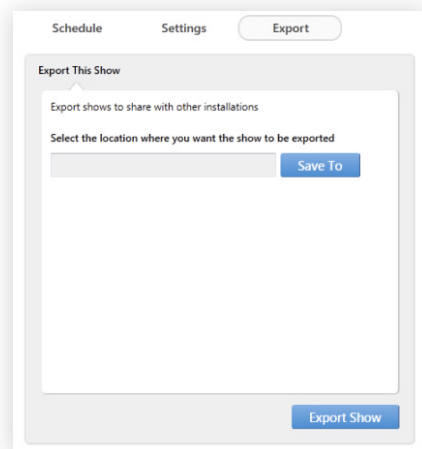fig. 103

Device Control and Scenes

Design Studio curates content so that a user never needs to build a custom scene unless they want to. A number of Ketra scenes are automatically assigned to keypads in new installations, so the user doesn't need to deal with keypad assignments either.

For custom scene building, Design Studio 2.0 offers significant improvements in efficiency. It is now very easy to build a single scene and apply it to any number of keypads, shows, or analog input triggers across the installation.

This chapter of the manual suggests a workflow for custom scene-building and provides instructions that cover most applications. It addresses the following topics:

- Differences between the Scenes tab and Keypads tab

- Differences between Tree View and Template View

- Descriptors in scene-building

- Assigning scenes to keypads

- Setting default button names for scenes

Global Scenes, Local Applications

It is easy to build one scene to apply to any number of keypads in the installation, without having to tailor the scene to each keypad. The scene should be built with content that affects the entire installation. When you assign the scene to a keypad, it will only be able to affect that keypad's groups.

For example, notice that the Daytime scene, below, affects every group in the hierarchy.
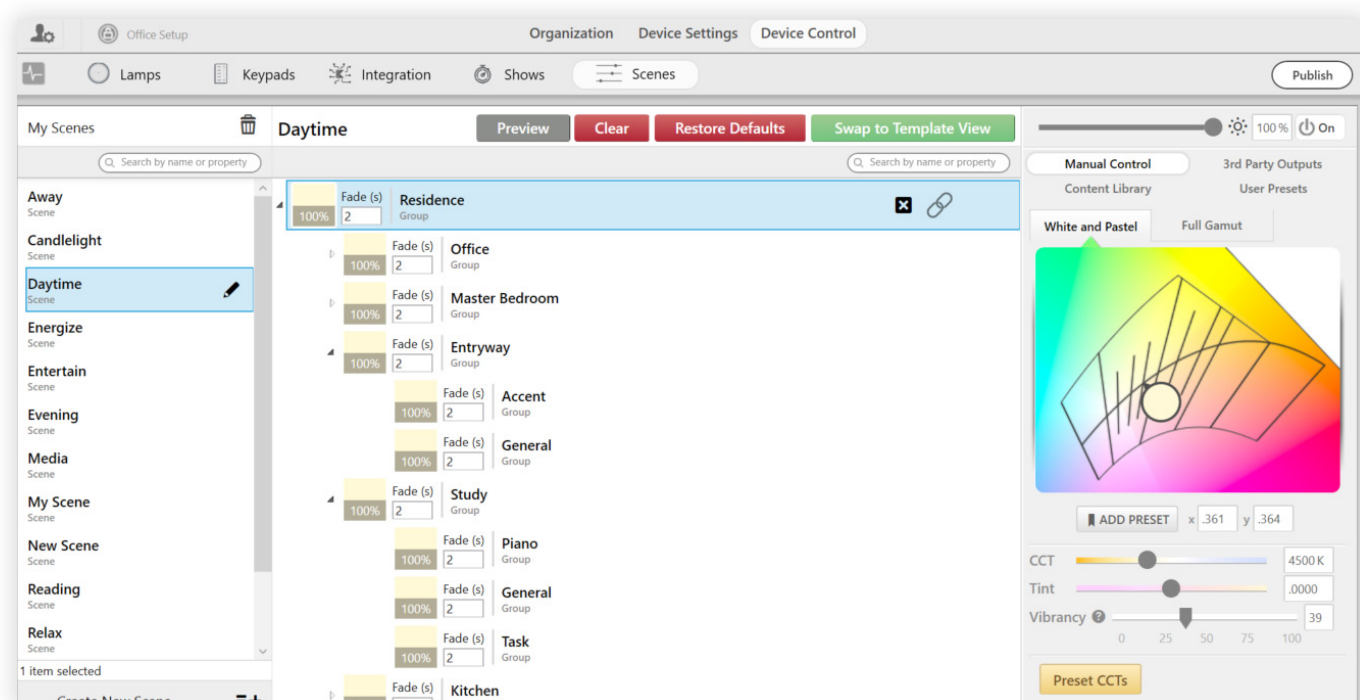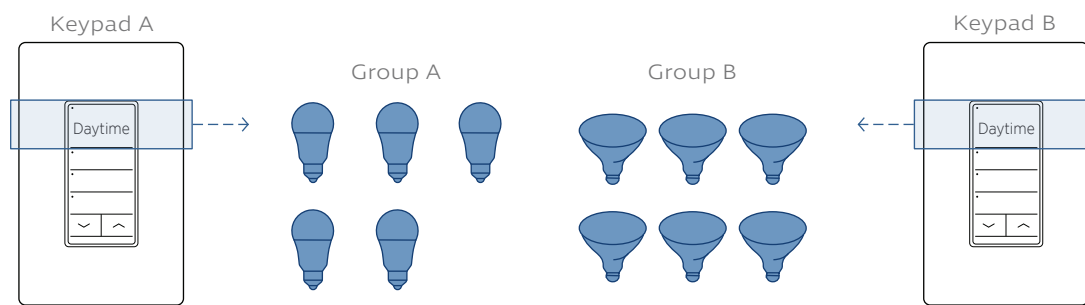

fig. 104

Triggering Daytime from a keypad *will not* cause every group in the installation to play the Daytime scene. Rather, it will tell that keypad (and only that keypad) to play the scene on whatever groups it can—namely, its own group and any subgroups. Keypads cannot control groups from other parts of the grouping hierarchy.

You can assign that one Daytime scene to the keypads Dining Room, Guest Bedroom, and Master Bath—a global scene with strictly local applications—or you could assign it to a Whole House keypad.

The Daytime scene will only play on each keypad's groups.

fig. 105

Suggested Workflow

In 2.0, we recommend building scenes on the **Scenes** tab and assigning them on the **Keypads** tab (or building them into triggers on the **Shows** tab or **Integration** tab).

Use the **Scenes** tab to:

• Build scenes (See **Building Scenes**, below)

• Set default button names for scenes, as desired (See **Default Button Names for Scenes**, page 94)

Use the **Keypads** tab to:

• Assign scenes to keypad buttons (See **Assigning Scenes on the Keypads Tab**, page 42)

> **Note:** While it is recommended that you use the **Scenes** tab for constructing scenes, you could also do so on the **Keypads**, **Shows**, or **Integration** tab. This might be appropriate if the scene will not be reused elsewhere in the installation. Note that scenes built on the **Shows** tab will not show up on other tabs.

Building Scenes

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 (fig. 106). 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.
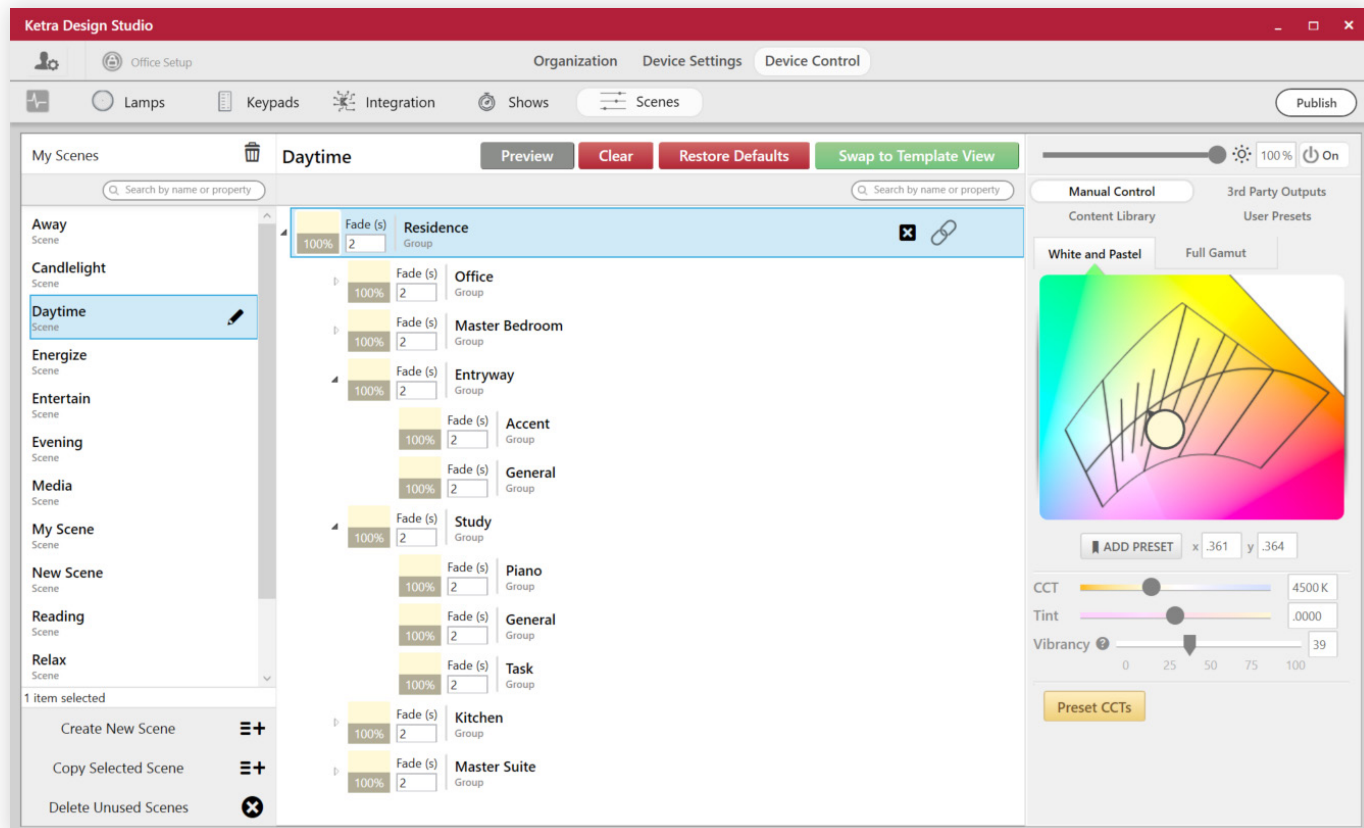
An ideal use of Tree View

fig. 106

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.
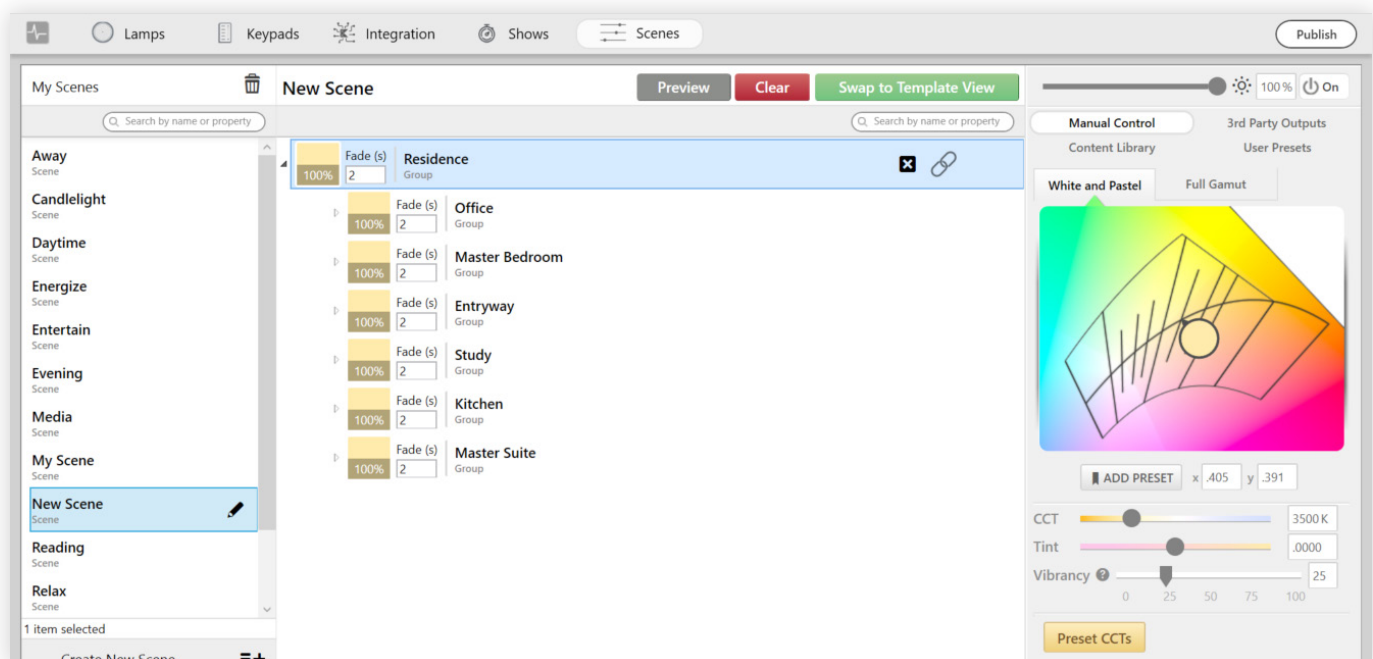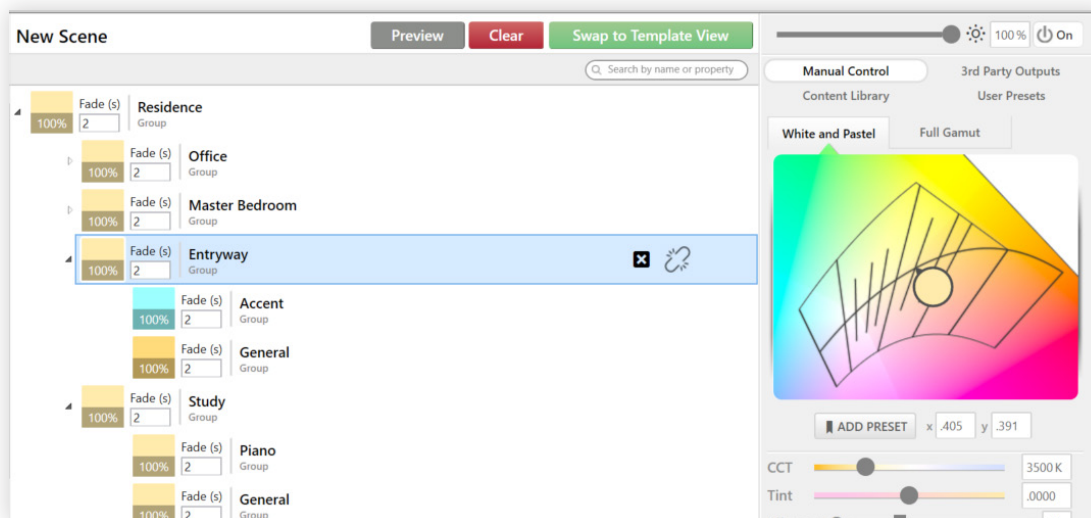
fig. 107

> **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 button press, you need to uncheck the group on the **Keypads** tab when assigning the scene (see **Assigning Scenes on the Keypads Tab**, page 42).

4   *Optional:* Make adjustments as needed to the lower levels in the hierarchy.

Groups lower in the hierarchy can be changed as needed.

fig. 108

For instructions on applying the scene to a keypad button, see **Assigning Scenes on the Keypads Tab**, page 42.

Template View

Template View lets the user vary content based on groups' **descriptors**. It is ideal for building scenes that apply distinct color settings at different points in the hierarchy.

An effective use of Template View might look like the curated Candlelight scene (fig. 110). All the **Task** groups have one kind of content, all the **Accent** groups have another kind, and everything else has a third kind.

Note: Fig. 109 shows Candlelight in Tree View so you can easily see how the scene applies to the installation's groups.
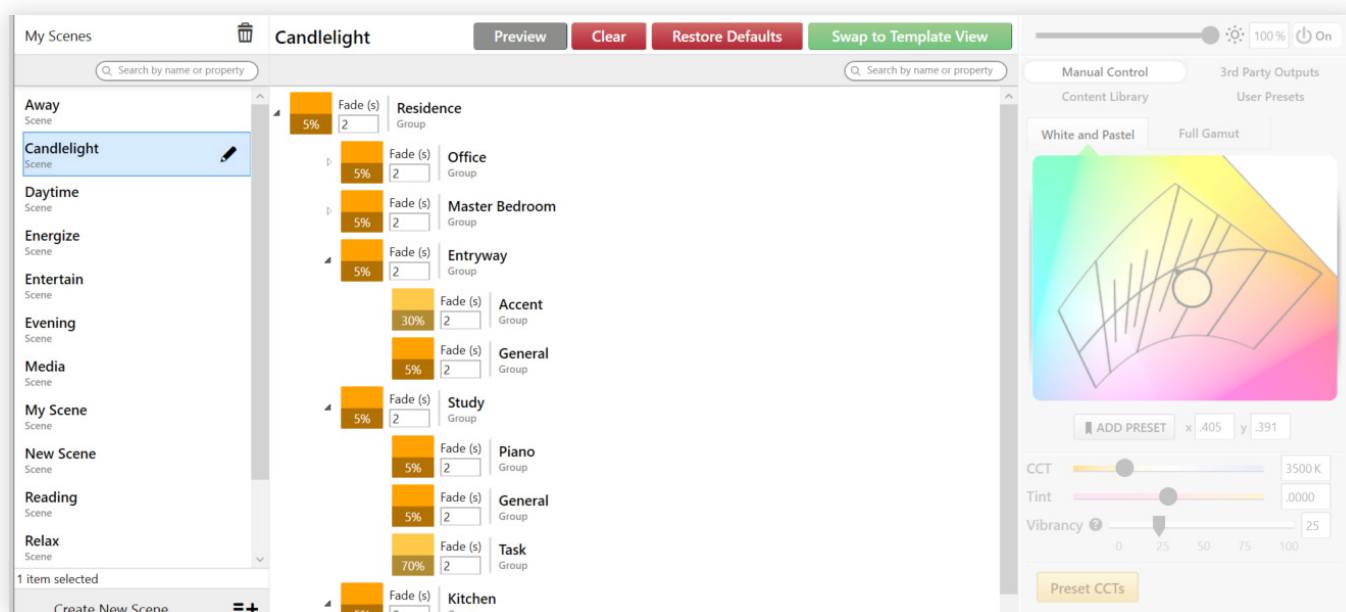
Wherever they appear in the hierarchy, Accent and Task have different content than all other groups.

fig. 109

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:
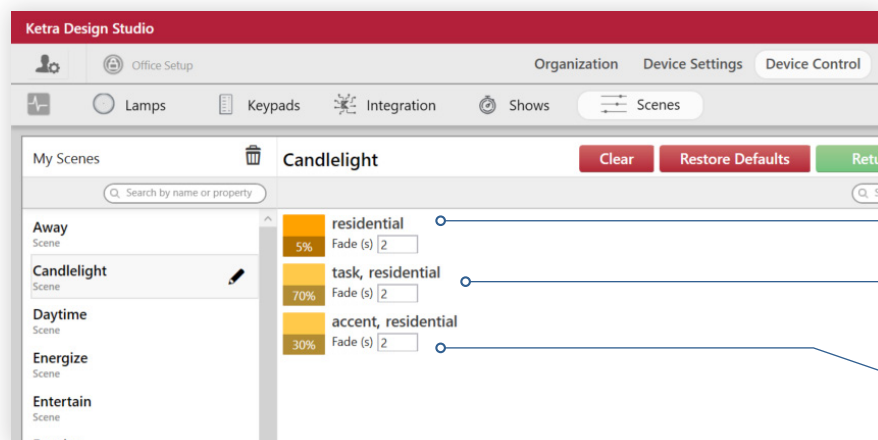
Groups tagged "residential": 1600K, 5% intensity

Groups tagged "task" and "residential": 2200K, 70% intensity (Overrides first line)

Groups tagged "accent" and "residential": 2200K, 30% intensity (Overrides first line)

fig. 110

Template View Example

Let's build a custom scene that can apply to any conference room in an office building. We'll start with this simple grouping structure already built on the Organization tab:
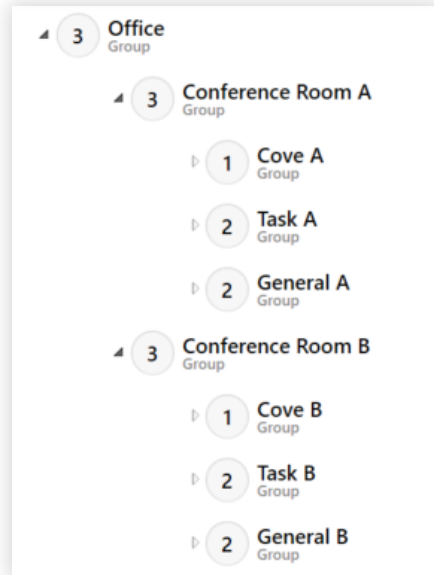
fig. 111

Next, we'll follow these steps:

1   On the Organization **tab, set a generic descriptor for each of the conference room groups (if necessary).** For each conference room group (not subgroups), add the descriptor "conference room". To add descriptors, select the group and enter the descriptor name into the bottom-right text field.

Note: If you used the **Office** template for the installation and make use of the recommended groups feature (top-right), these descriptors may already be set.

Selected group: Conference Room A
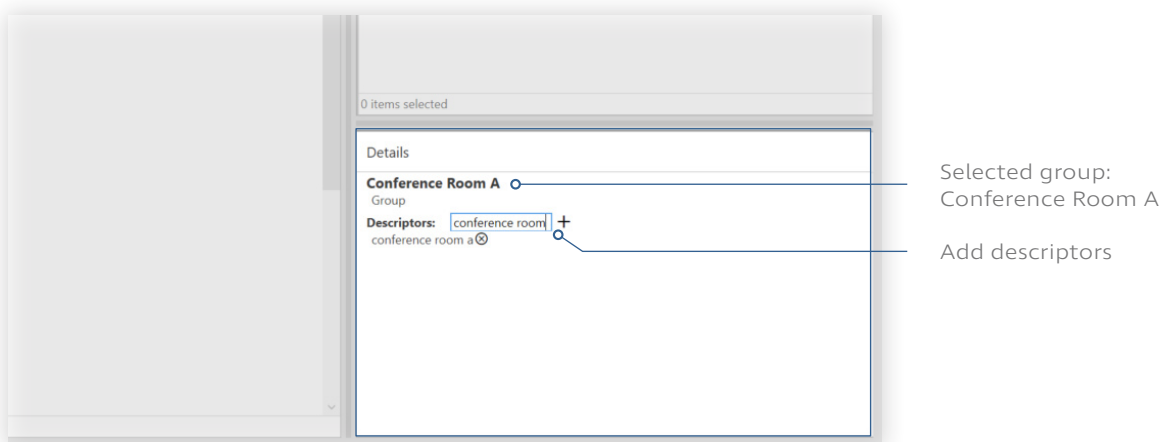
Add descriptors

fig. 112

2   **Set a generic descriptor for each category of subgroup.** Go through the cove groups tagging them "cove," then the task groups tagging them "task" (if not already applied) etc.

fig. 113

Selected group: Cove A (subgroup of Conference Room A)

Add descriptors
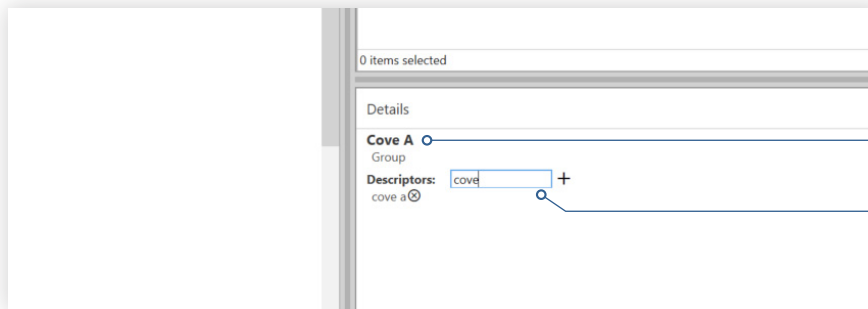
3   In **Device Control** > **Scenes,** click the **Create New Scene** button.
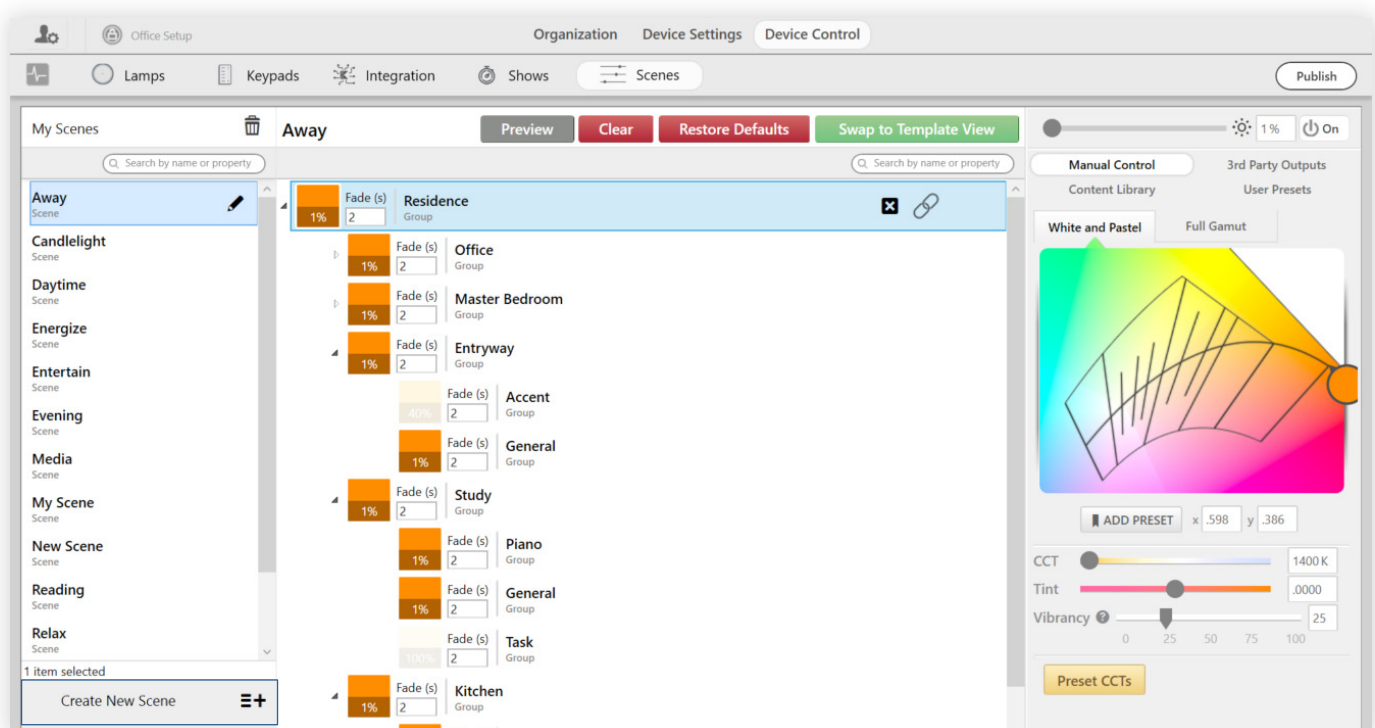
fig. 114

4   Click the **Swap to Template View** button.
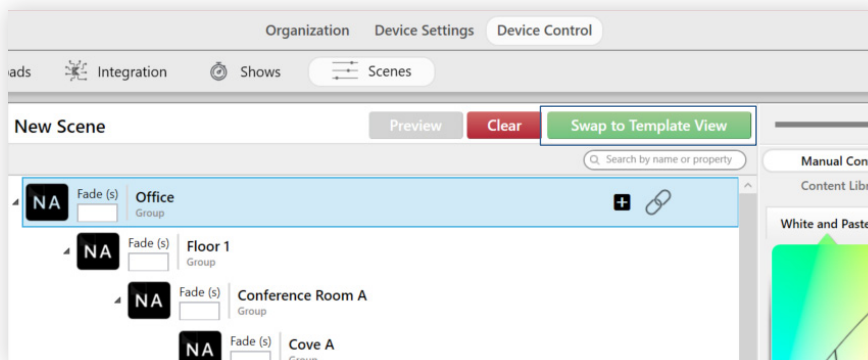
fig. 115

5   **Click the + button to add one line for each category of subgroup.** Since we have three categories—**general**, **task**, and **cove**—we'll add three lines.
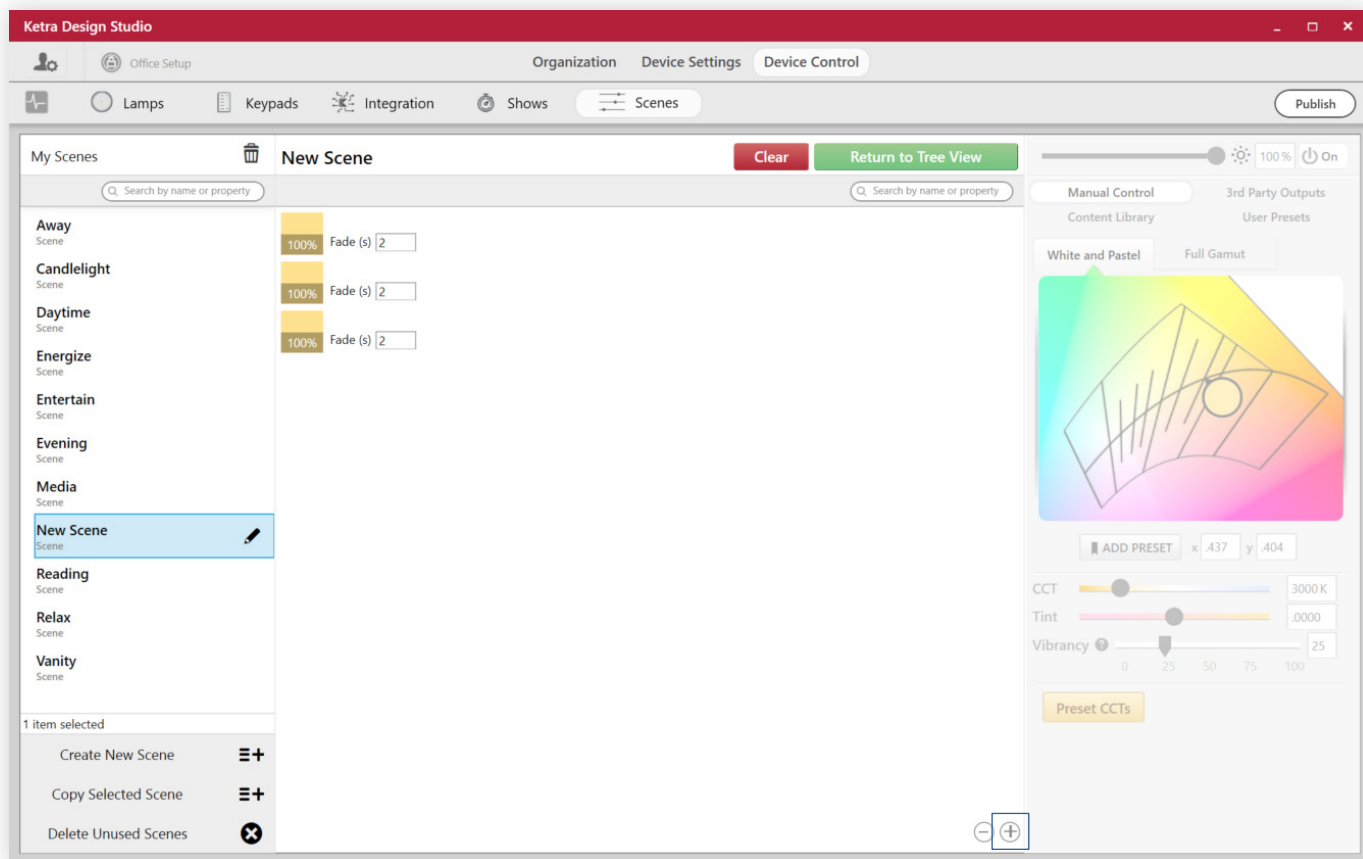
fig. 116

6   **For each line, add the category's descriptor and any other descriptors necessary to distinguish it.** For the general category, we'll add "general" and "conference room". The line will only affect groups with both of those descriptors. That way no other groups that might have the "general" descriptor will get affected.

Note: Groups inherit descriptors from higher-level groups.
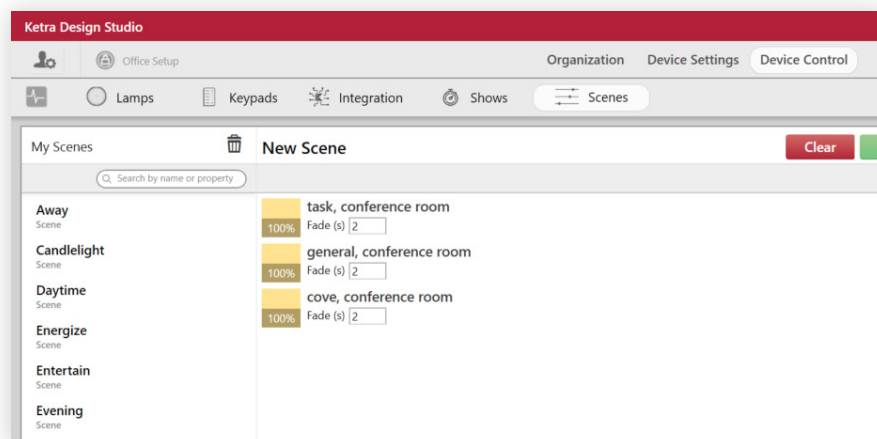
fig. 117

7 **Customize each line's color content.** Note that you can toggle **NA** on or off by clicking the **X** button. A scene marked **NA** will not be affected when the scene is triggered.
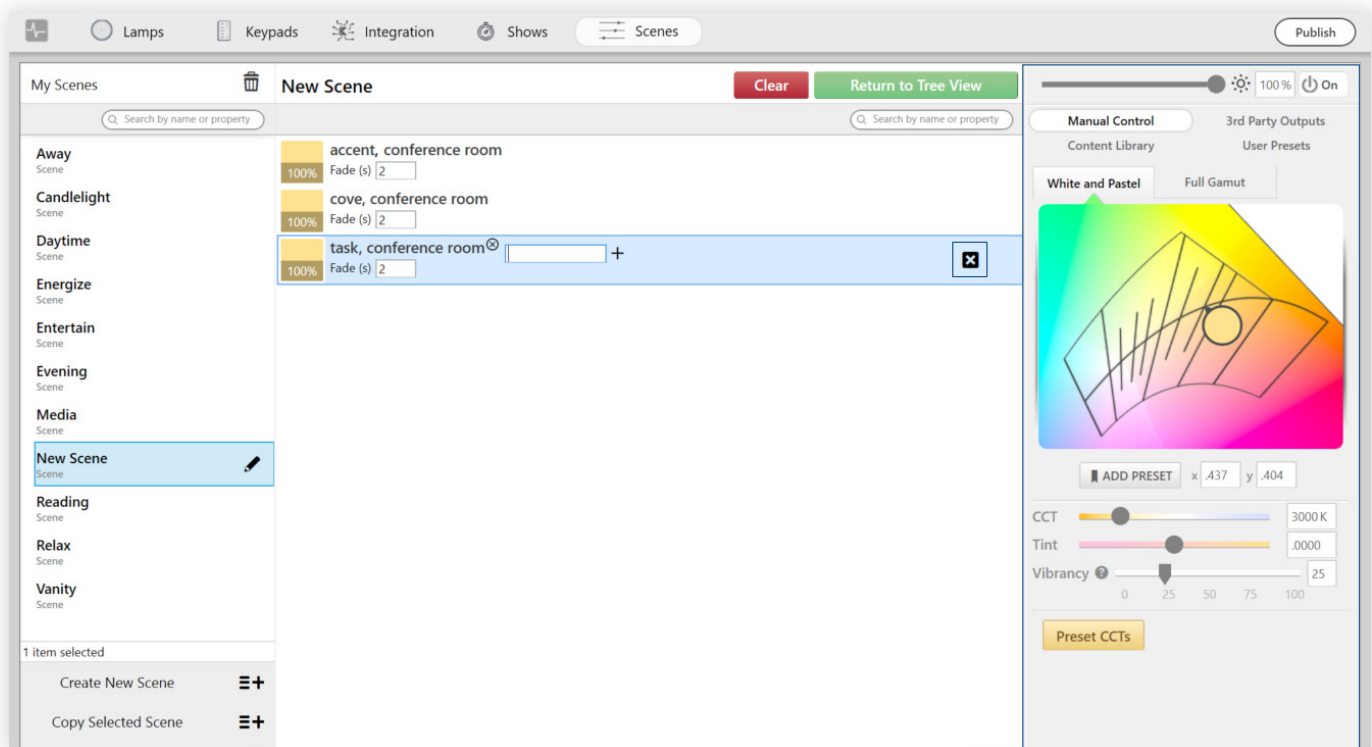
fig.118

> **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 button press, you need to uncheck the group on the **Keypads** tab when assigning the scene (see **Assigning Scenes on the Keypads Tab**, page 42).

8   **After completing all lines, validate the scene by swapping to Tree View.** In our case, the scene should look like this:
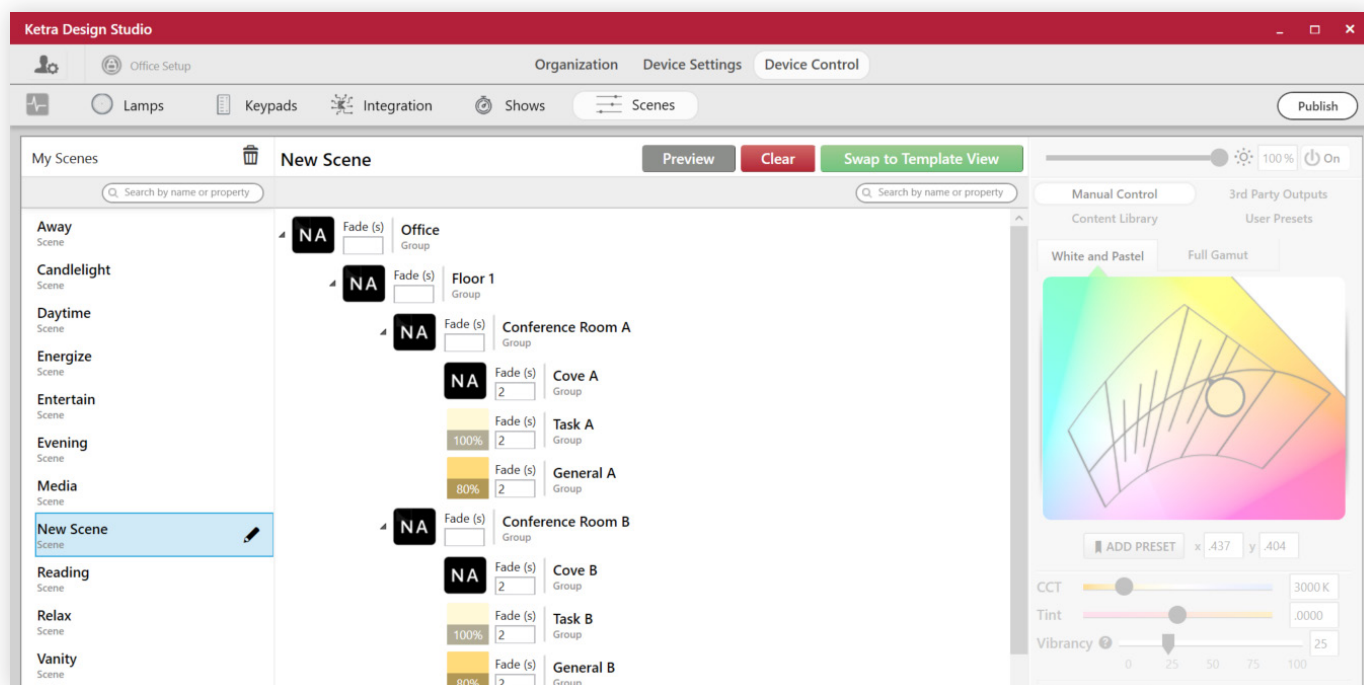
fig. 119
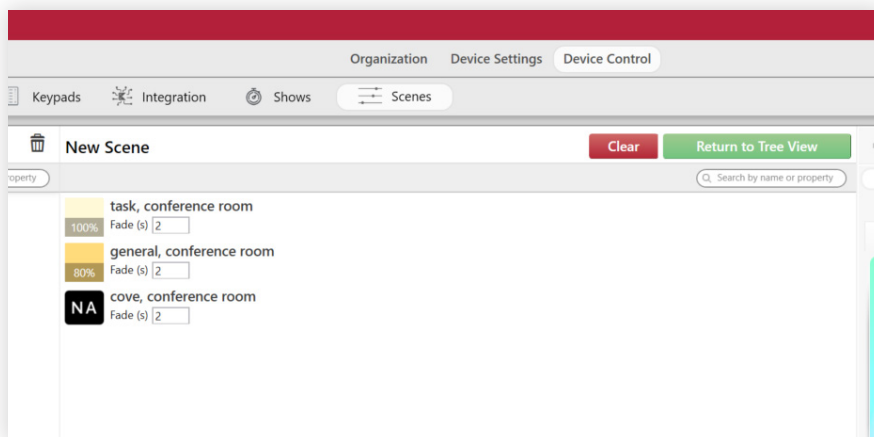
Scene in Template View

fig. 120

For information on applying the scene to a keypad button, see **A**ssigning Scenes on the Keypads **Tab**, page 42.

Setting Default Button Names for Scenes

On the Scenes tab, you can customize any scene's default button names—keypad button labels that default to a given scene. At certain times, Design Studio checks a keypad's button labels to see whether any has a default scene. This happens whenever:

- A keypad or virtual keypad is provisioned to the installation

- The user selects Assign Default Content in the *Action Menu* on the Keypads tab

For example, say you have set *My Scene*'s default button names to include "scene 4." When the user provisions a keypad with a button labeled "Scene 4," that button will automatically be assigned My Scene. This can save a lot of time in installations with many keypads.

To add or remove button default names, follow these steps:

1   In Device Control > Scenes, select a scene in the My Scenes pane, left.

2   Click the pencil icon next to scene's name.
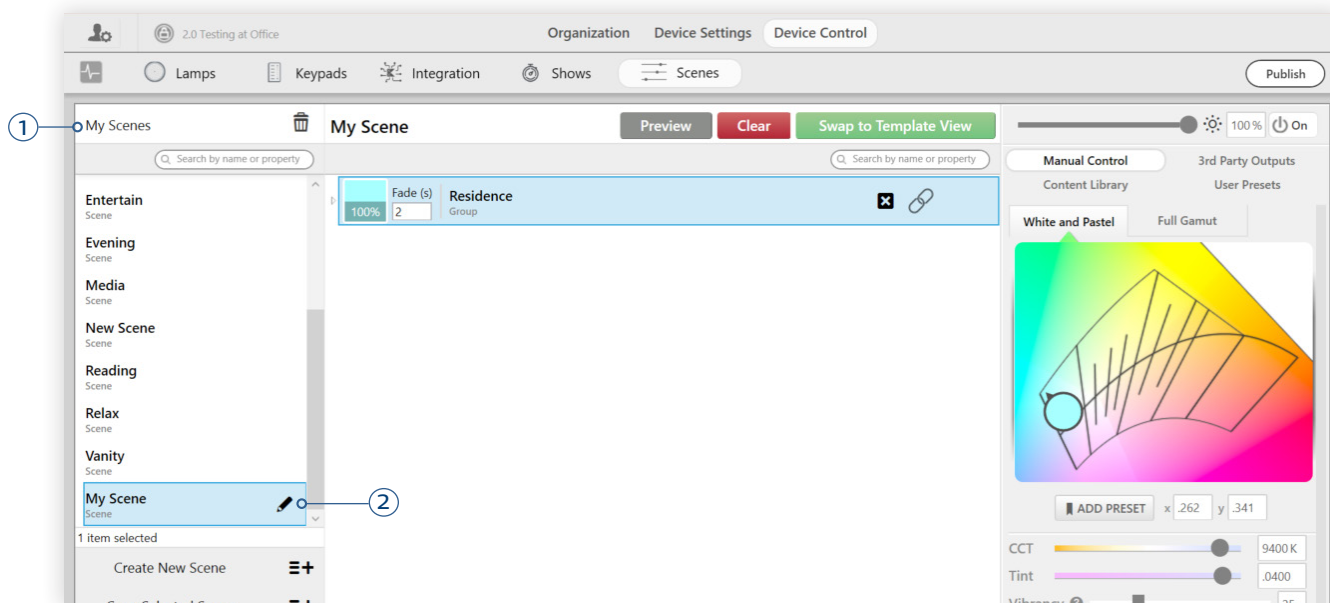
fig. 121

3   In the Scene Settings popup, enter a default button name and click +. Also additional names if needed.
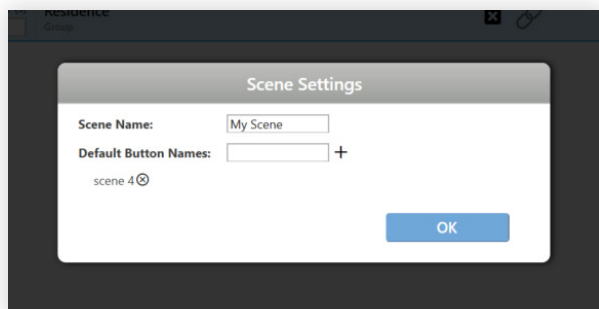
fig. 122

4   Click **OK**.

5   **If necessary, remove your default button name(s) from any other scenes that have them.** In the case of "scene 4," we'll need to edit the scene **Away**.

Publishing

Publishing is vital because it saves configurations to your devices as default states. When power-cycled, Ketra devices return to their default states; this means that if you change configurations in Design Studio without publishing, the devices will not return to those configurations when power-cycled.

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

Publishing is performed on the installation's **Device Control** tab using the **Publish** button in the top-right (see fig. 123). When you click **Publish**, all configurations you've made in Design Studio get saved to the installation's devices.
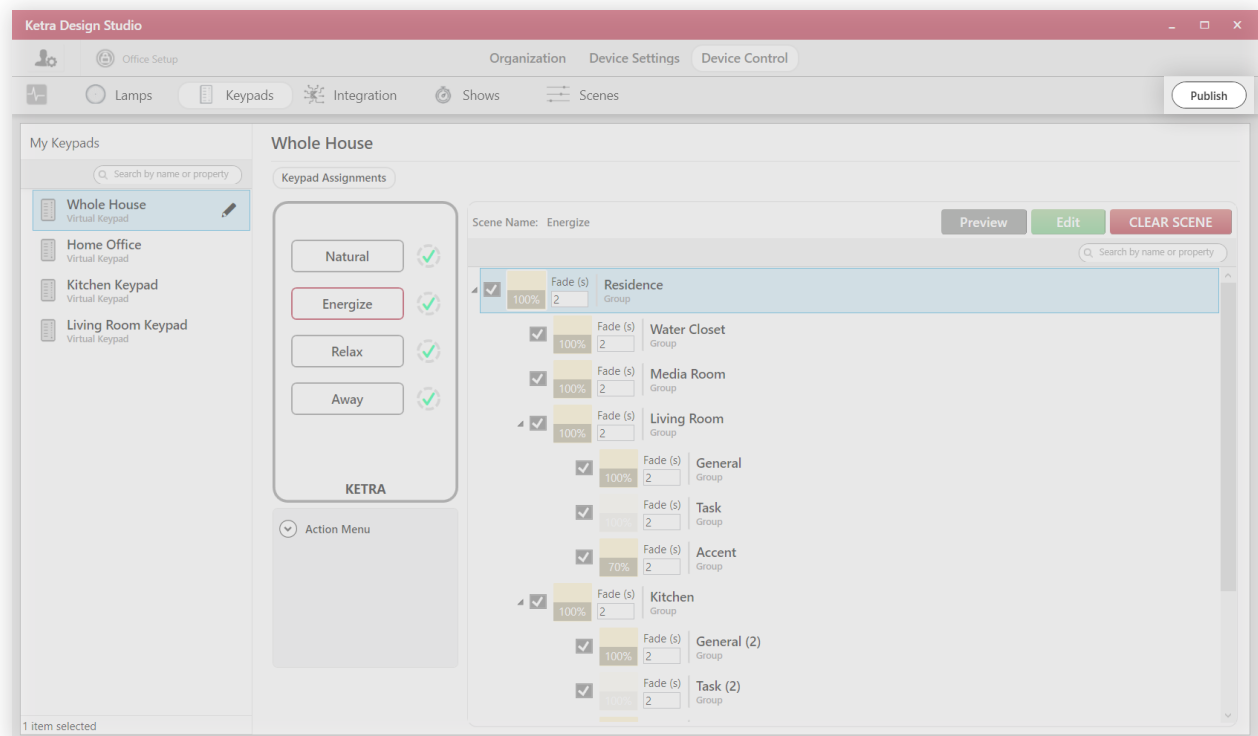
fig. 123

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. 124.
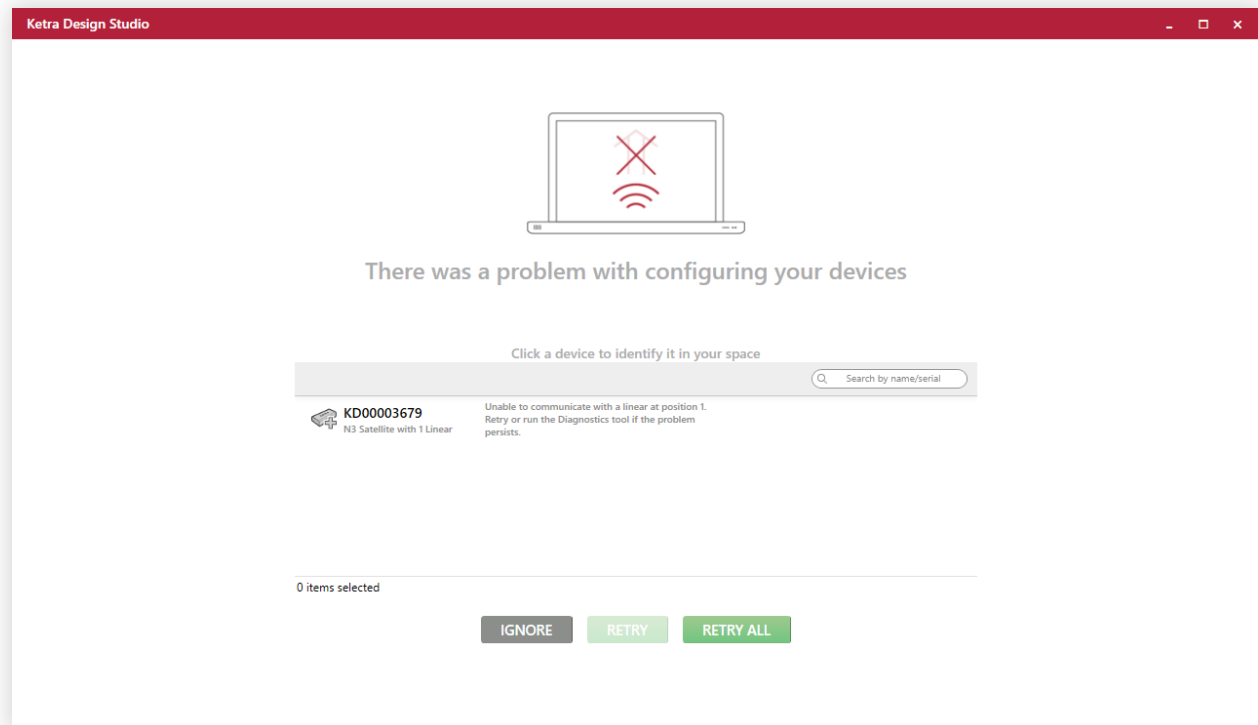
fig. 124

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

- **Ignore** dismisses all errors while publishing. Note that any devices that failed to publish will not have your configurations saved to them. When power-cycled, they will return to their last default state.

- **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 return to the **Organization** tab to perform a diagnostics check. See **Diagnostics**, page 31.

Installation Settings: User Icon and Sidebar

Clicking the user icon in the top-left corner of an installation opens a sidebar, pictured in fig. 125, with several important options.

User Icon
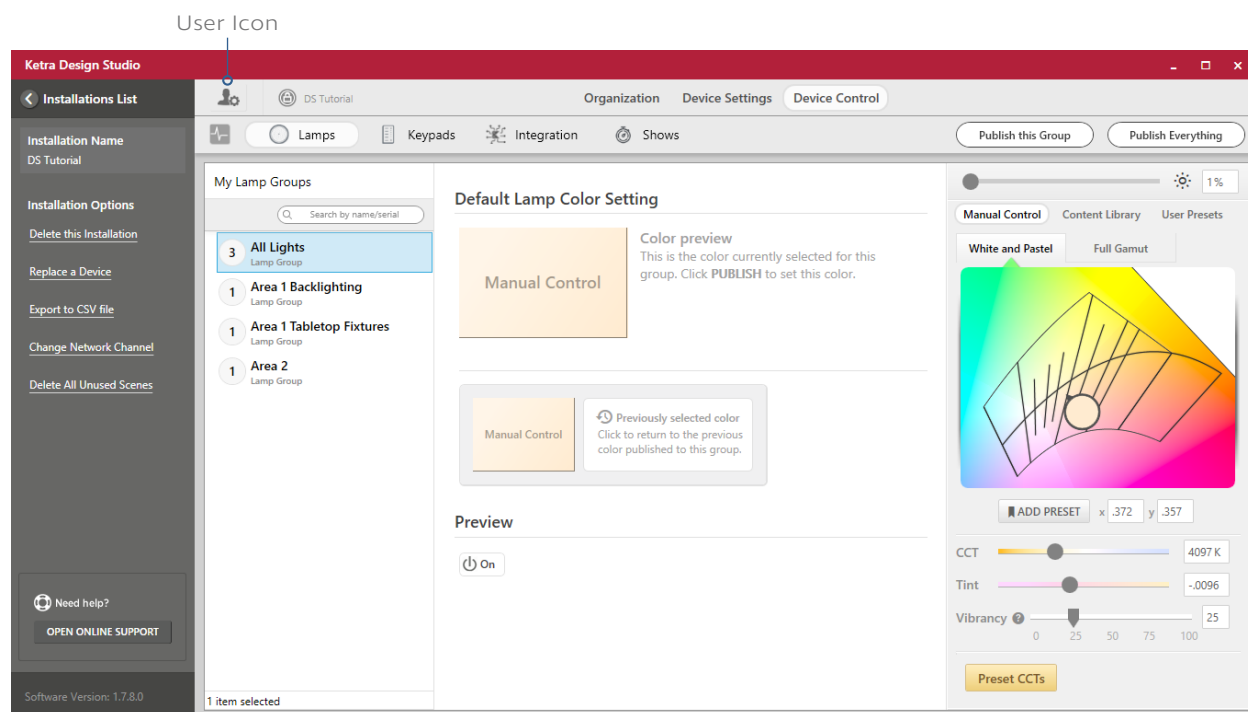
fig. 125

Returning to the Existing Installations List

This option will close your installation and take you back to the **Existing Installations** list. Design Studio will attempt to sync your installation; if you don't have Internet access, the installation will be marked **Sync Pending**. Unpublished changes will not be saved.

Renaming an Installation

You can rename your installation by double-clicking on its name in the **Installation Name** box.

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.com). When you click **DELETE** in the alert pictured in fig. 126, 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.
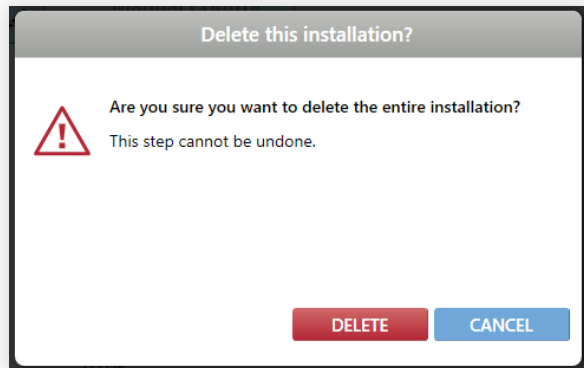
fig. 126

> **Note:** Design Studio requires that all your devices be powered on and in range when you delete the installation. It has to be able to communicate with the devices in order to deprovision them. If Design Studio can't 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 **Tech Tool: Advanced Features: Delete a Device**, page 113.

Replacing a Device

Use **Replace a Device** when one of your lights is no longer functioning and you have received a replacement device from Ketra.

> **Note: Replace a Device** is intended only for devices that are no longer functioning. If you mean to replace a functioning device, deprovision it in the Organization tab and provision the replacement device. See **Managing Devices: Deprovisioning, Regrouping**, page 29.

1   In the installation's sidebar, click **Replace a Device**.

2   **Input the serial numbers of the old device and the new one.** As in fig. 127, you have to enter the serial number of the old device, even if you have renamed it in Design Studio.

> **Note:** Serial numbers can be found on the devices themselves; all begin with two letters followed by eight digits. You can also find a device's serial number in the Organization tab; it appears in the Details panel when you select the device in **My Devices**.

3   **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.

4   Click REPLACE.

fig. 127

Creating a CSV Record of Your Installations

Clicking Export to CSV will create a CSV spreadsheet with information about your installation, like settings and number of devices. CSV files can only be read by Excel or another spreadsheet application; they cannot be read by Design Studio. They are useful for record-keeping, like as-built documents.

Converting to a Secure Installation

Secure installations have two advantages over open installations:

•   **Exclusive control:** All devices get set to a private network unique to that installation, meaning they cannot be discovered by other installations.

•   **Multiple N4 Hubs:** Whereas an open installation can only support one N4 (limiting the installation to 50 devices), a secure installation can support as many as you need.

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.

> **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 **Find a Missing Device**, page 113.

2   In the installation's sidebar, click Convert to Secure Installation. This opens a dialogue box like the one in fig. 128.

3   Select your N4 Hub.

4   Select a channel for your secure installation. 20 and 25 are ideal. The next preferred channels are 11, 14, 16, 19, 21, and 24.

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

6   Click CHANGE.

Convert To Secure Installation

Make sure all Ketra devices are powered on before proceeding. If any failures are ignored, the failing devices will not be on the correct network. Please run Ketra Tech Tool to recover these lost devices.

Channel 15

CHANGE   CANCEL

fig. 128

Changing Network Channel (Secure Installations Only)

When networks are physically close together, they can cause mutual interference if they are on the same channel. For example, two adjacent N4s that are both on channel 20 can cause mutual communication problems because of their proximity. You could fix this problem by changing the channel of one of the N4s.

For instructions, see **Changing a Hub's Channel**, page 30.

Enabling Remote Access

Users can enable remote access to streamline technical support. Enabling remote access allows any shared user to access the installation via Internet connection and then make changes from off-site. Additionally, it enables Lutron and Ketra tech support to remote in and troubleshoot if needed.

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

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 N4 Hubs or replace them.

To enable remote access, click **Enable Remote Access** in the installation sidebar, then click **Yes**.

Tech Tool offers you more advanced controls over your products than Design Studio does. After opening an installation, you have the abilities to add or remove specific G2 emitters from groups, update firmware, configure DMX outputs, and perform advanced installation management functions.

Accessing Tech Tool

Opening Tech Tool

Opening Tech Tool requires that Design Studio be closed.

Opening an Installation in Tech Tool

To begin, select an installation from Tech Tool's copy of your **Existing Installations** list, as in fig. 129.
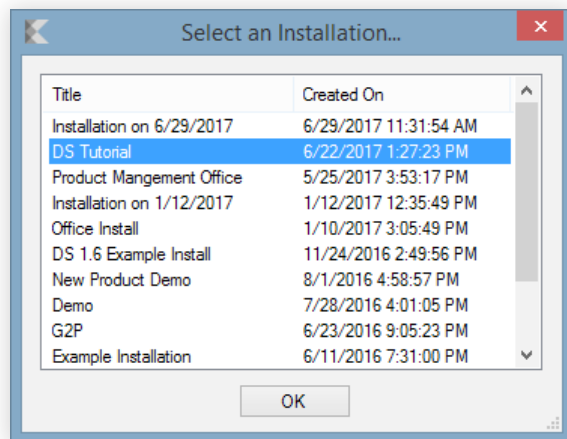
fig. 129

Just like in Design Studio, opening an installation will prompt Tech Tool to re-establish connection to that installation's devices.

> **Note:** If Tech Tool fails to re-establish connection to your devices, it will give you an error message with the options to **Abort**, **Retry**, or **Ignore**. If you click **Ignore** on this message, the devices that failed to communicate will not physically reflect the changes you make, and will not be able to receive published configurations.

After connection has been re-established, you will see the default page for an installation in Tech Tool.

You can return to Tech Tool's Existing Installations list at any time by clicking **Select a Different Installation...** .

Toolbar: Files, Tools, and Help

The toolbar at top of the page gives you a handful of options.

- **File:** Here you have the option to exit Tech Tool.

- **Tools:** Here you can access to an install wizard that will walk you through installing new drivers for your controls devices. If you don't have up-to-date drivers, your controllers won't be able to receive firmware properly by USB cable.

  New drivers are themselves installed with a USB cable connected directly to an X1 Keypad or N3 Satellite.

- **Help:** This gives you basic information about Tech Tool, including the version you have.

Primary Features

Updating Device Firmware

As shown in fig. 130, 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.
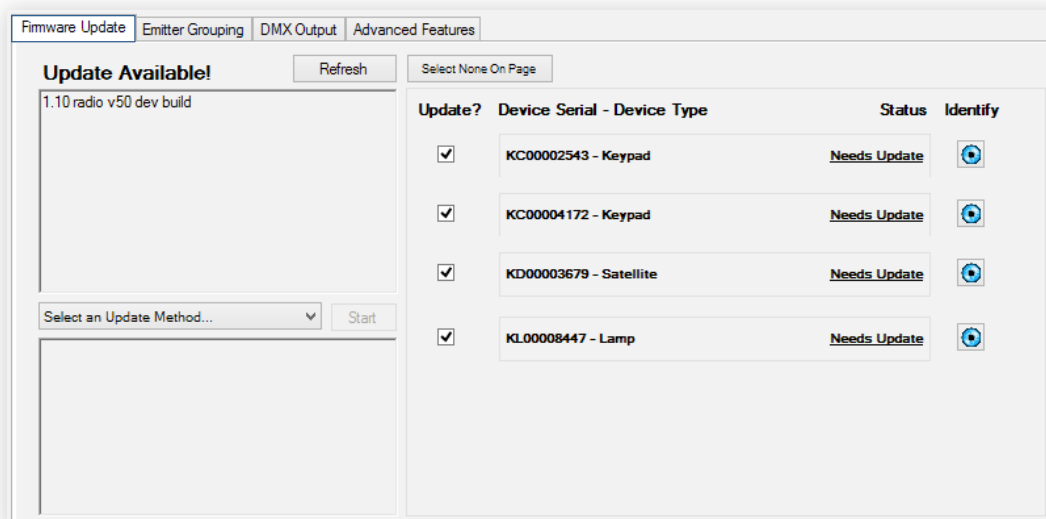

fig. 130

The firmware update can be performed on-site or remotely. Instructions for both are included below.

> **Note:** *75-minute cooldown before update*
> The 1.15 update requires a cooldown period of up to 75 minutes, during which your Ketra lights will be locked into a dim state. The exact length of the period will vary by light depending on the fixture's temperature.

> **Note:** *Loss of line voltage dimming compatibility.* As of firmware 1.12, Ketra lights are not compatible with line voltage dimming. If your installation makes use of line voltage dimming and has not been updated to 1.12 or above, do not update the applicable Ketra lights. Note that you will not be able to access the new keypad functionality.

Before Updating

Plan a time to perform the update.
We recommend performing the update at a time when the space is not in use. Because of the cooldown period associated with the 1.15 update, your lights may dim to minimum brightness for up to 75 minutes. The time required to update the whole installation varies by the number and type of devices and may take several hours. After the 75-minute cooldown, lights and control devices will remain functional throughout the update, though you may notice lights flashing as they reset.

Updating may cause lights to return to default states.
If performing the update at night and the installation includes any sleeping areas, it would be a good idea to set your lights' default state to 1% brightness in Design Studio's Device Control > Lamps tab. That way if the lights come on in the middle of the night, they won't wake anyone up. The next day, after the update is complete, you can return to Device Control > Lamps and set the default state to whatever it was before.

Try to resolve any communication issues before updating.
Use the Diagnostics tool in Design Studio (fig. 131) 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.
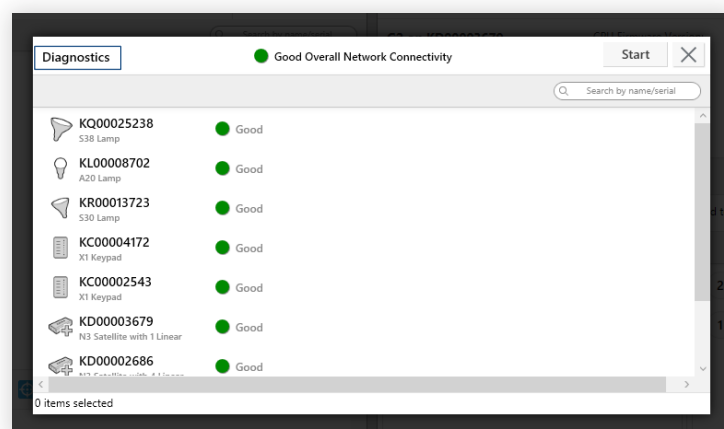
fig. 131

For remote updates, ensure the installation is remote access enabled. (See fig. 132)
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 on all N4 Hubs. To enable remote access, open the installation in Design Studio, click the gear-head icon in the top-left corner to open the sidebar, and click Enable Remote Access.
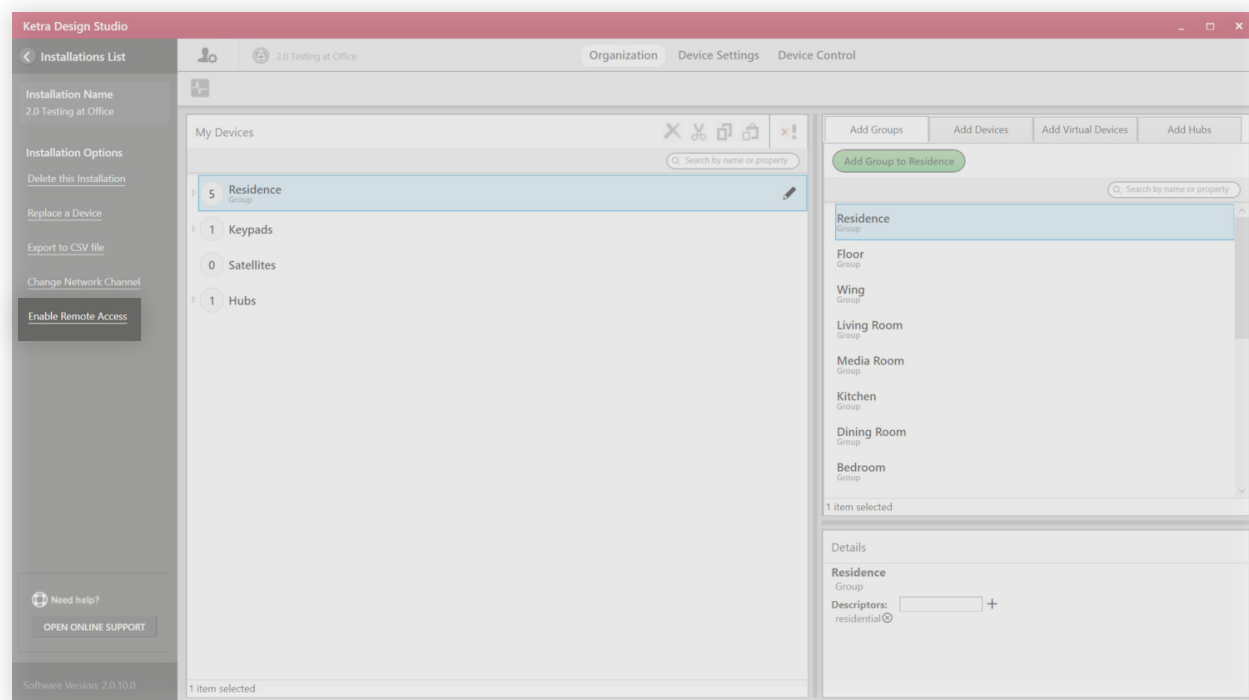
Enabling remote access

fig. 132

Performing the Update

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

1   Open Ketra Tech Tool.

2   Select the installation from the "Select an Installation…" list.

3   If performing remotely, click Yes in the remote connection popup.
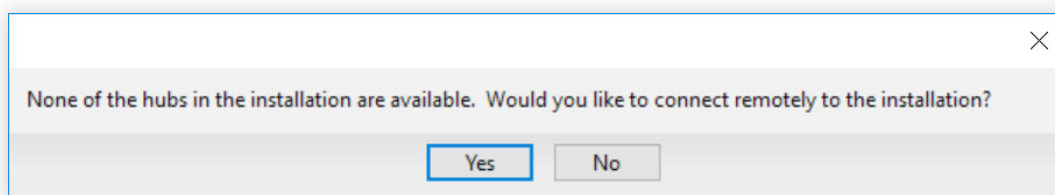
fig. 133

> **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 on all N4 Hubs.

4   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.

fig. 134

5   In the **Update Method** dropdown, choose **Upgrade From Control Device(s)**.
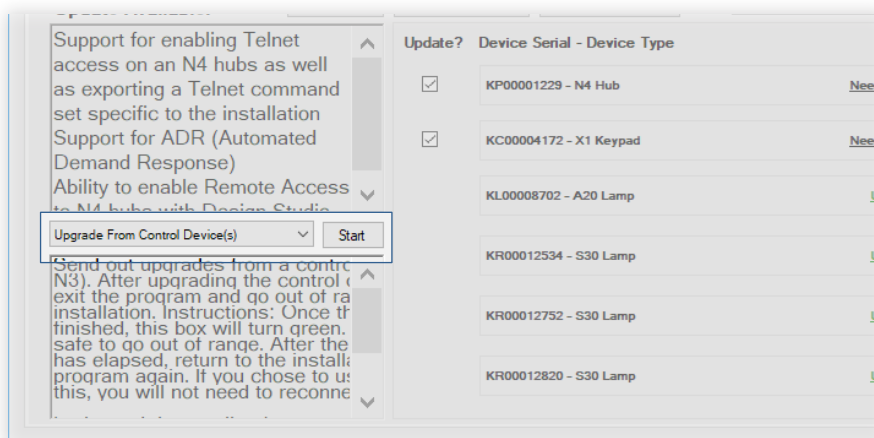
fig. 135

6   Click **Start.** If a popup warning appears, click **Yes**. Tech Tool will first update your installation's N4s, and then the N4s will propagate the update to the devices on their KNets.
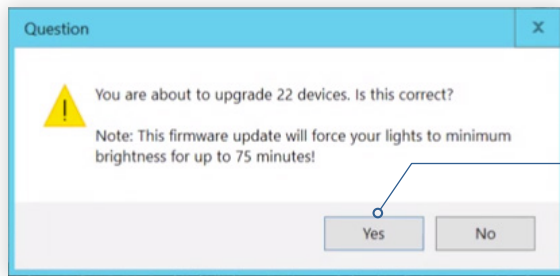
Click **Yes** if a popup warning appears.

fig. 136

7   **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.
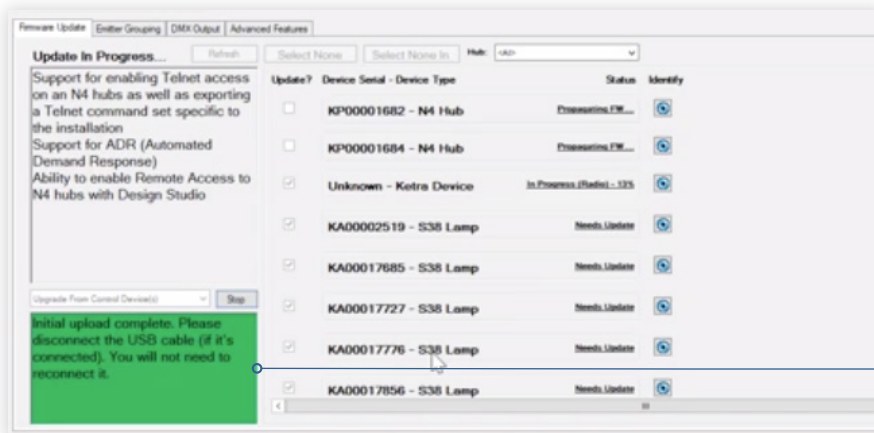
Okay to close Tech Tool (N4 only)

fig. 137

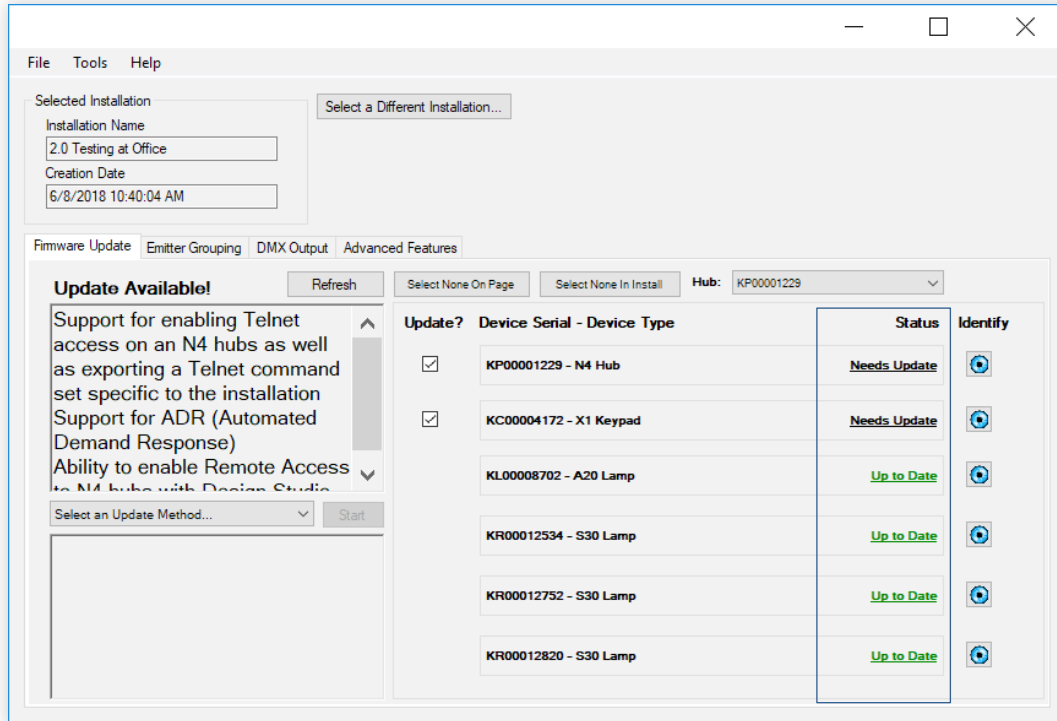> **Note:** If older lights are later added to the installation, they will require the update to 1.15. Until they receive the update, the **Device Control** tab in Design Studio will be grayed out.

Assigning Individual G2 Emitters to Groups

Whereas Design Studio treats all luminaires connected to a single N3 Satellite as essentially one light, Tech Tool allows you to control not just each linear fixture but also each one of the six emitters per fixture. This is useful if, for example, you want a button to make every other fixture go to one light state and the remainder go to a different light state.

To group linear emitters, navigate to Tech Tool's Emitter Grouping tab.

fig. 138

> **Note:** While you can change group memberships in this area of Tech Tool, you must use the Organization tab in Design Studio to build the groups that you plan to put the emitters into.

Checkboxes in this window represent individual emitters on G2-family luminaires. If a box is checked, it means that the emitter is part of the group you have selected next to **Select By**.

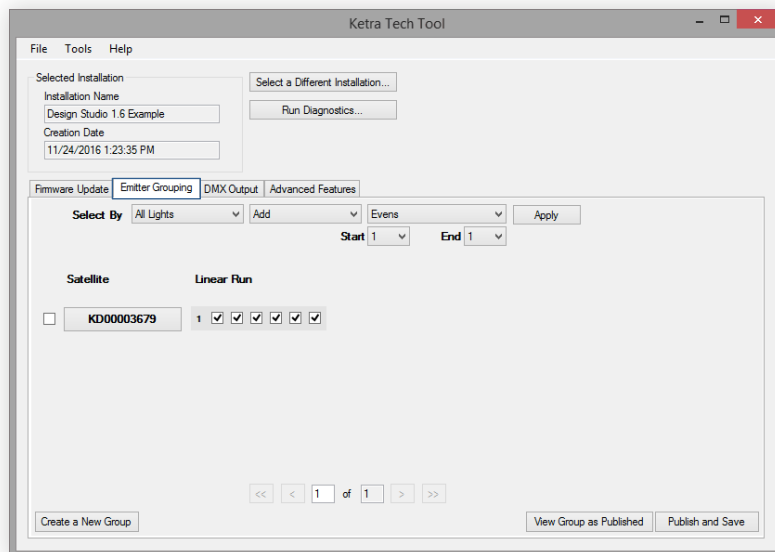To add or remove linear fixtures or emitters from a group, use the dropdowns that come directly after **Select By** to determine which addresses you will apply changes to. Refer to fig. 138 for locations.

1   **Select a hub.** Use the dropdown to pick the hub whose group you want to edit.

2   **Select a group.** You can either add or remove emitter addresses from this group. The group does not need to have linear fixtures already. If the group already has linear fixtures, you will notice that for each fixture attached to a given N3 Satellite, all six checkboxes will auto-check.

> **Note:** The View Group as Published button at bottom will help you identify which lights in your installation are part of a certain group. All lights will temporarily turn red, and then lights in the group will change to green.

3   **Check the boxes next to the linear runs you want to edit.** Since the selected group may have multiple runs of linears, Tech Tool lets you pick and choose runs to edit.

4   **Choose whether to add or remove.** This determines whether you are putting addresses into the group or subtracting them from the group.

5   **Choose a range of addresses to add or remove.** A "run" is all the luminaires connected to a single N3 Satellite, while a "fixture" is each individual foot of luminaire. So choosing **Entire Run** in this dropdown will add to or remove from the group all fixtures attached to the selected N3 Satellite, whereas choosing **Odds** will add to or remove from the group all odd-numbered emitters per fixture.

> **Note:** You can also manually check or uncheck boxes to control whether those emitters are part of your group.

6   **Choose a start and end fixture.** This enables you to apply your addition/removal to only a specific range of luminaires attached to a N3 Satellite, rather than the entire run.

7   **Click** Apply**.** You will notice that the checkboxes become checked or unchecked depending on what you've selected in the dropdowns. Your installation will not change yet; this only applies the changes to the mockup display lower in the window.

8   **Publish your changes.** Clicking the **Publish and Save** button will confirm your settings and alter your Design Studio installation to reflect your changes. Your changes will take effect in the lights themselves at once.
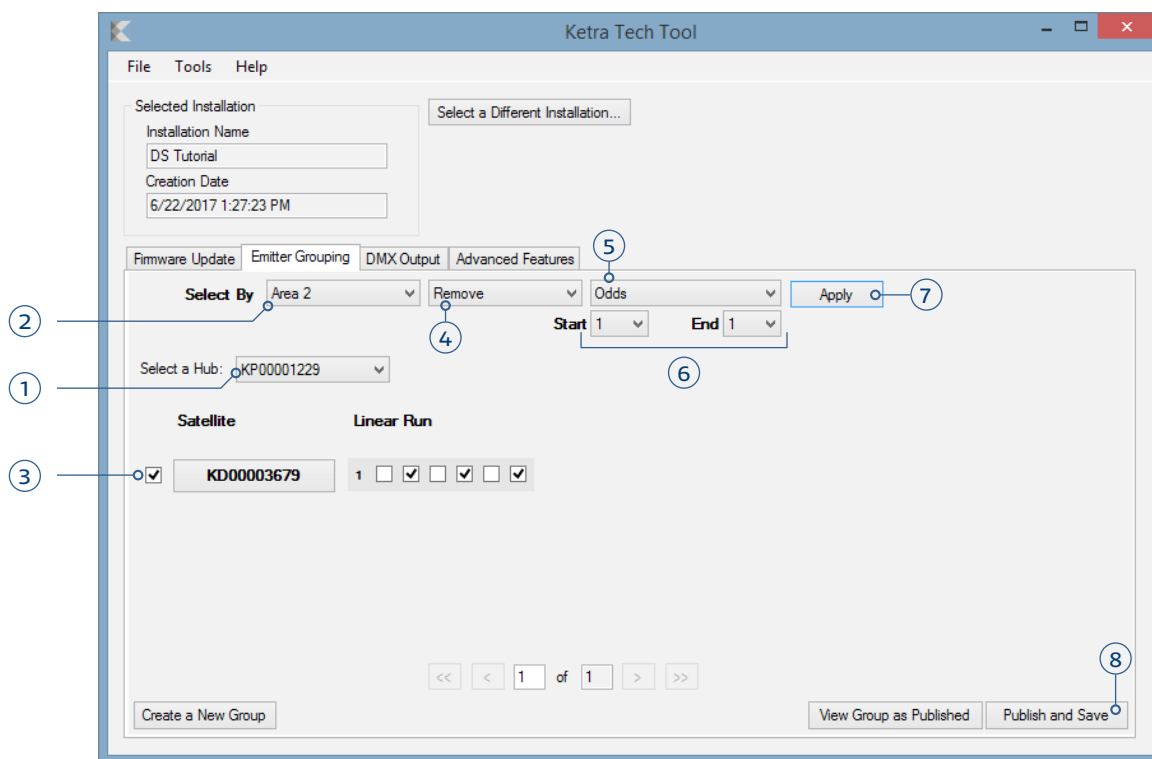
fig. 139

Configuring DMX Output

In the **DMX Output** tab pictured in fig. 140, you can direct your N3 Satellite to act as DMX master.
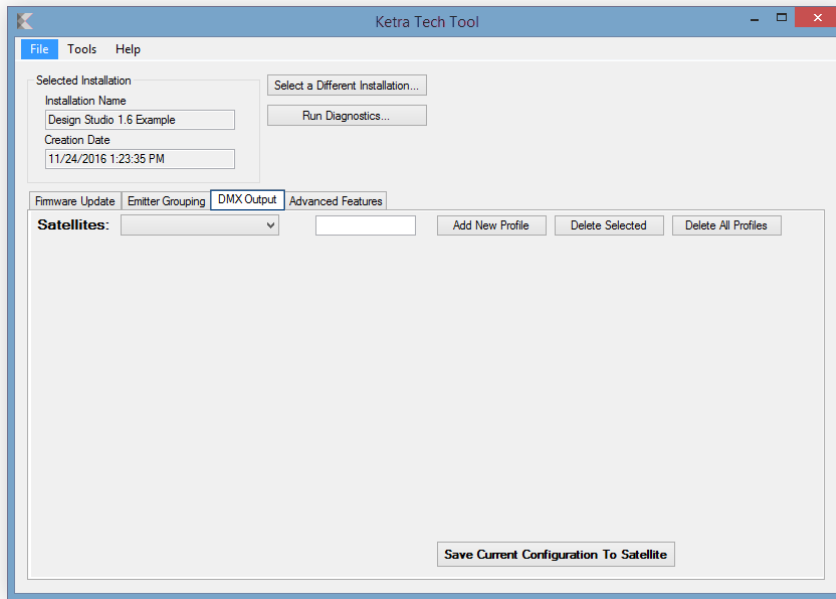
fig. 140

Follow these steps:

1   Choose an N3 Satellite to configure. To do this, use the dropdown after Satellites:, as in fig. 141.

Note: Tech Tool's default configuration for N3 Satellites is DMX slave, not master. If you want the device to remain a DMX slave, simply choose an N3, click **Save Current Configuration To Satellite**, and skip to step 7.
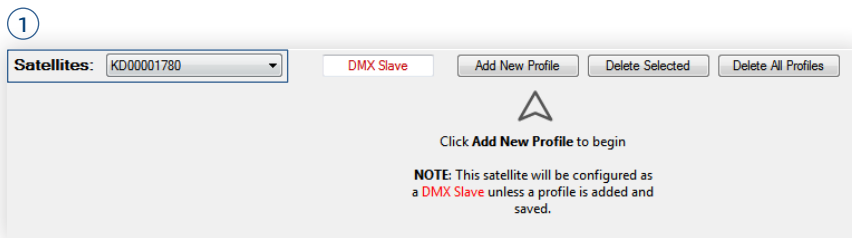
fig. 141

2   Click Add New Profile. Adding a profile will automatically change the "**DMX slave**" field to "DMX master."

3   **Configure your profile.** As in fig. 142, choose from the dropdown of supported profile types, and select a starting channel. Make sure the checkbox next to the profile dropdown is checked if you want your configurations to be saved to the N3 Satellite.

> **Note:** Whatever channel you choose to start from, Tech Tool will reserve a certain number of the immediately following channels, based on how many channels are required for your profile. For example, an RGB 8-bit profile requires the use of three channels, so if you choose to start with channel 1, Tech Tool will reserve channels 1-3; if you choose to start with channel 510, Tech Tool will reserve channels 510-512.

4   **Name your profile.**
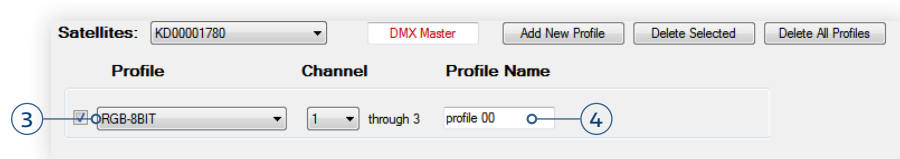
fig. 142

5   *Optional:* **Add additional profiles.** Click Add New Profile. You can then select the new profile's type. The next available channel will be populated in the list, and any channels that you've already used will not appear.

> **Note:** To delete a profile or profiles, select the ones you want to delete using the checkboxes at left, and then click Delete Selected. You can also click Delete All Profiles.

6   **Publish your settings.** When you're happy with your configurations, click Save Current Configurations To Satellites at the bottom of the window. This sends your DMX settings to the device.

    Once you've published, you can close Tech Tool.

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

fig. 143

8   Navigate to Device Control > Scenes.

9   Confirm that the **Content Settings** pane (right) has a tab labeled "3rd Party Outputs."

fig. 144

10   **Customize the scene as needed.** As in any other scene, you may use **Tree View** or **Template View**. You can use the **Content Settings** pane to set lights' color and intensity as well as the third party outputs' settings.

fig. 145

Advanced Features

In the Advanced Features tab of Tech Tool, you can:

- Remove a malfunctioning device from the installation; see Delete a Device, page 113
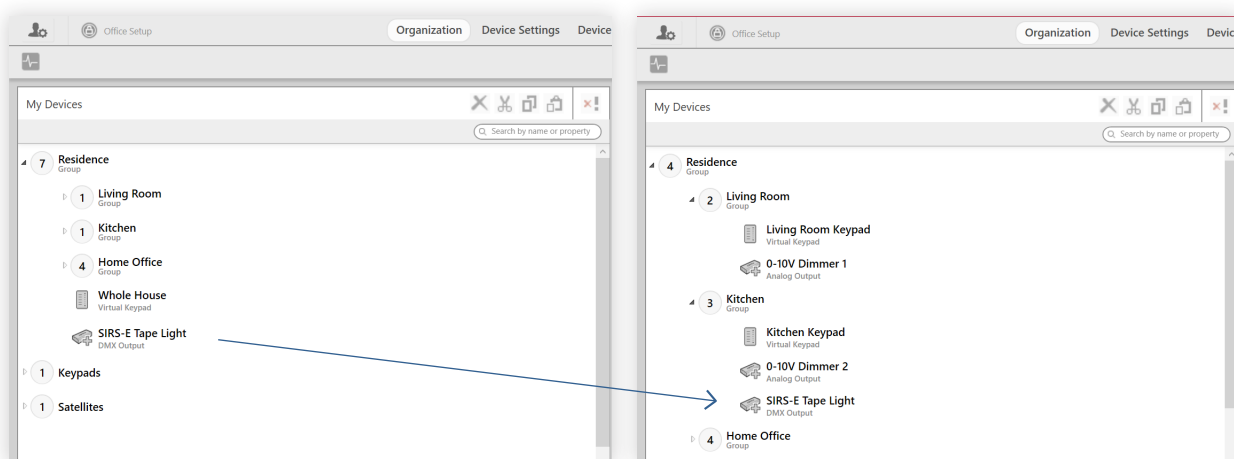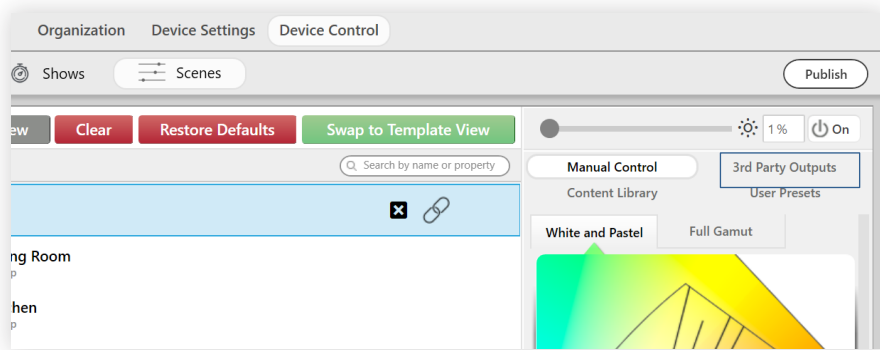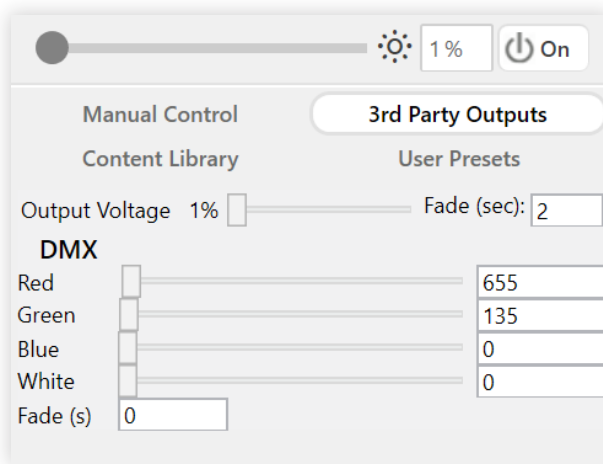
- Find an uncommunicative device in your installation; see Find Missing Device, page 113

- Set custom DNS addresses for an N4 in your installation; see N4 Settings: Custom DNS, below

Use the **Select a Feature:** dropdown to pick a feature.

Delete a Device

This tool removes all record of a device or devices from your installation. This is useful if, for example, you are trying to delete your installation, but Design Studio won't let you because it can't talk to one missing or malfunctioning device.

Use this tool if:

- a device or devices are not communicating in an **open** installation

  OR

- a device or devices are not communicating in a **secure** installation, and you have already tried Find a Missing Device (see below)

> **Note:** It is not necessary to have the device or devices powered on before you use this tool.

Find a Missing Device

Use this tool if a device has lost communication with a secure installation. This is used most often if a device has failed to move to a new channel after performing a Change Network Channel. The tool searches all of the installation's current and former KNets for any devices that a) have been deprovisioned, or b) Design Studio has no record of.

> **Note:** Find a Missing Device should only be used if you have a secure installation, as it will be searching private networks. In open installations, lights are not on private networks, so Find a Missing Device will not find them.

After finding your device, you can deprovision it to ensure that Design Studio will be able to discover it again. Return to Design Studio and to your installation's Organization tab. Click Add New Devices. You should see the missing device.

N4 Settings: Custom DNS

The N4 Settings feature 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.

- **Black body locus (or *Black body curve*):** In physics, the natural arc of visible light that a very hot object emits as it heats up. Objects heated to relatively low temperatures emit a red glow—but as they continue to heat to 10000K (see *Kelvin*) and above, their emission is brighter and bluer; this is why the hottest flames (like those that welders use) are blueish white, not red.

  Objects tend to follow the black body locus with some variation (see *Correlated color temperature*) as they heat. The locus itself is based on the heating of a black body, an idealized object that absorbs all electromagnetic radiation (EMR) and emits its own EMR at corresponding wavelengths.

  The black body locus is illustrated by the CIE 1931 color diagram, which Design Studio reproduces in its Manual Control pane.

- **Channel:** An individual radio frequency band used for communication by KetraNet Mesh-enabled devices (see *KetraNet Mesh*). All KetraNet Mesh-enabled devices use a channel; the factory default is channel 25, but in a secure installation (see Secure installation in Installation) you are allowed to choose a channel. KetraNet Mesh-enabled devices are also on a communication network (see *Network*).

- **Chromaticity:** On a color diagram, refers to the x, y coordinates of a color. Unlike color space (see *Color space*), chromaticity is a two-dimensional measure because it lacks intensity.

- **Color rendering index (or *CRI*):** A quantitative assessment of the ability of a light source to illuminate an object without changing that object's color. The highest possible index is 100, corresponding to natural light; Ketra lights can illuminate objects with 90+ CRI when shining white light.

- **Color space:** A three-dimensional color configuration incorporating intensity as well as the two dimensions of chromaticity (see *Chromaticity*).

- **Commission (v):** To fully configure devices in an installation (see *Installation*). Can include programming scenes/shows (see *Scene*, *Show*), manually controlling groups (see *Group*), etc.

- **Correlated color temperature (or CCT)**: The temperature in Kelvin (see Kelvin) approximately corresponding to a given point on or near the black body locus (see *Black body locus*). Since no object is a perfect black body, heated objects generally emit colors that fall close to but not on the black body locus in a color diagram; CCT is useful as a calculation of how hot the object must be given the wavelength it's emitting.

  Design Studio calculates the CCT automatically for any color you choose in the Manual Control: White & Pastel section, since those colors are near the black body locus.

- **Current sink:** A control protocol for dimming ballasts, which limit the voltage going to devices on a single circuit. At maximum input (10V or 24V), lights shine at full intensity, whereas at minimum (0V), lights are off.

- **Current source:** A control protocol for theatrical dimming consoles, in which the console provides the voltage going to devices. At maximum input (10V or 24V), lights shine at full intensity, whereas at minimum (0V), lights are off.

- **Default state:** The state that Ketra lights return to when power-cycled. Publishing (see *Publish*) sets new defaults for lights. The factory default—i.e. the state that lights return to if never published with alternate configurations—is 100% intensity, 3000K.

- **Dimming curve (or Dim curve):** Refers to the shape of the curve resulting from a graph of intensity power value vs. the perceived brightness of a light source. For example, see the model of Ketra's exponential dimming curve on page 37. Design Studio allows for three types of dimming curve—Ketra, linear, and square law—which can be selected in the Dimmer section of the Integration tab.

  Linear and square law curves are commonly used by lighting designers. Linear dimming curves match input with voltage so that a 10% increase in intensity leads to a 10% increase in voltage. Square law dimming curves enhance the visibility of intensity adjustments at low levels; this is useful especially with incandescent lights, since by default much of their emission at very low intensity levels is in the infrared part of the spectrum, rather than visible.

- **Discover (v):** To search a wireless channel (see *Channel*) for a device or devices; to find a device or devices by wireless communication.

- **Group (n):** A collection of devices (including lights, keypads, and third-party outputs) assembled by you in the Organization tab of Design Studio. Groups can contain any number of devices—including zero. In Design Studio, you issue commands to groups, not directly to devices. **(v):** To add devices to a group.

- **Installation: 1.** A single file in Design Studio, comprising all your devices grouped (see *Group*) for control as well as any configurations set to those devices. Installations are accessed from the Existing Installations list in Design Studio.

  Roughly, the workflow for an installation goes: Discovery, Provisioning, Commissioning. (See *Discover*, *Provision*, *Commission*.)

  Installations can be configured as *secure* or *open*.

  - **Secure installation:** An installation in which devices are provisioned to a unique and private network (see *Network*), on a channel (see *Channel*) specified by you. Devices will be inaccessible to other installations. Any permanent installations should be configured as secure.

  - **Open installation:** An installation in which devices are left on Ketra's default network and channel. Other installations will be able to discover, provision, and commission the devices; if they do, you will not have exclusive control.

- **(Installation) 2.** The actual lighting solution in a given physical space. Can consist of multiple KetraNet installations (sense 1) networked together.

- **Kelvin:** The scientific standard unit for temperature measurement, where 0K = absolute zero. Ketra measures *CCT* (see *Correlated color temperature*) in Kelvin.

- **KetraNet Mesh:** Ketra's system of wireless communication with Ketra devices. All Ketra devices—with the exception of luminaires (see *Luminaires*)—contain radio chips tuned to unique frequencies (see *Channel*).

- **KNet:** A term for a KetraNet Mesh wireless network. See *Network*.

- **Luminaire:** A generic term for any complete lighting fixture, including G2 Linears, G2 Pendants, and Downlights. Some Ketra lighting devices—namely S30s, S38s, and A20s—don't come with their own housing, and are therefore referred to as lamps instead of luminaires.

- **Master intensity:** The intensity limit of all devices in a group (see *Group*) or groups. Each device's individual intensity setting changes in proportion to master intensity. For example, if you had a scene with group 1 at 50% intensity and group 2 at 100% intensity, setting master intensity to

20% would result in group 1 going to 10% intensity and group 2 going to 20% intensity. Master intensity is not set in Design Studio, but rather with a keypad intensity control, DMX master intensity profile, or 0-10V input master intensity profile.

- **Network:** A set of KetraNet Mesh-enabled devices (see *KetraNet Mesh*) that are able to communicate only with each other; devices on other networks will not be able to communicate with them. All KetraNet Mesh-enabled devices are on a network, just like all are on a channel (see *Channel*).

  For the difference between networks and channels, consider this example: Two installations (see *Installation*, sense 2), both on channel 15, each on a private network. Because they are on the same channel, their KetraNet Mesh-enabled devices are tuned to receive commands on the same radio frequency. However, because each is on a private network, each will ignore commands intended for the other installation.

- **Node:** A single KetraNet Mesh-enabled device (see *KetraNet Mesh*) in a network (see *Network*). An installation (see *Installation*, sense 1) can consist of 50 wireless nodes. A node may be a light or other device. Essentially, every KetraNet Mesh-enabled device is a wireless repeater, relaying signal to other devices on the network. An installation should have at least one wireless node per 50 ft of floor space.

- **PAN:** Personal Area Network, a term for a KetraNet Mesh wireless network. See *Network*.

- **Provision (v):** To add devices to a certain network (see *Network*) and channel (see *Channel*). Provisioning happens automatically when you group a lamp or luminaire (see *Group*).

- **Publish (v):** To save configurations and default states (see *Default state*) to your devices. Devices must be powered on to receive the data by wireless communication.

- **Scene:** A static configuration for your lights, activated by a control device such as a keypad or an Analog-enabled N3 Satellite.

- **Show (or Time trigger show):** A dynamic configuration for your lights involving triggers (see *Trigger*). Lights shift between settings over time, and they continue doing so until another scene or show is activated. An example of a show would be a circadian lighting display that changes over the course of the day.

- **Spectral power distribution (or SPD):** A measurement of the power of a light source emitting each possible wavelength in the visible spectrum. SPD is the starting point from which other quantitative parameters of light, such as chromaticity (see *Chromaticity*) are calculated.

- **Trigger:** A component of a show (see *Show*). A trigger consists of a time and a scene; when the show is running, the scene will be triggered at the given time. A show can consist of any number of triggers.

SUPPORT

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