Ronin Sentinel

User Manual

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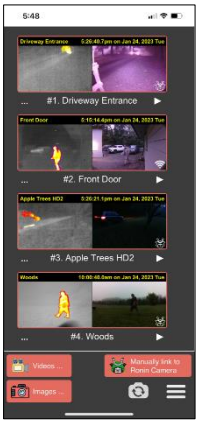
Table of Contents

I. Introduction & Setup

The **Ronin Sentinel** is a radio base station for coordinating and communicating by radio, WiFi, and USB to connected **Ronin Cameras**. It is intended to be used either as a permanent installation mounted to a wall or placed on a desktop, or it can also operate as portable unit for those situations where you want to download captured Ronin Camera pictures by bringing the Sentinel into range of the already placed Ronin Camera.

Users can use the Ronin Sentinel to setup new cameras, view a live image, download saved images or videos, and control their Ronin Cameras using Radio, WiFi, or a USB link. The Sentinel handles all incoming alert messages from the cameras and forwards them out for free by email and text (*) to specified phones or other devices (free texting requires you to use a cell plan that allows for free texting).



The Sentinel also acts as a central server for the **Ronin Camera Link App**. If you are on the same network as the Sentinel, this free app allows your Android or iOS device, Windows PC, or Mac to view connected cameras and communicate with them through the Sentinel even when camera is linked by Radio and many miles away.

The Ronin Camera Link app also manages the images and videos stored on the Sentinel or directly downloaded to your device from an SD card. Users can save images or videos in various formats including the ability to create point-by-point temperature maps from FLIR images or videos.

Users typically install the Ronin Sentinel permanently to a wall or set it on a desk in a location with network access. When the Sentinel is functioning as a mobile device it is brought within radio range to one or more cameras and 12V is connected from a car or battery pack. The Sentinel wakes up and then immediately searches for available cameras. When a camera is found, captured images or videos can be downloaded automatically or by a simple button push eliminating the need to disturb the blind, stand, or other location after the initial camera placement.

I.a. Sentinel Power

The Sentinel is powered by connecting 12V to the plug on the side of the unit. Under most situations this will be from the included wall adapter, however you can also power it from a car adapter or an external 12V battery. Contact Diamond Edge Technology for more information on power options.

Plugging the unit in will automatically boot up the built-in software and show a screen like this when the Sentinel is ready and first being setup (this may take 1-3 minutes). The front panel is a touchscreen, so simply tap the Next button to walk through the setup guide and start using the Ronin Sentinel!

Advanced users can tap Skip to immediately begin using the Ronin Sentinel. Cameras can be added at any time.

Please read the Antenna information in the next section before proceeding (if you have not already done so).

I.b. Antenna Installation

The antenna used with the Sentinel is critical for reliable communication to radio connected cameras. Before proceeding with setup, it is a good idea to first install and configure the antenna you are going to use with the Sentinel.

The biggest factors affecting the quality of radio communications with Ronin Cameras is the speed of communication, the antenna size and placement, and the terrain. Having direct line of sight between two antennas is the ideal situation, but this is rarely achievable in real life. Going through buildings and trees will reduce range, and a mountain or hill can completely block the radio signal.

Good antenna type selection and antenna placement can help compensate for terrain and distance issues. The standard antenna that comes with the Ronin is a 5dBi 915Mhz antenna that looks like this:

This can be screwed into the SMA connector at the top of the Sentinel for immediate use with Ronin Cameras.

However, this small standard antenna is usually not adequate for ranges greater than about ¼ to 1 mile (depending on terrain and other conditions).

If it is necessary to use a different antenna for your location, the key parameters are the antenna frequency and the "dBi" value. Always use an antenna that is specifically designed for the 900 to 915Mhz range. The larger the "dBi" value the greater the amplification of the signal. However, higher dBi values are more expensive, bigger, and can require more complicated mounting. In addition, not all antennas are suitable for this product so care must be taken in selection.

An "omni-directional" antenna like the image below is one that can transmit and receive from any direction and works extremely well with the Sentinel base station, especially when mounted high up on a roof or tree. Mounting an antenna like this to your roof and connecting it to the Sentinel with a low-loss antenna cable is an excellent option for improving the range and quality of your radio communication:

The most powerful antennas are usually those that are labeled as "Yagi" antennas. A Yagi antenna has a specific direction and it works best when you point it towards the Sentinel or the cameras. However, this is only a good choice for the Sentinel if all the cameras are in roughly the same direction. A Yagi antenna like the one below is usually a better choice for the Ronin Camera since it only must point at the Sentinel to be effective:

I.b.1. Daisy Chaining Cameras

At extreme long ranges the Ronin Camera and Ronin Sentinel can daisy chain together to extend the range even further. As long as the closest camera can reach the Sentinel base station, and the other cameras can reach each other, then the range can be extended further than 9 miles. However, daisy chaining does slow the system down since each transmission must be repeated along the chain.

I.b.2. Antenna Summary

For distances less than 1/4 mile or 1500 feet, the system usually works very easily right out of the box. Even from inside a building or house you can typically reach the cameras with the highest speed possible and never give it another thought.

For distances greater than 1/4 mile, or when terrain is an issue, additional effort may be required. Placing an omni-directional antenna on the roof for the Sentinel base station is a great first step and, if necessary, slowing down the speed to Medium or Low speed will greatly extend the range (see section **II.g.1. Radio Connection** for speed information). This is all that is necessary for most customers.

For very challenging configurations with long distances and difficult terrains, customers can add higher dBi antennas to both the cameras and the Sentinel. An omni-directional antenna on the roof for the Sentinel is a good choice along with Yagi antennas for each camera mounted as high as possible and pointed towards the Sentinel base station. *Height of the antennas is an extremely most important factor in improving range.* If this is still not enough, turning on daisy chaining between the cameras can exponentially increase the maximum distance to as much as 50 miles!

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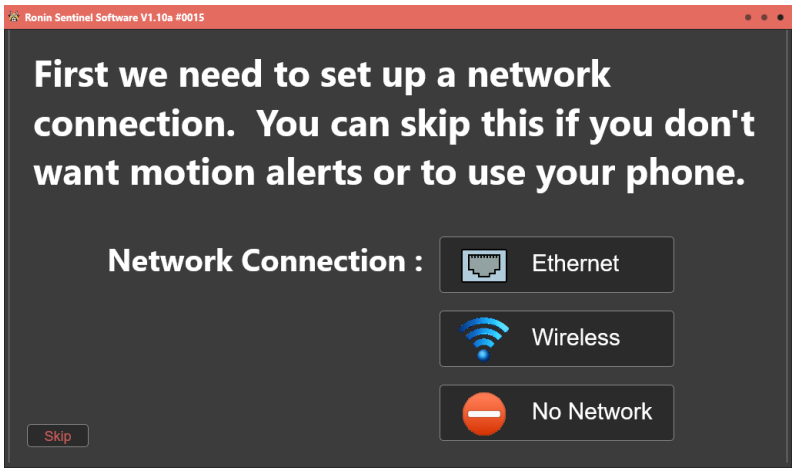
I.c. Sentinel Network Connection

Now that the antenna is setup, the next step is to configure the network connection for the Ronin Sentinel:

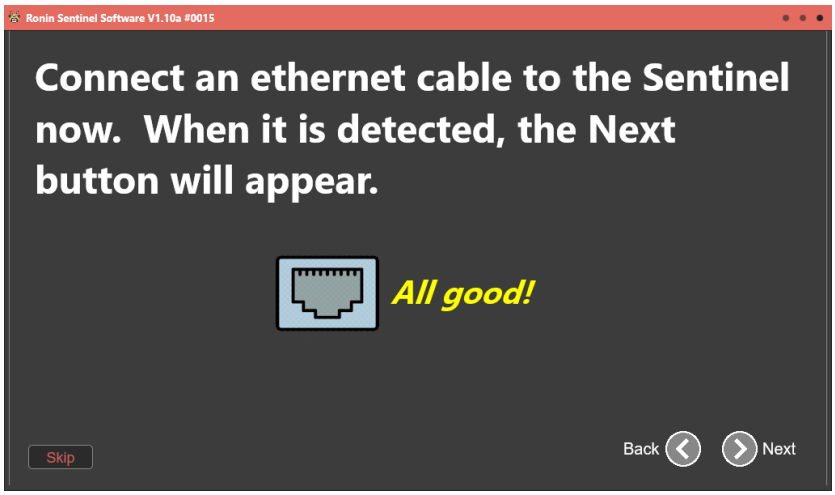


A network connection with access to the internet is necessary if you want the Sentinel to be able to send you free email and/or text alerts when motion is detected from the cameras. In addition, if you want to be able to use the Ronin Camera Link app with the Sentinel to communicate to your cameras from your phone or other device, then a local wireless network connection to both the Sentinel and your phone or other device is required. This is completely optional - you do not have to allow the Sentinel internet or local network access and it will still download images and videos from Radio connected cameras. **However**, it is necessary to have internet access to receive email/text alerts, and local network access for the Ronin Camera Link app to function with the Sentinel.

Option	*Description*
Ethernet	Select this if you have or want to plug an Ethernet cable into the Ethernet port on the side of the Sentinel.
Wireless	Select this if you want to connect the Sentinel to an existing wireless network (with or without internet access).
No Network	Select this if you do not want to allow the Sentinel network access. In this case, you can only see camera activity, Live View cameras, and change camera configuration directly from the Ronin Sentinel touchscreen.

II.c.1. Ethernet

Selecting Ethernet will display a network status screen. Plug in your ethernet cable and make sure it says “All Good” before proceeding:



II.c.2. Wireless

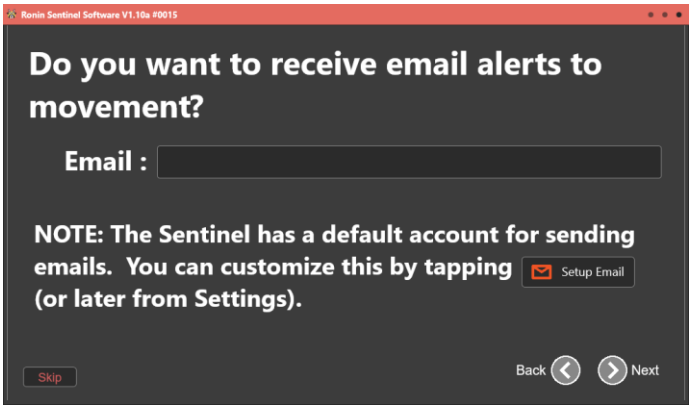
Selecting Wireless will display a list of available wireless networks to the Ronin Sentinel like this:

Select the network you want to use and enter the network password. When ready, tap **Link** to connect the Sentinel to this network.

If the connection succeeds the Sentinel will inform you and allow you to move to the next step.

I.d. Email Alerts

If a network connection has been selected (either Wireless or Ethernet), the next step is to enter in the email addresses you want to receive email alerts on. This is optional, and you can leave it blank to skip sending email alerts.

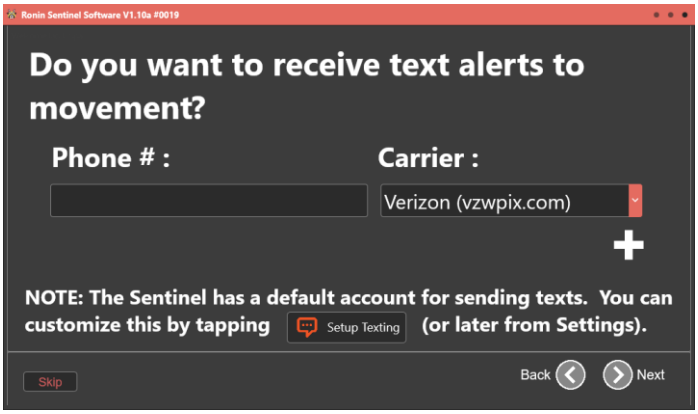


Enter in one or more email addresses separated by a comma. If you want to customize how emails are sent from the Sentinel you can tap Setup Email button (see section VII.a.5. for more information).

All Sentinels are pre-programmed with a free email account that is used by default for sending emails and text message alerts. You can customize this, or simply use the pre-setup account.

I.e. Text Alerts

If a network connection has been selected (either Wireless or Ethernet), the next step is to enter in the phone numbers of the devices you want to receive text alerts. This is a very useful feature because the free text messages will be sent no matter where you are in the world (as long as your phone carrier supports this) and they include an attached image or video of the alert. You will also receive alerts in the case of a low battery or if the Ronin Camera stops responding.

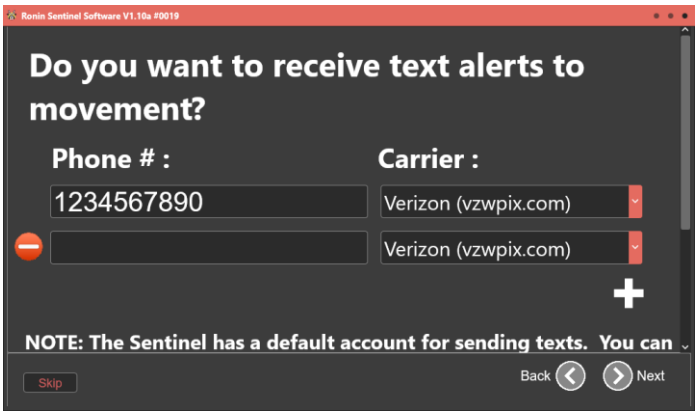


Enter the phone number you want to send and select the carrier this phone uses (Verizon, AT&T, etc).

The default setup is to use the free texting service that comes as part of the Sentinel package. This uses a specific email address for each carrier to send text messages to phone numbers.

You can also setup your own email server for texting using the "Setup Texting" button now or later in advanced settings.

To add additional numbers to send text messages to, tap the [+] button to get an additional line:

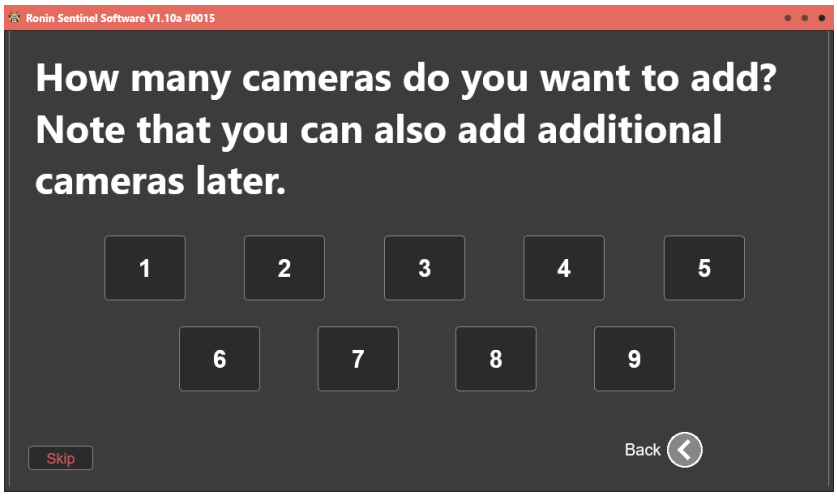


You can add multiple numbers by repeatedly tapping the [+] button. Delete any individual entry by tapping the [–] button.

When finished, tap [Next] to move on.

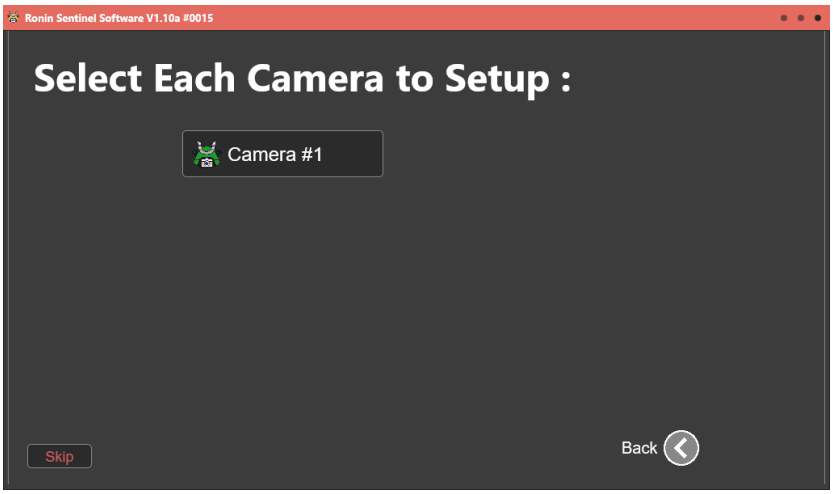
I.f. Add Cameras

Choose the number of cameras you want to setup to use with your Sentinel. You can always add or remove cameras later, but this initial setup helps guide you through setting up cameras to use with the Sentinel:



Tap [Skip] if you want to add cameras later.

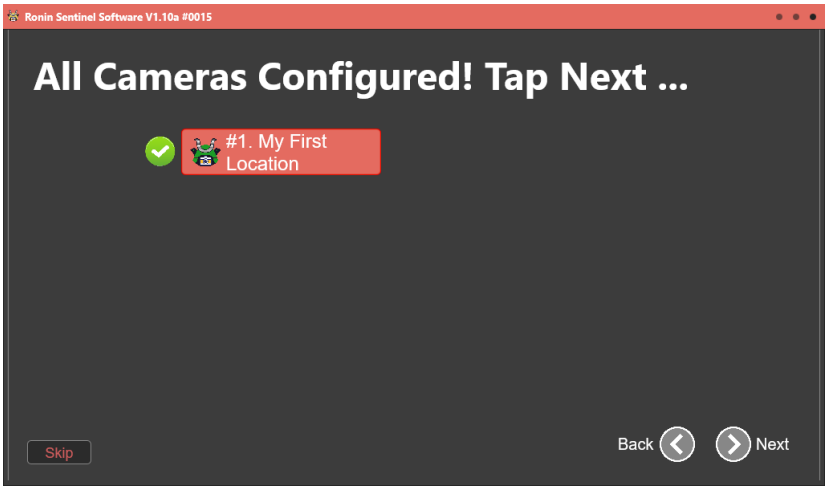
Once you choose the number of cameras, a different screen appears to walk you through setting up each camera:



In this example just one camera was selected to add. Tap [Camera #1] to set it up to use with the Sentinel.

After you tap the camera button the **Add New Camera** screens will appear. See the section **II. Add Camera** for a complete description of this process.

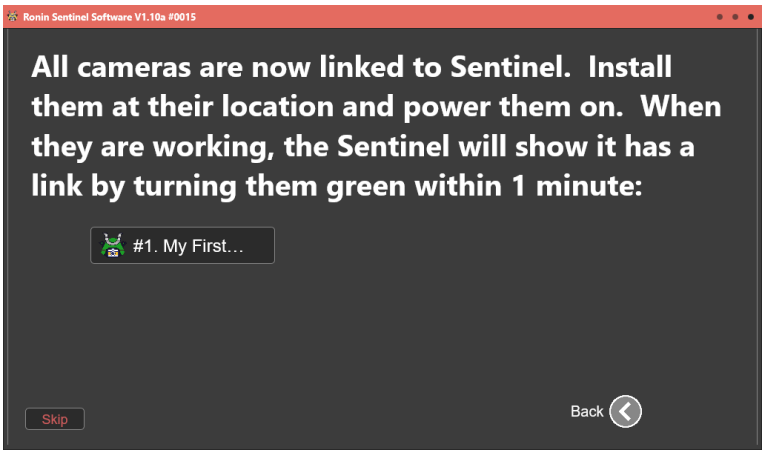
Once all cameras have been added, the screen will display:



The green check next to each camera appears when the camera has been successfully added to the Sentinel.

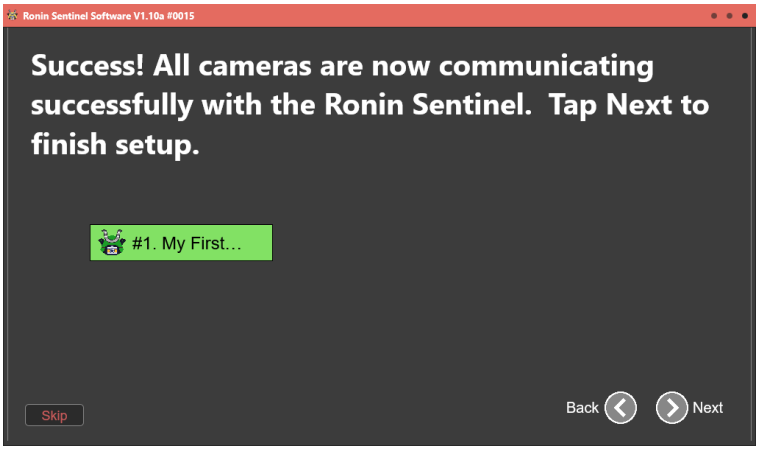
I.g. Waiting for Cameras to Link

It is often the situation where you will setup the cameras with the Sentinel and then need to physically go out into the field to place them. This may take significant time since antennas may have to be installed. The following screen appears after all cameras are added and gives you a visible sign when they successfully establish a link to the Sentinel:



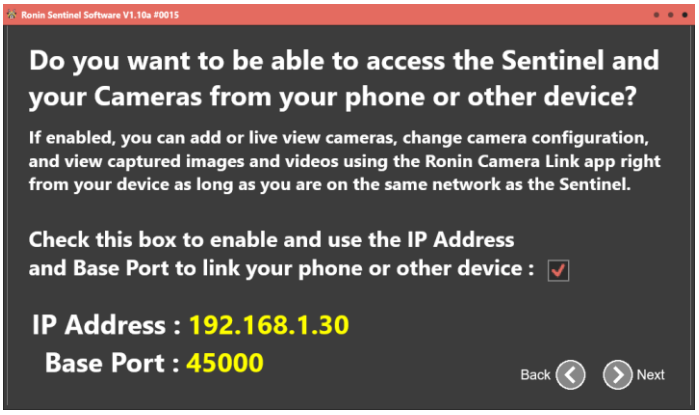
Up to 9 different camera buttons will appear in black while Sentinel is waiting for the link.

When a link is made, the button turns green. If you do not want to wait just tap Skip, or you can go out at this point and install your cameras and use this screen to verify each camera has successfully linked to the Ronin Sentinel.



I.h. Ronin Camera Link App

The next to last step displays the link information for the **Ronin Camera Link App**. If you want to use this app to view, communicate, and monitor your cameras using your iOS, Android, Windows PC, or Mac device to access the cameras through the Sentinel on your local network, take note of the "IP Address" shown on this page. You will need to enter this information into the **Ronin Camera Link App** to connect it to the Sentinel:

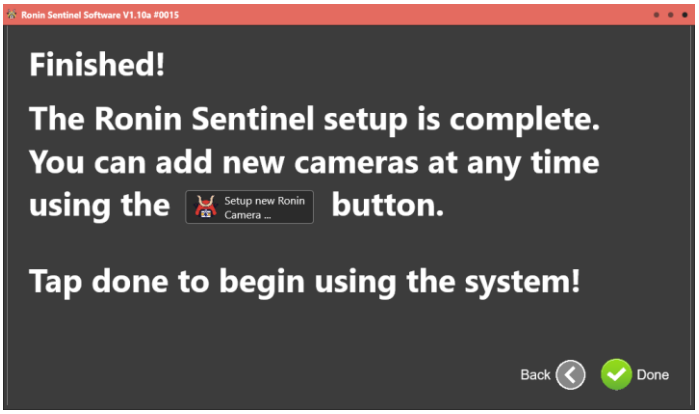


Make sure the box is checked to enable using your iOS, Android, Windows PC, or Mac device with the Ronin Camera Link app and the Sentinel. This is a very useful feature and most users will want to access this ability.

NOTE: The "IP Address" will be specific to your network and will vary from installation to installation. It will also appear at the bottom of the Main Link Screen if the server is enabled (see Section III).

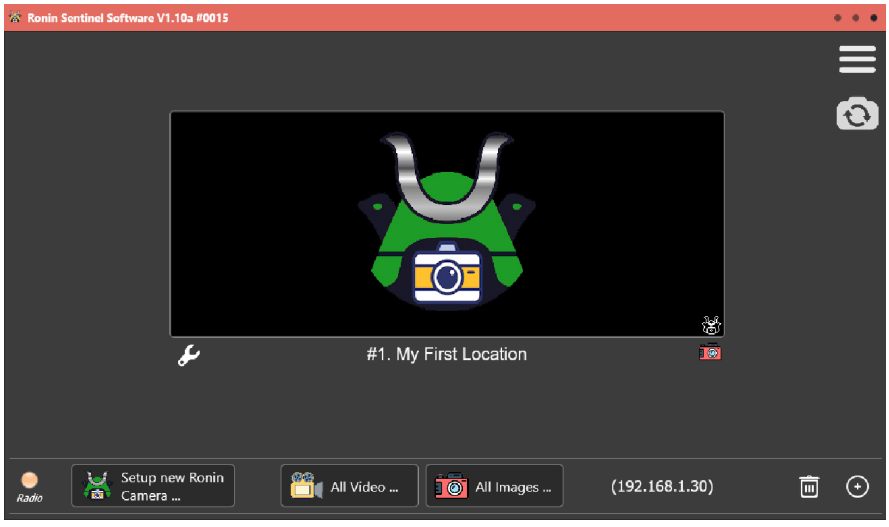
I.h. Setup Finished!

The final setup screen completes the initial setup of your Ronin Sentinel:



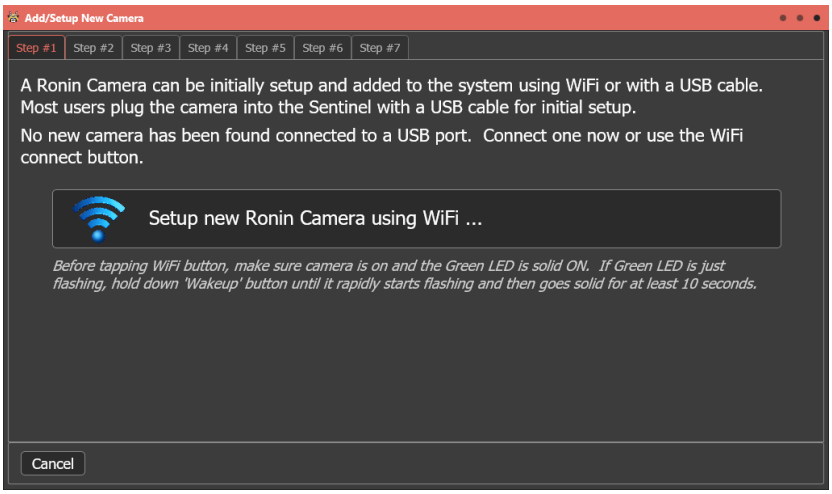
Tap Done when ready to start using your Ronin Sentinel!

This is the Main Sentinel Link screen. See Section III for complete information on how to live view, configure, and add or remove Ronin Cameras and downloaded Images and videos!



II. Add New Camera

Anytime a new camera is added (either during the initial setup or later when Setup new Ronin Camera is tapped), the following set of screens is displayed.

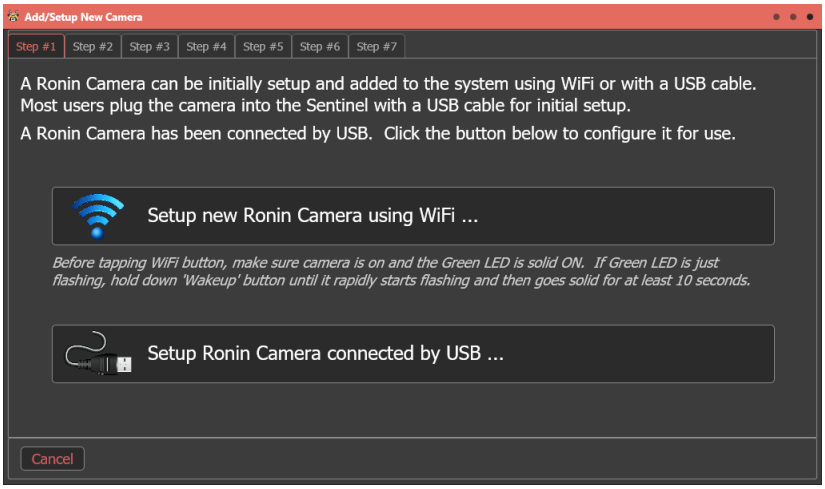


There are seven steps in setting up a new Ronin Camera. The Add/Setup New Camera screens allow you to quickly configure the most common options and link your Ronin Camera to the Sentinel at the end of the process.

If you have not physically plugged a Ronin Camera into your Sentinel using a USB cable then your only choice is to setup by WiFi. However, we recommend plugging the camera in using the included USB cable for simpler setup and configuration.

Tap Cancel button to abort new camera setup.

When a Ronin Camera is connected by USB cable to the Sentinel then a new button appears as shown here:



Setup by WiFi

To use WiFi, first make sure the Ronin Camera WiFi is on by checking the green LED on the front panel of the camera. If this is solid on then the Camera is likely ready for a WiFi link.

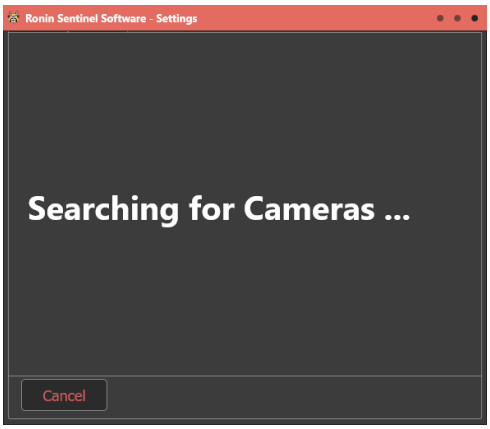
Tap Setup new Ronin Camera using WiFi and the Sentinel will search for the camera and automatically link to it.

Setup by USB

This button only appears if a Ronin Camera is physically connected to the Sentinel by a USB cable. This is a quick and simple way to temporarily connect the camera for setup and many users choose to setup cameras this way. We recommend this method for most users since it is very easy and does not require any searching of the wireless network for it to quickly work. It also keeps the Sentinel connected to your regular WiFi network because it does not have to break that connection to communicate with the Ronin Camera.

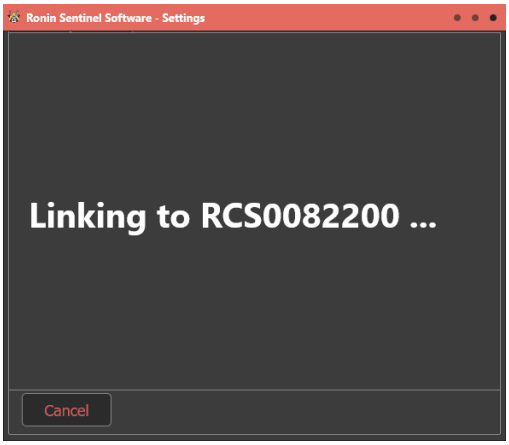
II.a. Add New Camera using WiFi

After tapping the Setup New Camera using WiFi… the Sentinel will immediately start searching for a Ronin Camera:



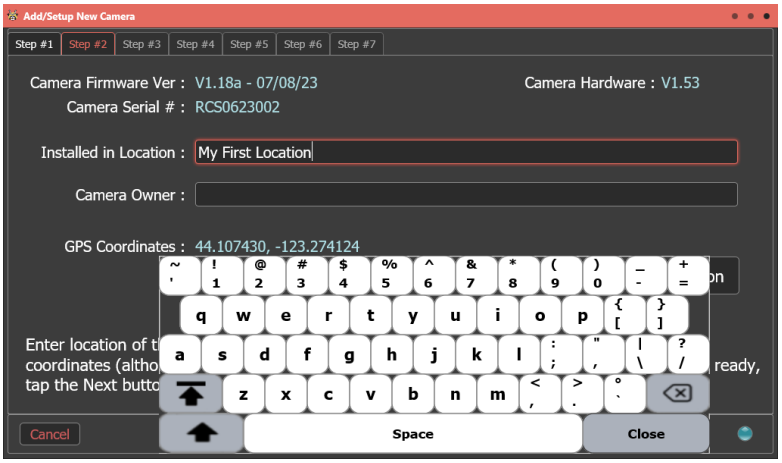
When a camera is found, the Sentinel will link to it automatically:

If none is found, a warning message will appear and you should check your camera or retry linking to it.



II.b. Add New Camera Step #2 - Location

Once the Sentinel has found and linked to a Ronin Camera (either by USB or WiFi), you will immediately move to Step #2 for setting the location:



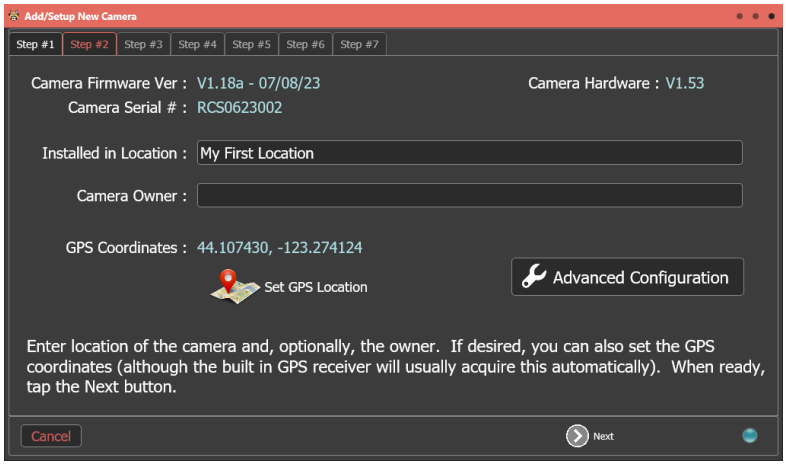
The Sentinel will first ask for the **Location** the camera is installed in and optionally the **Camera Owner**. The virtual keyboard automatically appears whenever it is needed as shown here and will disappear when not being used. You can also add a keyboard or mouse to the Sentinel if desired.

This step also shows the camera firmware and hardware version, the factory assigned serial number, and the current GPS coordinates as determined by the internal GPS chip (or assigned manually by you).

Tap Close when the location is set and the virtual keyboard will disappear:

The **Advanced Configuration** button takes you to another set of programming screens where you can completely control all aspects of the camera's operation. See Section V for a complete description of these camera settings.

If you want to manually set the GPS location or review where the location is currently set to, tap Set GPS Location to see the position on a live map view (internet network connection is required for the live map to function).



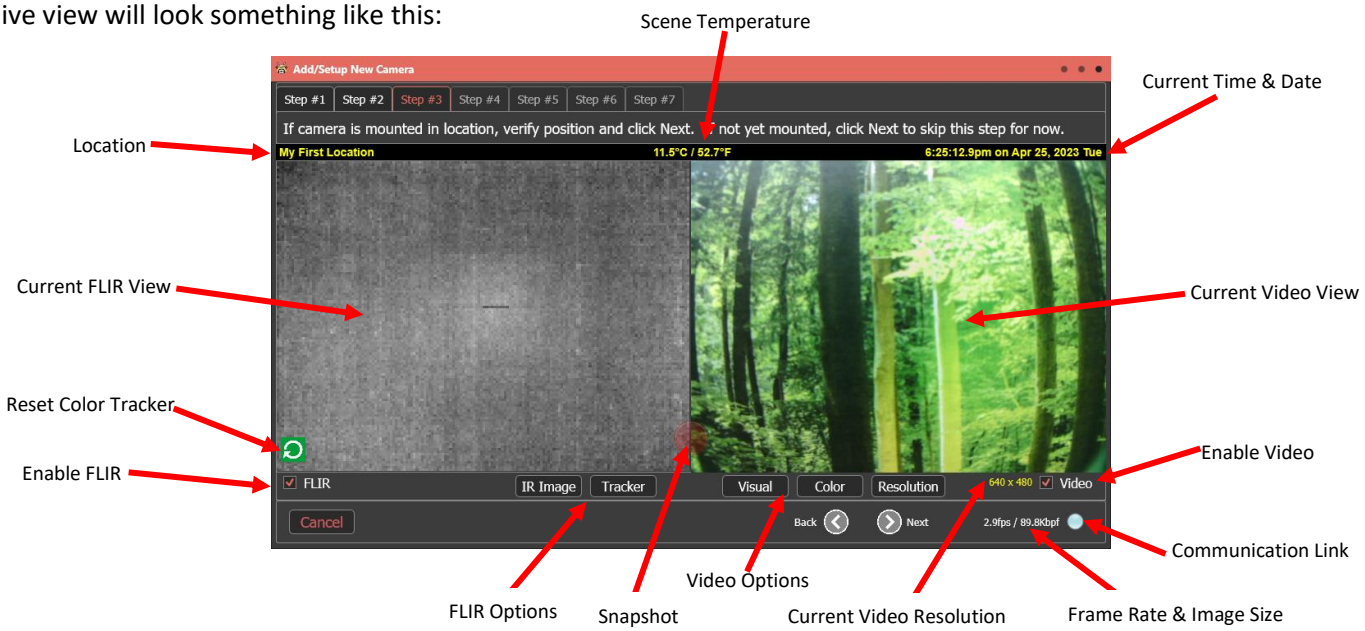
Add New Camera has two buttons labeled Next and Back button at the bottom of the screen. Tap these to move forward and back between steps as you complete each task.

II.c. Add New Camera Step #3 – Live View

After setting the Location the next step displays the current camera Live View. This can be used to:

- Verify the Video and FLIR Thermal cameras are functioning as desired.
- Set the Video and FLIR Thermal camera parameters such as resolution, view mode, etc.
- Make sure the cameras are pointed at what you want to capture. Note that this only applies if the Ronin Camera is physically in the final location you want it to be. Most of the time the camera will be moved after you set it up to its final position, so this ability is not usually needed at the initial setup.

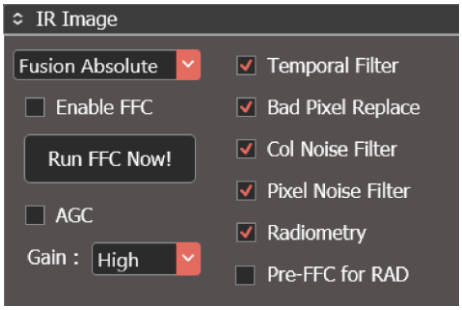
A live view will look something like this:



While the view is active you can tap any of the option buttons (IR Image, Tracker, Visual, Color, and Resolution) to change camera settings. You can also tap on either the FLIR or Video camera image to zoom in on it, or check/uncheck the FLIR and Video checkboxes to enable/disable specific cameras.

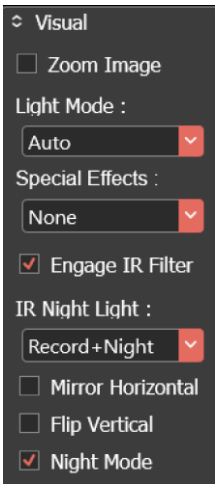
Option	*Description*
Enable FLIR	Tap this checkbox to turn ON or OFF the FLIR Thermal Imaging camera view.
Enable Video	Tap this checkbox to turn ON or OFF the Video Camera view

FLIR Camera Controls:

IR Image	Tapping this button displays the main FLIR Infrared Image controls: ● **View Mode:** Selects the mode to display the FLIR thermal image. The default is "Color Tracker", but you can choose from: + Raw + Grayscale + Fusion Relative + Color Tracker + Fusion Absolute + Quad Mode + Rainbow The "Quad Mode" splits the view into four separate displays of Grayscale, Fusion Absolute, Color Tracker, and Rainbow. See Section IV for more information.  IMPORTANT: The Ronin System allows you to change the view mode of any captured image or video after it has been recorded! This means it does not matter what view mode you pick here because you can always change it later using the View Images/Video function. Your choice here only sets the default view mode for the image or video and what format will be used when the image or video is sent to you by an email or text alert. See Section VI for more information on this very useful ability.

	• **Enable FFC:** Turns on the Flat Field Correction function of the FLIR camera. • **Run FFC Now :** Runs the Flat Field Correction function one time. • **AGC:** Turns on or off Auto-Gain Control (defaults to Off). • **Gain:** Manually sets the gain to Low, High, or Auto (defaults to High). • **Temporal Filter, Bad Pixel Replace, Col Noise Filter, Pixel Noise Filter:** These options improve the quality of the FLIR image by adding specific filtering and replacement functions. They default to ON and should be left that way for most users. • **Radiometry:** Enables using a temperature controlled scale for FLIR camera output. This provides a more accurate picture of the scene regardless of the external temperature. Defaults to ON. • **Pre-FFC for RAD**: Check to turn on running the Flat Field Correction before capturing any images when Radiometry is enabled. This can help improve the image in Battery Only mode.
Tracker	Tapping this button sets the options when Color Tracker or Quad View mode is selected. These settings adjust how the Color Tracker image is displayed:  • **Min Change:** The minimum difference (in 0.01 degrees Celsius) between the background and the new pixel for it to qualify as *Active* and should be shown in color instead of black and white. • **Min Grouping:** The minimum number of pixels that must be active and next to each other to maintain their active status. This helps eliminate isolated pixels that are not part of a larger object being shown as active. • **Color Amplifier:** The amount of color amplification that should be applied to active pixels to make them stand out more. • **Retune Rate:** How quickly the camera should adjust to background changes to make a new non-active value. Increasing this value makes the camera less able to adjust to changing background temperature, but less likely to tune out slow moving objects in the field. • **Max ON:** The maximum number of seconds a pixel can be active before it is assumed to be a new part of the background. • **Show in Fusion:** Check to color the active pixels the same color as Fusion Relative. • **Use Negative:** Check to use pixels that are both colder than the background (negative) and warmer than the background (positive). Unchecked then only the warmer are used. • **Use Active Pix:** When checked the coloring of active pixels is determined only by the range of temperatures of the active pixels themselves. When unchecked, then the entire image temperature range is used to determine the color of the active pixels.
Reset Color Tracker	When Color Tracker or Quad View is selected for the FLIR View it will show the current Color Tracker based image. This uses the known background temperature to display everything non-moving in gray and only show in color those pixels that are *Active Motion* and different than the background. However, when a camera is first placed it takes it some time to determine the background temperature map. Tapping this button jumpstarts this tuning to the background and forces the camera to immediately tune to the current view as the new background temperatures. The view will immediately change to all grays and from then on only new motion will show up in color.

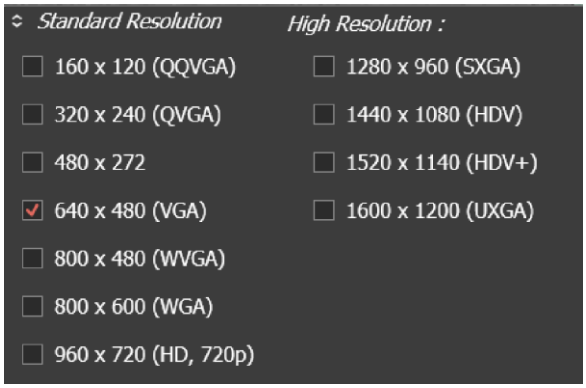
Video Camera Controls:

<table>
<tr><td>Visual</td><td>
The Visual options control how the video camera displays images:


Zoom Image: Check to zoom the video camera in.
Light Mode: Controls how the camera adjusts to light conditions. Choose from: + Auto + Sunny + Office + Cloudy +Home
Special Effects: Various special effects that can be applied to the video camera image including:
+ None + Blue + Red + Green
+ Monochrome + Sepia + Negative
Engage IR Filter: The camera has a special mechanical filter that it automatically puts over the camera during the day and removes it at night. This greatly improves the camera image during each time and is normally controlled automatically by the system. However, you can manually Engage (filter is over the lens) or Disengage (filter is removed from the lens) using this check box.
IR Night Light: Built into the camera is a high power infrared night light that is invisible to humans but visible to the camera and is designed to illuminate the camera view up to 60’ away at night. This light is usually turned on automatically by the camera, however there are some options that can control how it is used:
+ Disabled (never turn on this light)
+ Low Light Only (turns on whenever the light level gets low at night)
+ Auto On (turns on and stays on, not recommended unless wall power connected and the camera is permanently in the dark!)
+ On Recording (turns on whenever capturing images or video regardless of light level)
+ Record+Night (turns on whenever capturing images or video when it is dark)
This option should only be changed to “Disabled” or “Record+Night” unless the user has a very good understanding of the power modes and the usage of the camera night light.
Mirror Horizontal & Flip Vertical: Check these boxes to mirror the view horizontally or vertically.
Night Mode: Enables a special night mode in the camera that makes the view at night of higher quality. Does slightly reduce the quality of daytime views.

</td></tr>
<tr><td>Color</td><td>
The Color button accesses specific video camera view and color settings. Each slider can be increased or decreased to control that aspect of the camera view.

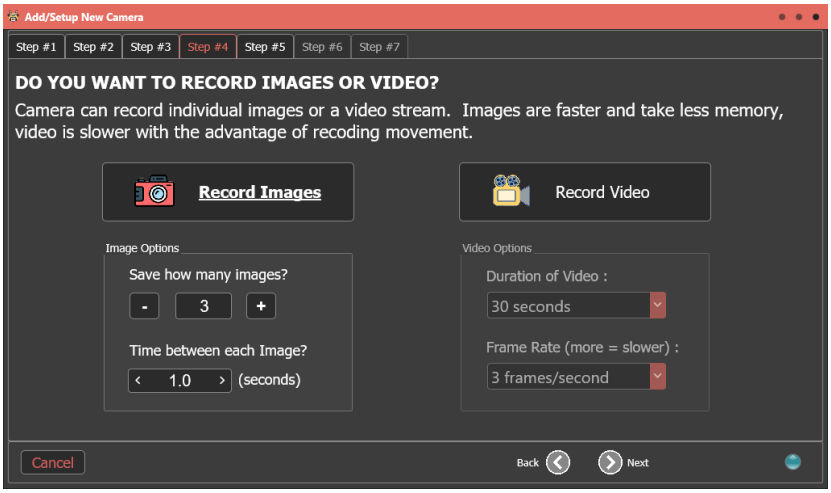

</td></tr>
</table>

Resolution	The Resolution sets the camera view pixel count from 160x120 to as high as 1600x1200. Note that the higher the resolution the larger the images from the camera. When communicating pictures by radio it is important to not pick such a high resolution, especially if also collecting video, that the transmission rate slows down to the point of making the system less useful. When using radio to connect to the Ronin Camera, we recommend not using higher than 1440x1080 for Images and not higher than 960x720 for Video data collection.	

II.d. Add New Camera Step #4 – Record Images or Videos

Once the Live View has been configured, the next step is to select between recording Images or Videos. The Ronin Camera can actually do both at the same time, however this raises some complex issues and must be configured using the advanced settings described in Section V.

Most users will want to collect either Images or Videos:



Tap Record Images or Record Video. If Images is selected, you can also select the number of images you want to capture when motion is detected and how long of a delay between each image the camera should use once it starts capturing.

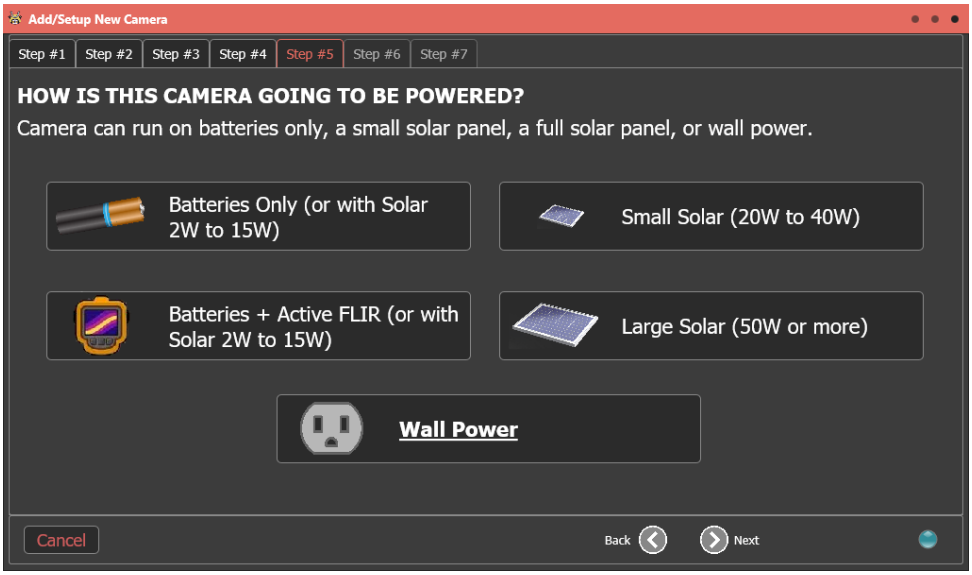
Note that when sending alerts out by email and/or text message, the camera only attachs one image no matter how many are captured. This will be the middle image of the set, so if 3 images are captured it will be the second image that is included with the alert message.

When capturing Videos, you can then choose how long of a video to record and the frame rate of the video (from 9 frames per second to 1 frame per three seconds). It is very important to understand that videos can take a VERY long time to send by radio. The longer the video and the higher the frame rate the longer it will take to send the video.

When recording videos for radio transmission, we recommend no longer than 5 seconds in duration using a frame rate of 3 frames per second or slower. This will typically result in a video being received in 3-15 minutes (depending on the video camera resolution). If you do not mind the wait, then selecting a longer duration or higher frame rate is acceptable, although you should also note that it requires power to transmit the video and using a medium or large size solar panel or wall adapter is recommended. In addition, only one camera at a time can transmit images or videos so tying up the system in downloading a long video will block other cameras for long periods of time.

II.e. Add New Camera Step #5 – Power Mode

The Ronin Camera has five different power modes for different situations. Each power mode has advantages and disavantages as described below.



Power Option	*Description*
Batteries Only (or with Solar 2W to 15W)	The lowest power mode. Both FLIR and Video camera are turned off and the Radio is kept off except for 1 minute at the top of each hour. Cannot access camera remotely by radio except at the top of each hour. Time from detection to recording an image is about 3 to 5 seconds (if the FLIR is enabled), or about 0.5 seconds if the FLIR is not enabled. Camera will typically last 4-6 months when the Radio is disabled, less if the Radio is enabled and pictures are actively being downloaded.
Batteries + Active FLIR (or with Solar 2W or 15W)	One step up from Batteries Only with the FLIR camera being kept on. This greatly speeds up the time to first picture because it does not have to turn on the FLIR and let it warm up. Users cannot access camera remotely by radio except at the top of each hour. Camera will typically last 1-2 weeks when the Radio is disabled, less if the Radio is enabled and pictures are actively being downloaded.
Small Solar (20W to 40W)	The FLIR Camera and the Radio are kept on all the time. Users can access a live view at any time and the time from detection to first image is ~0.5 seconds. Email and/or text alerts are sent out whenever motion is detected. The Sentinel is updated once per hour as to the camera's current status. Camera will typically last indefinitely as long as the solar panel keeps providing power.
Large Solar (50W or more)	The FLIR and Video cameras are kept on all the time. Either the Radio or WiFi link is also kept on and users can access a live view whenever desired. Time from detection to first image is ~0.1 seconds. Camera will typically last indefinitely as long as the solar panel keeps providing power.
Wall Power	All features and functions are kept on all the time. Either the Radio or WiFi link is also kept on and users can access a live view whenever desired. Time from detection to first image is ~0.1 seconds. The main difference between Large Solar and Wall Power is that the camera updates the Sentinel every minute in Wall Power mode and once every 15 minutes in Large Solar Mode. Camera will last indefinitely as long as power is available.

Additional power mode comments:

1) Even in Battery Only and Batt+FLIR mode a solar panel can still be connected. This can greatly extend the life of the mode and is completely acceptable to do.

2) Some locations may be able to use smaller solar panels than the one indicated. It depends considerably on the amount of sunlight and the latitude of the location. More power is always welcome!
3) The Ronin Sentinel can automatically download images from cameras connected by radio and in Battery Only and Batt+FLIR mode. This does, however, reduce the length of time the batteries will last. It does this by detecting when the camera wakes up at the top of each hour and then downloads the new pictures at this time.
4) Color Tracker view mode is only useful in Small Solar , Large Solar , and Wall Power modes. This is because the camera saves power by not monitoring the background temperature of the scene unless you are using one of these higher power modes.

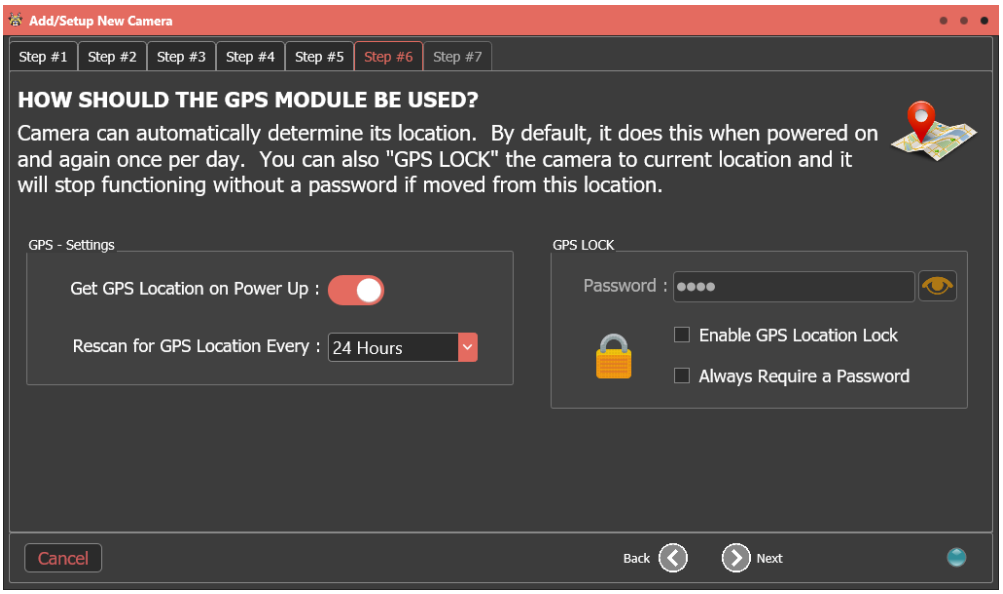
RONIN CAMERA POWER MODE FEATURE TABLE:

NOTE: Time measurements below assume a 9AHr LiFEPO4 battery pack charged to a 9.6V level

Parameter	*Mode 0: Battery Only*	*Mode 4: Batt + FLIR*	*Mode 1: Small Solar*	*Mode 2: Large Solar*	*Mode 3: Wall Power*
Estimated Battery Life	4-6 Months	1-2 Weeks	Infinite	Infinite	Infinite
Max Number of Images	38,000	50,000	Infinite (to limit of SD Card)	Infinite (to limit of SD Card)	Infinite (to limit of SD Card)
Estimated Battery Life if Input Power fails	N/A	N/A	4-5 Days	2-3 Days	1-2 Days
FLIR Camera ON	Only on Detection	Yes	Yes	Yes	Yes
Video Camera ON	Only On Detection	Only On Detection	Only On Detection	Yes	Yes
Trigger Time (Delay from detection to Image Capture)	~3 to 5 seconds	~0.5 seconds	~0.5 seconds	< 0.12 seconds	< 0.12 seconds
Passive IR Motion Detection	Yes	Yes	Yes	Yes	Yes
FLIR Motion Detection	No	No	Yes	Yes	Yes
"Color Tracker"	No	No	Yes	Yes	Yes
Radio is ON (when enabled)	For 60 seconds once per hour	For 60 seconds once per hour	Yes	Yes	Yes
Radio Status Updates	Once per hour	Once per hour	Once per 30 min	Once per 15 min	Once per minute
Radio Detect Alerts	No	No	Yes	Yes	Yes
Radio: - Access Live View - Download Images - Setup Camera	Only if initiated during 60 second On period once per hour	Only if initiated during 60 second On period once per hour	Yes		
WiFi is ON (when enabled)	No	No	For 60 seconds once per hour	Yes	Yes
WiFi Status Updates	No	No	Once per hour	Once per 15 min	Once per minute
WiFi Detect Alerts	No	No	No	Yes	Yes
WiFi: - Access Live View - Download Images - Setup Camera	No	No	Only if initiated during 60 second On period once per hour	Yes	Yes

II.f. Add New Camera Step #6 – GPS

Ronin Cameras have a built-in GPS module to capture the location of the camera. Step #6 allows you to setup how this function is used and if you want to lock the camera to a specific location for security purposes:



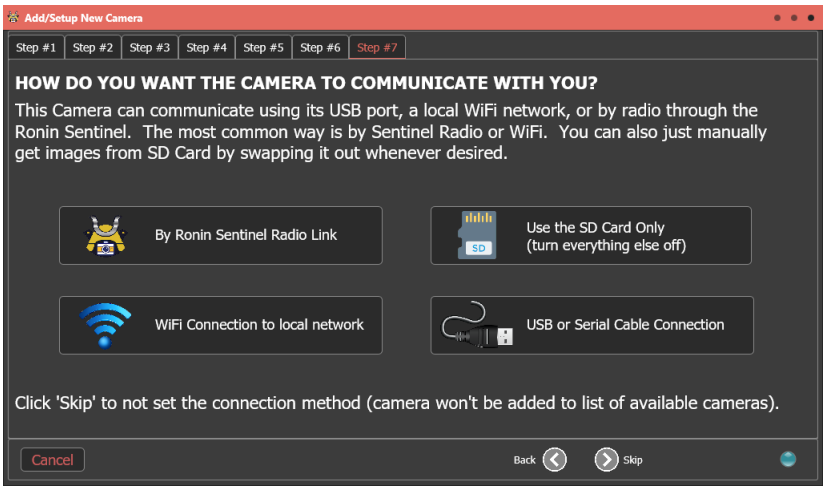
Option	*Description*
Get GPS Location on Power Up	Set this to ON if you want the camera to automatically scan for the current GPS location of the camera when it is first powered up.
Rescan for GPS Location Every	Select the length of time you want to automatically recheck the GPS location after the first time.

GPS Lock:

Enable GPS Location Lock	If this is checked the Ronin Camera will save the current GPS location and LOCK it into its memory. When it rescans for the location, or the next time it is powered on, if the location it gets is different than the locked location into the camera it will stop functioning until it receives a password from the user. In effect the GPS Location Lock will "brick" the camera until it receives a password if it moved from its location. This is an anti-theft feature which can help deter anyone who might steal the camera since it becomes useless unless it is returned to its original location.
Password	The password that must be entered to unlock the camera from a GPS location lock.
Always Require a Password	If checked, then passwords are enabled for accessing the camera anytime and not just when it is location locked. Users may want to enable passwords for increased security.

II.g. Add New Camera Step #7 – Communication & Connection to Sentinel

The final step is to select how you want to connect the camera to the Ronin Sentinel. You can also just set the camera for SD Card only image and video retrieval and not link it to the Sentinel.



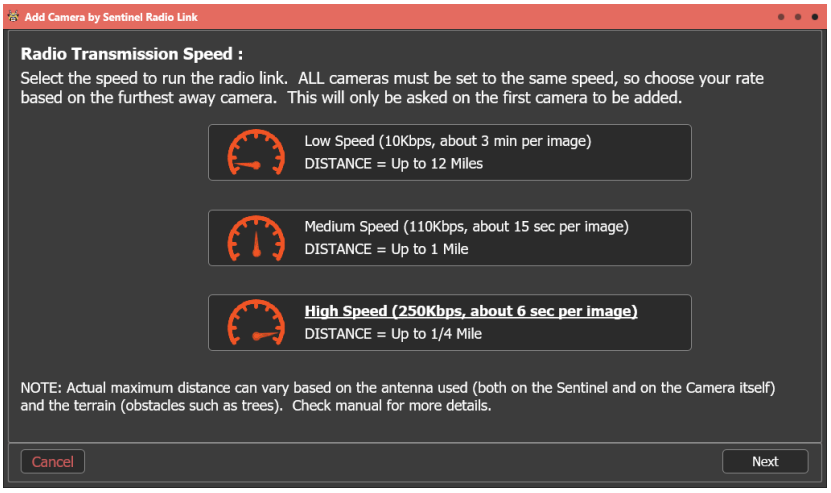
The four options are:

+ By Ronin Sentinel Radio
+ WiFi Connection
+ Use SD Card Only
+ USB or Serial Cable Connection

Option	*Description*
By Ronin Sentinel Radio Link	This is the most common option and connects the camera to the Ronin Sentinel using the built in radio. This option works regardless of camera power mode. When setting up the first camera you will be asked to select a "Speed Mode" for the radio. All cameras must use the same speed mode so it is important to choose a mode based on the furthest distant camera in the system. See section II.g.1. for details.
Use the SD Card Only (turn everything else off)	Turns off all communication features and sets the camera to only record images and videos to its built in SD Card. This is the lowest power mode.
WiFi Connection to local network	Connects the Ronin Camera to a local wireless network and then links the Ronin Sentinel to this camera. This works the same as when connected by radio, but the speed is faster because it is being connected by WiFi. Must select Small Solar, Large Solar, or Wall Power to use this mode.
USB or Serial Cable Connection	Adds the camera to the Ronin Sentinel using the USB connection. This option is not commonly used, but Ronin Cameras can work directly connected to the Sentinel in this manner.

II.g.1. Radio Connection

When connecting your first camera by Radio to the Sentinel it asks an additional question about range. The radio requires that all cameras are connected using the same speed rate so if you have some that are very far away and require a slower speed to function you must choose this rate for all cameras.



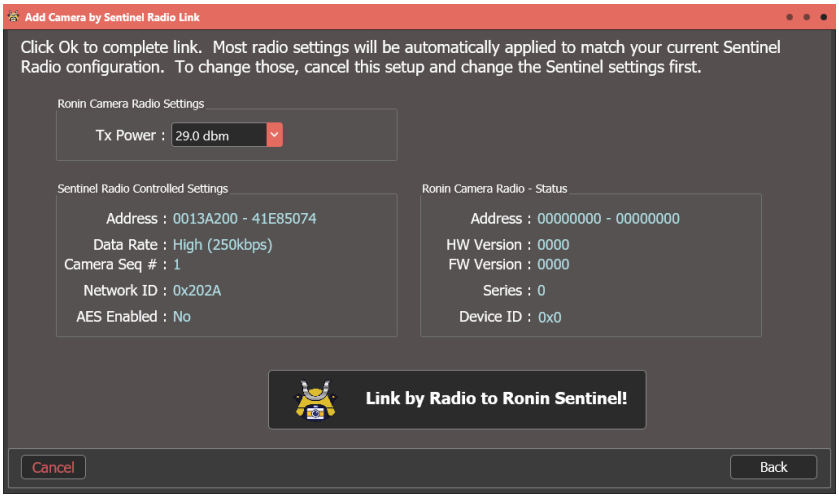
Select a range based upon the furthest distant camera you want to use with the Ronin Sentinel.

- Low Speed : For distances up to 9 to 12 miles away.
- Medium Speed : For distances up to 1 mile away.
- High Speed : For distances up to ¼ of a mile away.

Note that the speed is also dependent on terrain and radio antenna used. See the Ronin Camera guide for more information on antenna selection.

Parameter	*High Speed*	*Medium Speed*	*Low Speed*
Communication Speed	250 Kbps	110 Kbps	10 Kbps
Range for one camera	Up to 1/4 Mile (1500 feet)	Up to 1 Mile	Up to 9 Miles
Time to send one typical dual image (FLIR+Camera)	6 seconds	13 seconds	2.3 minutes
Time to send 5 second typical video recording 3 frames per second	1.5 minutes	3.2 minutes	34 minutes
"Live" view frame rate	5 seconds per frame	12 seconds per frame	2 minutes per frame

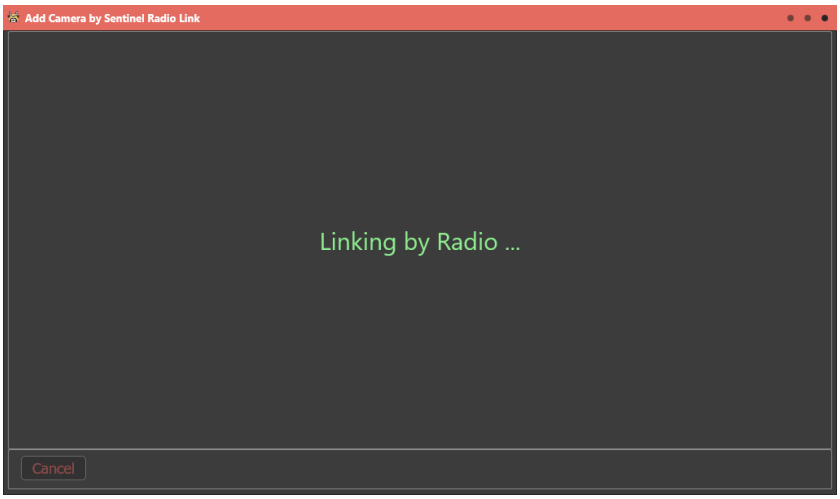
After the range is selected (or immediately if this is the second or more camera to be connected by radio) you will be asked to set the transmission power of the camera:



Set the "Tx Power" and tap Link by Radio to Ronin Sentinel.

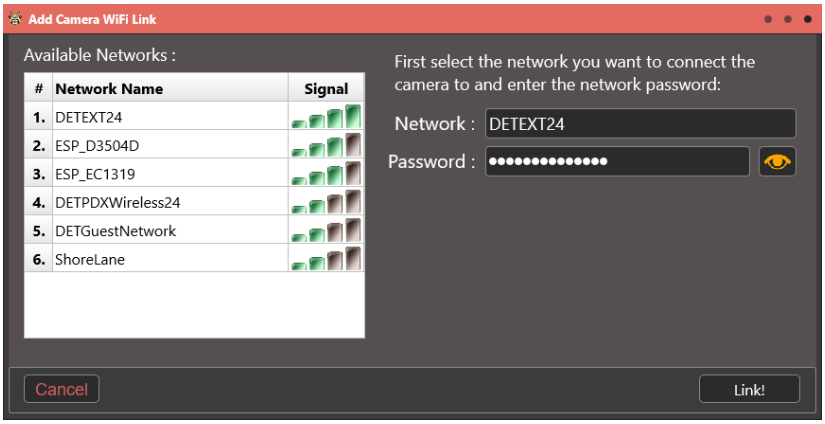
Typically, you can use the max Tx Power of 29.0 dBm for most installations. However, if you want to save power to make your batteries last longer, or to use a smaller solar panel, then choosing a lower power may be a good option.

Once you tap Link by Radio to Ronin Sentinel a linking window will appear and the camera will be added to the Ronin Sentinel main page for immediate use!



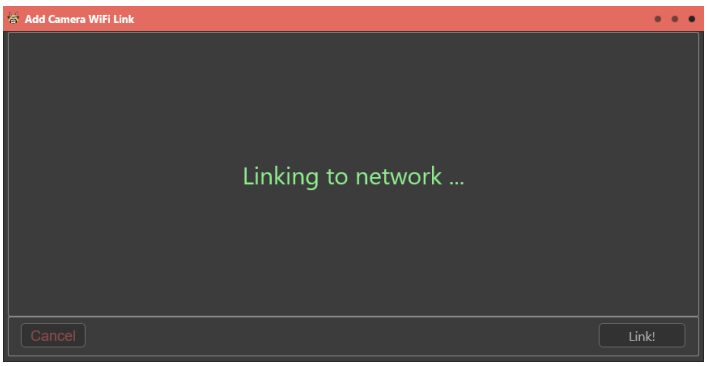
II.g.2. WiFi Connection

Selecting link by WiFi to the Ronin Sentinel will connect the Ronin Camera to your local wireless network and then setup the Sentinel to communicate with it over that connection:

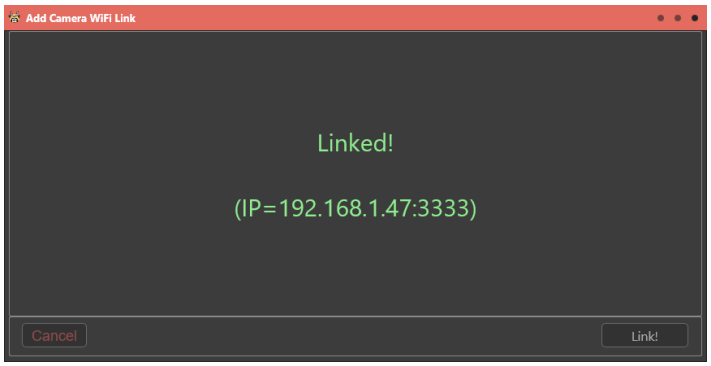


The Ronin Camera will search for available networks and display the results on the Sentinel link page. When it is done, select the network you want to use and then enter the password for that network. When ready, tap the Link! button.

Linking to WiFi Network:



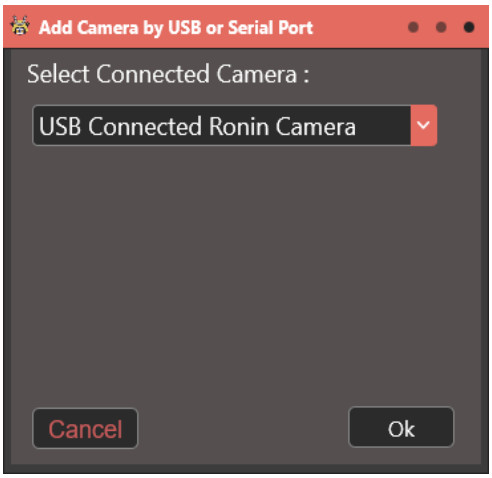
Linked with the IP address and port of the camera:



After this the new camera will be added to the Ronin Sentinel main page for immediate use.

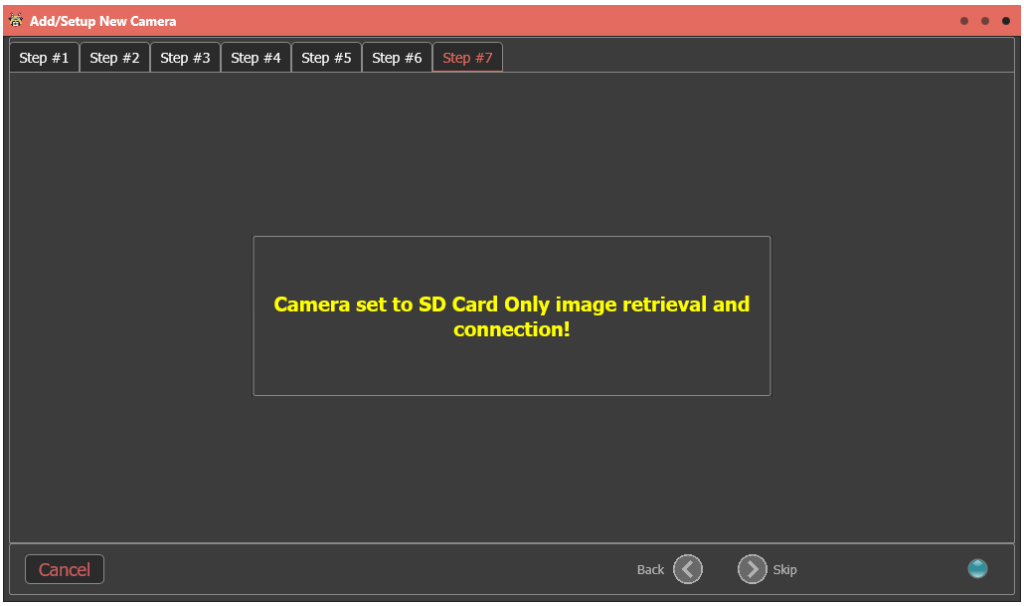
II.g.3. USB Only Connection

If you select linking the camera to the Ronin Sentinel using the existing USB connection, a small window appears that lets you verify you want to make the link. Simply tap Ok to add the camera to the Sentinel main page and it will be immediately available for full use.



II.g.4. SD Card Only

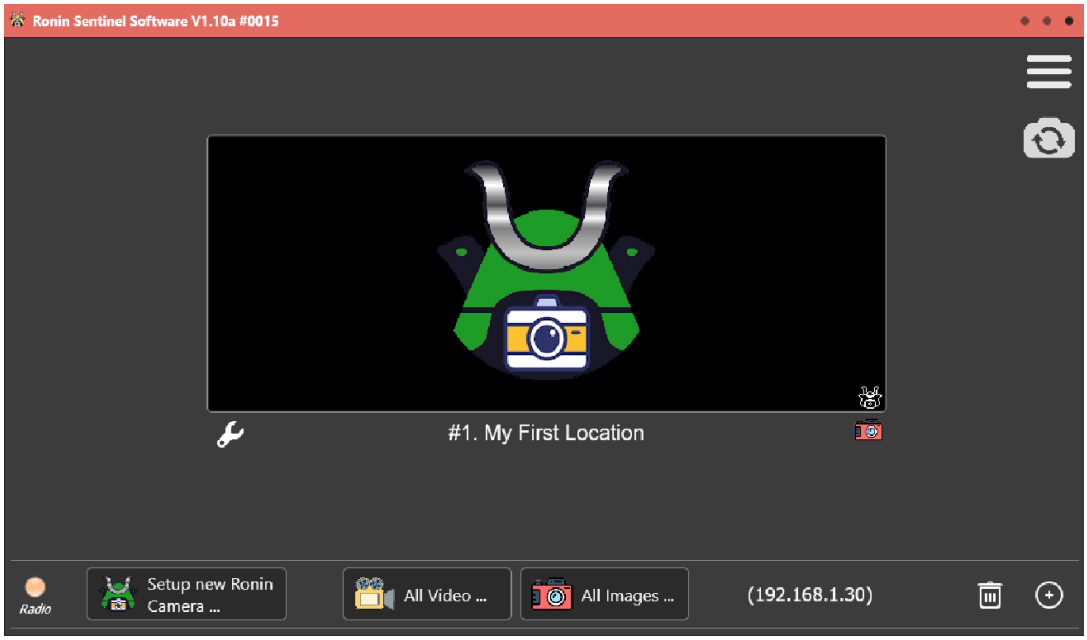
If you select linking the camera to the Ronin Sentinel using an SD Card Only , a window appears telling you that the way to download images and videos to the Sentinel from this point for this camera will be by SD Card only. See section **III.g. Importing Images & Videos** for more information on this process.



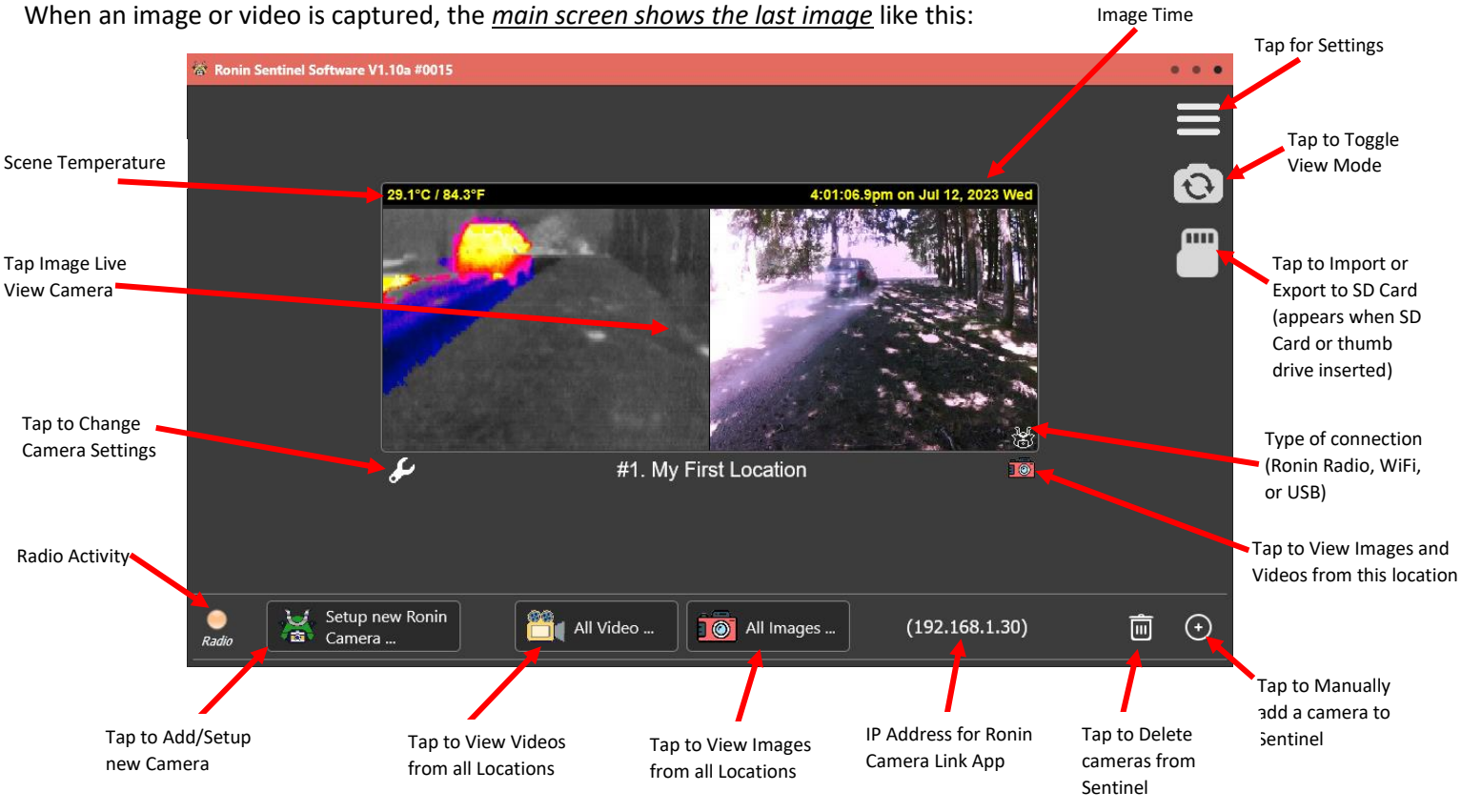
III. Main Sentinel Link Screen

The Sentinel Main Link Screen is where the system will spend most of its time. From here you can Live View any connected camera, change Camera Settings, view any downloaded Video or Image, add or delete cameras, and access several setup functions to better control how the Sentinel operates.

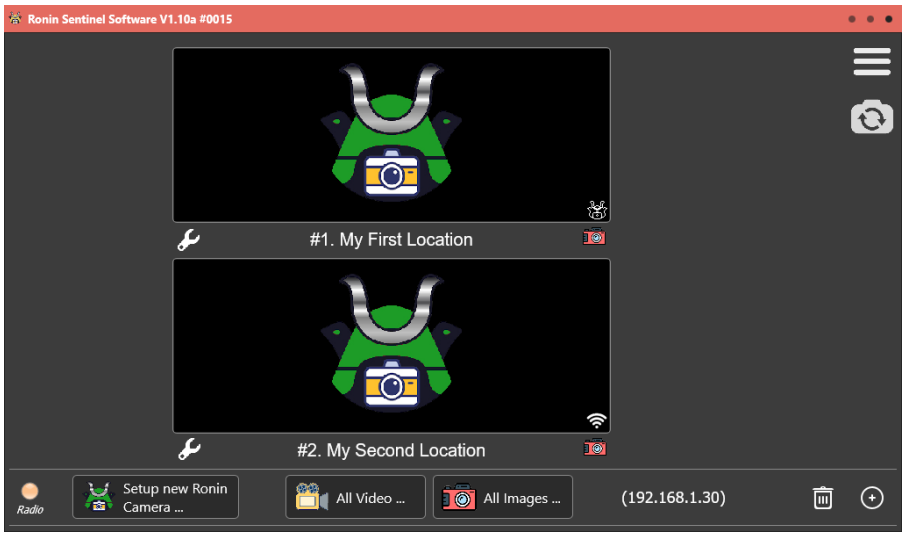
The main screen shows all currently connected cameras and the most recent captured image from that camera. When you first add a camera to the Sentinel it will show something like this:



When an image or video is captured, the *main screen shows the last image* like this:



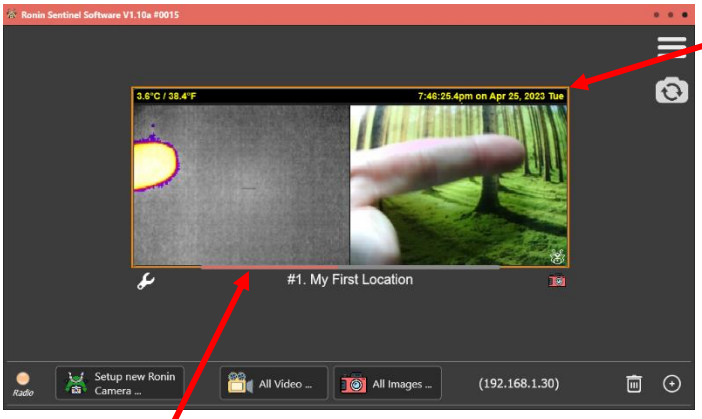
When more than one camera is added to the Sentinel, it automatically rearranges the screen to show each camera in their own box. For example, when two cameras are added:



Up to nine different cameras can be added to one Sentinel. For most of this manual just one camera will be shown in the examples, but everything holds the same for multiple cameras.

III.a. Camera Status and Alert Downloads

The main screen highlights camera activity with a color rectangle around the location. This color varies depending on what is currently going on with the camera:



Camera status rectangle:

Brown: Downloading an image or video from a motion alert received by the Sentinel from a remote camera.

Green: Received a new alert and have sent out motion alert email/text message (stays green for 60 seconds after the motion alert image or video is downloaded).

Cyan: Camera in Battery Only mode has established a link at the top of the hour and is ready to communicate.

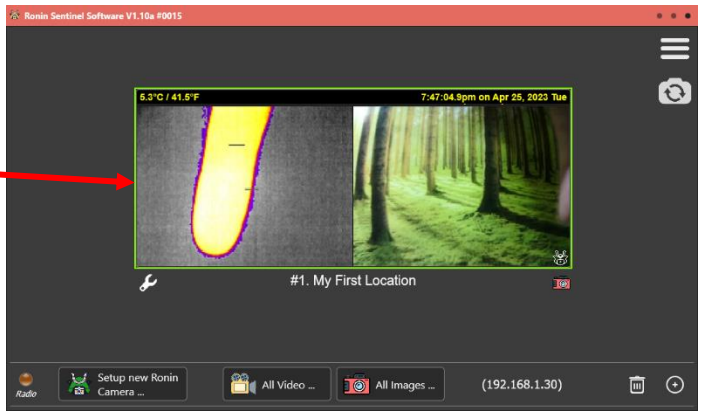
Yellow: Camera Settings being accessed by an external device using the Ronin Camera Link app.

White: Camera Live View being accessed by an

Download progress bar.

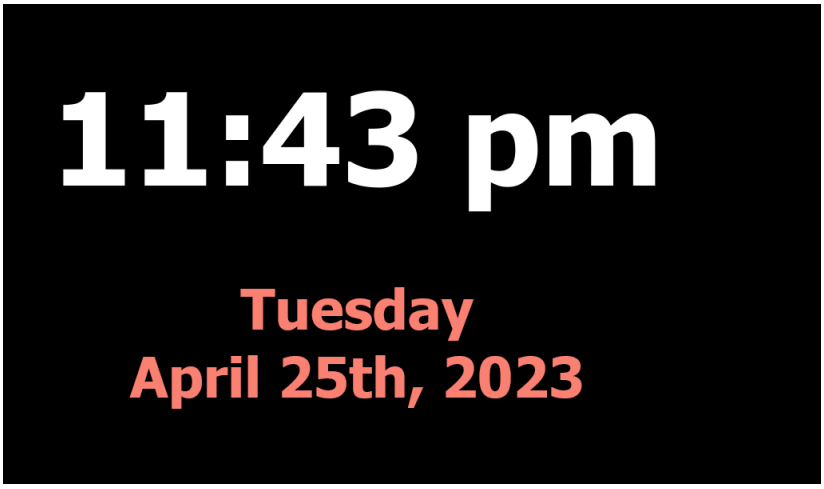
Green indicates alert received and email/text message sent out!

Will stay green for about 60 seconds after the alert is received.



III.b. Screen Saver

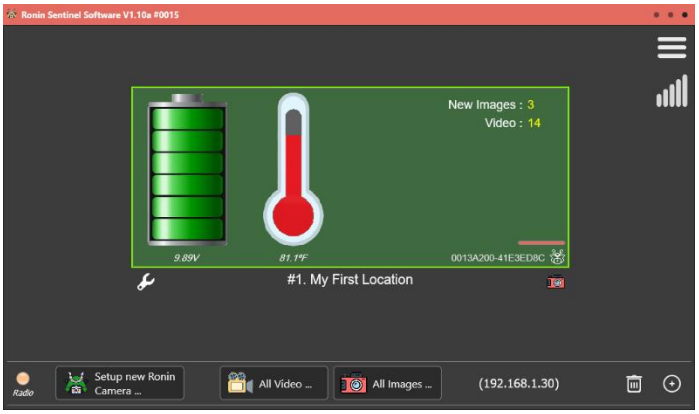
By default a screen saver is enabled for the Ronin Sentinel that appears after about 15 minutes of no user activity. It can be disabled in the advanced settings screen. This screen saver shows the current time and date in a slowly side scrolling window like this:



Also by default the screen saver will disappear when an motion alert is detected. This makes it easier to see when motion has tripped the Sentinel.

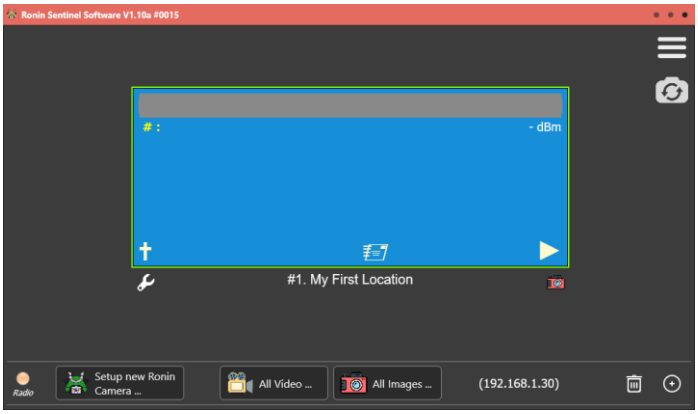
III.c. Toggle Camera View Mode

The main screen supports three view modes for the cameras. The primary mode is the main screen described in the previous sections. However, if you tap the button you can switch to the Camera Status View, and then tap to switch to the Link Activations View, and finally tap to switch back to the Main Link Screen:



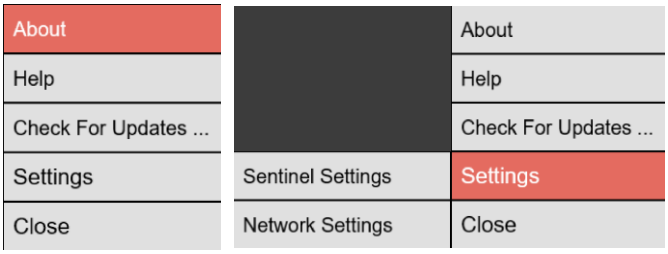
The Camera Status View shows the battery status, new images and videos, current temperature, and specific link information for each camera.

The Link Activations view shows a bar at the top which highlights the signal strength of the received radio packets. This screen is useful for changing the radio rate and strength and is described in more detail in Section VIII.a.



III.d. Main Screen Settings Menu

At the top right of the display is the settings button . Tap this button to display the Settings Menu:



Sentinel Settings and Network Settings are descibed in Section VII.

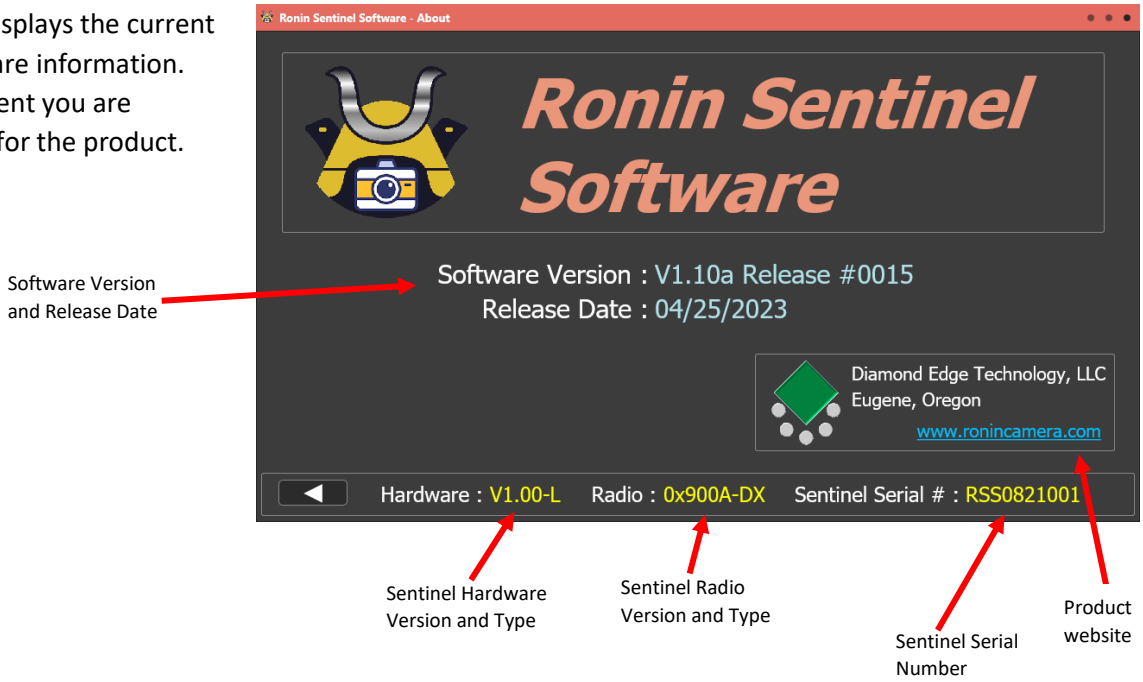
Close exits Sentinel software and shuts down the unit.

Check For Updates accesses Diamond Edge cloud server for updates to the Ronin Sentinel or Ronin Camera firmware. We recommend this is checked periodically to keep your system up-to-date.

Help opens the Ronin Sentinel user manual (this guide).

III.d.1. About

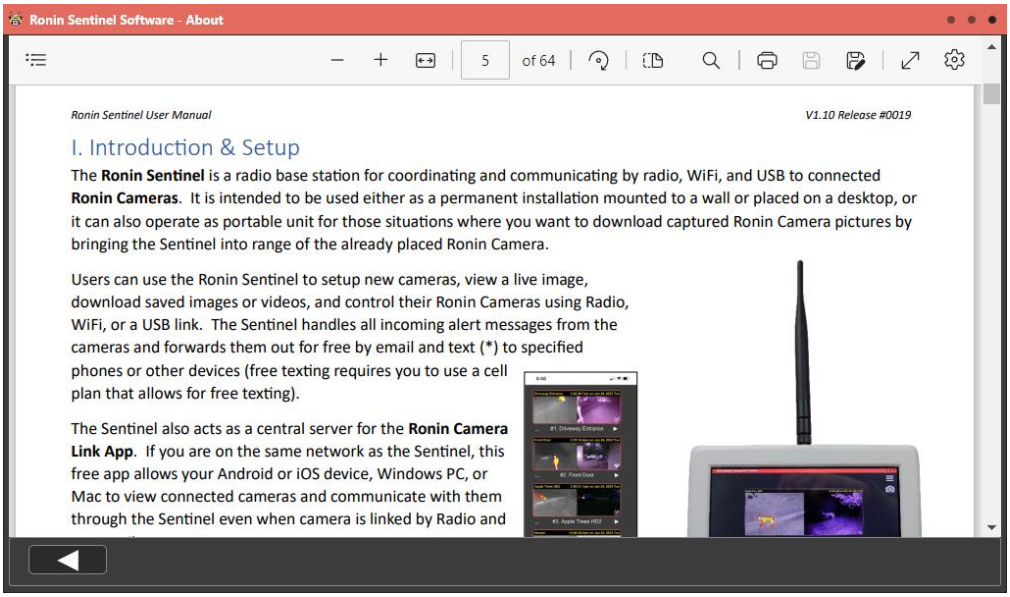
Tapping the About button displays the current Sentinel hardware and software information. This may be needed in the event you are requesting technical support for the product.



III.d.2. Help

Tapping the Help button opens this user manual directly on the Ronin Sentinel screen.

The Sentinel remembers the position and keeps it so that it is easier to open and close the help window while making changes to the operation of the unit.



III.e. Delete Cameras

You can easily delete cameras that are linked to the main screen by tapping the trash can icon at the bottom right:

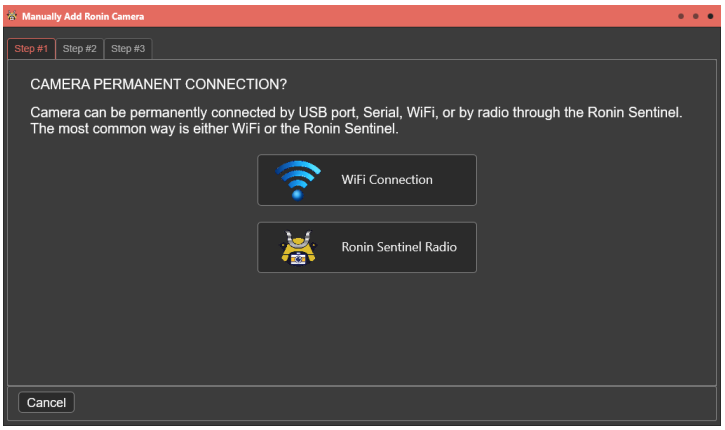
After you tap the trash can, check boxes appear under each camera and a Delete Selected button appears. Check the boxes under each camera you want to remove and then tap Delete Selected.

III.f. Manually Add Camera

As an alternative to the **Add New Camera** function described in Section II, there is a three step process to manually add a camera to the Sentinel without going through the entire camera setup. This ONLY works if the camera is already powered up and running in a way that it can be linked to the Sentinel, so most users will use **Add New Camera** instead of this function.

One situation where this function does help is with WiFi connected cameras that have their IP Address changed by an external modem or router. This function allows you to manually relink it to the Sentinel if you know the new IP Address of the camera.

Your first choice is how you want to add the camera:



Select either WiFi or Ronin Sentinel Radio to add:

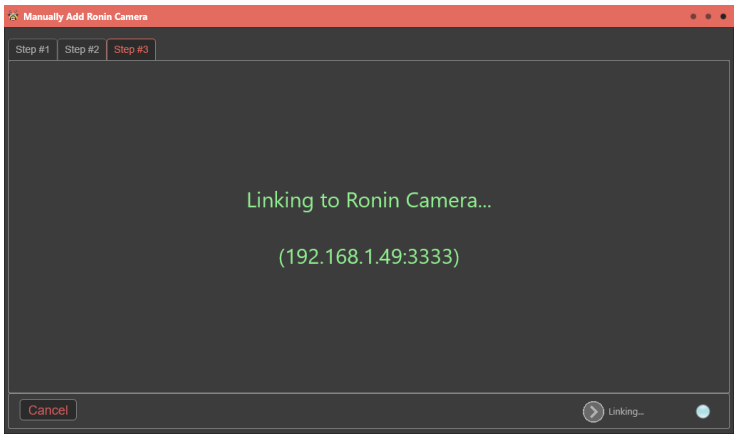
III.f.1. Manually Add Camera – WiFi

When selecting WiFi, you will be asked for the IP Address and Port of the Camera. When this is set, tap Add Link:

Port 3333 is the default for the Ronin Camera. Only change this value if you have changed it in the Camera itself.

Once you tap Add Link the Sentinel tries to link to the camera at the IP Address and Port you entered in the previous screen.

If it succeeds it will be added to the Main Screen.



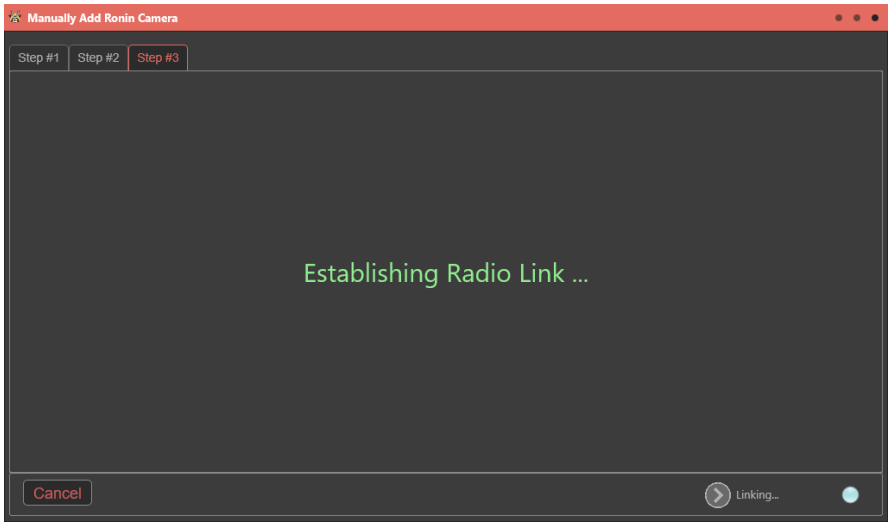
III.f.2. Manually Add Camera – Ronin Radio

When selecting adding a camera by Ronin Radio, you will be asked for the 32 bit High Address and 32 bit Low Address of the radio inside the Camera. It MUST be set to work with the current Ronin Radio network configuration or the Sentinel will not be able to link to the Camera:

Enter in a valid High and Low address and tap Add Link to connect to the Camera.

Once you tap Add Link the Sentinel tries to connect to the camera at the address you entered.

If it succeeds it will be added to the Main Screen.



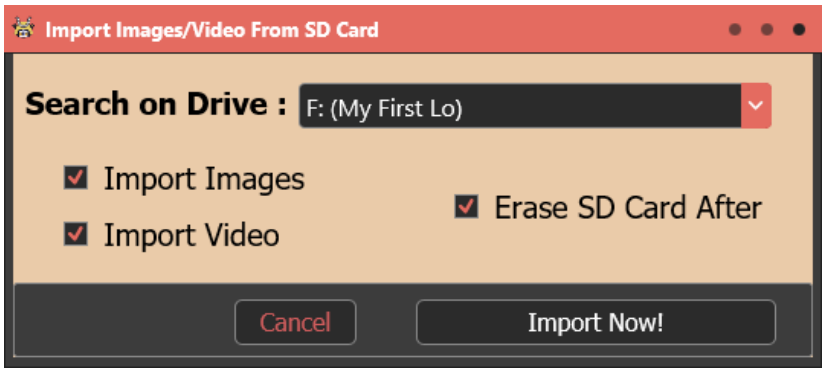
III.g. Import or Export Images & Videos

The Sentinel supports importing and exporting videos and images. This feature allows you to quickly and easily centralize your images or transfer them between the Sentinel and other devices.

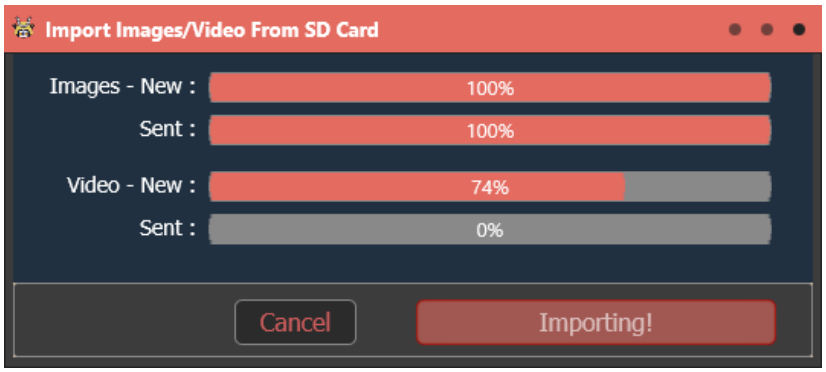
III.g.1. Importing Images & Videos

To import pictures collected by a Ronin Camera or from any other Ronin Sentinel or the Ronin Camera Link App follow the steps below:

1) Insert the SD Card containing the images into a SD card reader and plug it into the USB port on the side of the Ronin Sentinel. This is usually the SD card out of a Ronin Sentinel.
2) A new icon will appear on the screen like this:  Tap this icon.
3) If the SD Card you insertted contains images and/or videos, a new window will appear like this:



4) Choose what types of pictures to import and whether or not you want to erase the SD card after the data is imported. When ready, tap Import Now!. An import window will appear and show the progress:

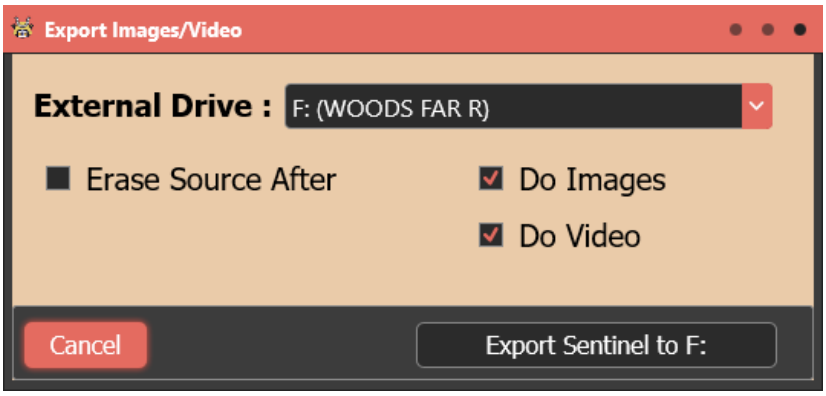


5) When the import completes this window will disappear. You can immediately tap the All Video or All Images buttons to access the imported pictures.
6) Tap Cancel at any time during the import to halt the process.

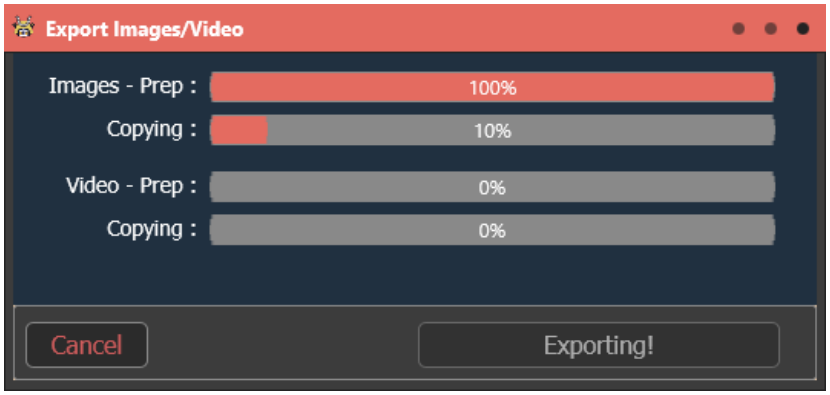
III.g.2. Exporting Images & Videos

Similar to importing you can export the images and videos stored inside the Sentinel to a connected thumb drive. To start the export follow these steps:

1) Plug in a USB thumb drive into the side of the Ronin Sentinel.
2) A new icon will appear on the screen like this:  Tap this icon.
3) An export window will appear like this:



4) Select Images, Videos, or both and select if you want to erase the source after the export. In general, unless your Sentinel is low on space, it is recommended to not erase the files off of the Sentinel to make sure you don't lose your original copy (although the Camera itself will likely also have a copy).
5) When ready, tap Export Sentinel to _ where "_" is the drive letter of the thumb drive. A new window shows:

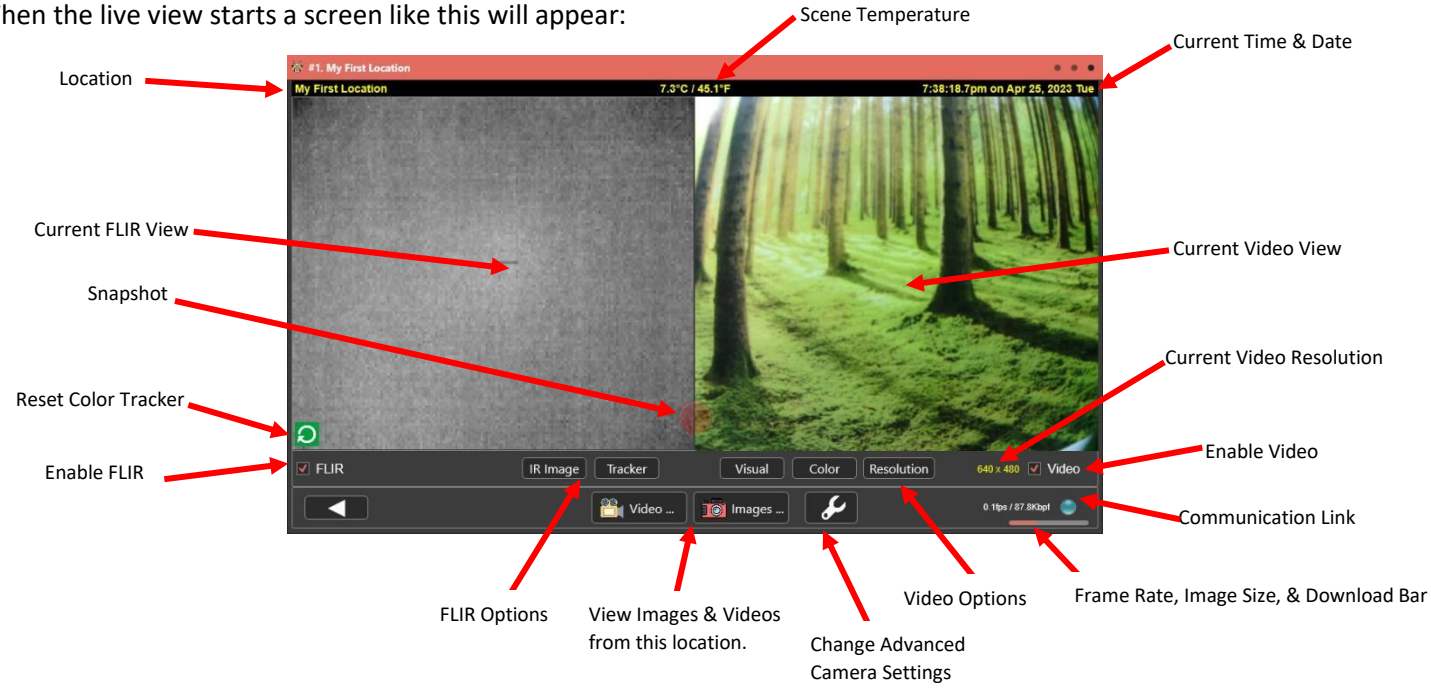


6) When the export finished this window will disappear.
7) Tap Cancel at any time during the export to stop the process.

IV. Live Camera View

Any camera connected to Sentinel by any method (WiFi, Ronin Radio, or USB) supports a Live View of the current camera scene. Cameras that are running in **Battery Only** or **Batt+FLIR** modes are only available for Live View at the top of each hour, and users must start the few within 60 seconds to access the camera. This can be determined when a cyan colored rectangle surrounds the camera on the Main Link Screen.

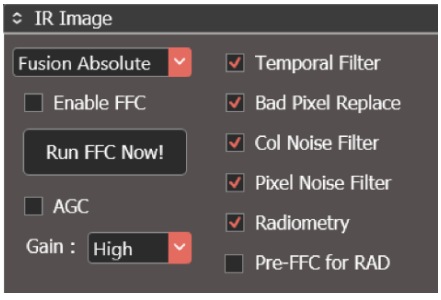
When the live view starts a screen like this will appear:



While the view is active you can tap any of the option buttons (IR Image , Tracker , Visual , Color , and Resolution) to instantly change FLIR or Video camera settings. Tap the Change Advanced Camera Settings button to access the advanced camera setup (see Section V). You can also tap on either the FLIR or Video camera image to zoom in on it, or check/uncheck the FLIR and Video checkboxes to enable/disable specific cameras.

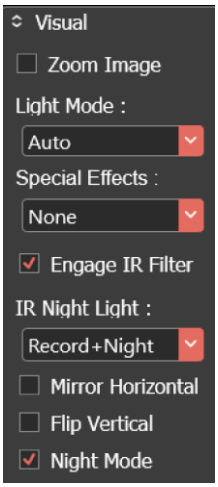
Option	*Description*
Enable FLIR	Tap this checkbox to turn ON or OFF the FLIR Thermal Imaging camera view.
Enable Video	Tap this checkbox to turn ON or OFF the Video Camera view

FLIR Camera Controls:

IR Image	Tapping this button displays the main FLIR Infrared Image controls: • **View Mode:** Selects the mode to display the FLIR thermal image. The default is "Color Tracker", but you can choose from: + Raw + Grayscale + Fusion Relative + Color Tracker + Fusion Absolute + Rainbow + Quad Mode The "Quad Mode" splits the view into four separate displays of Grayscale, Fusion Absolute, Color Tracker, and Rainbow (see below).  IMPORTANT: The Ronin System allows you to change the view mode of any captured image or video after it has been recorded! This means it does not matter what view mode you pick here because you can always change it later using the View Images/Video function. Your choice here only sets the default view mode for the image or video and what format will be used when the image or video is sent to you by an email or text alert. See Section VI for more information on this very useful ability.

	• **Enable FFC:** Turns on the Flat Field Correction function of the FLIR camera. • **Run FFC Now :** Runs the Flat Field Correction function one time. • **AGC:** Turns on or off Auto-Gain Control (defaults to Off). • **Gain:** Manually sets the gain to Low, High, or Auto (defaults to High). • **Temporal Filter, Bad Pixel Replace, Col Noise Filter, Pixel Noise Filter:** These options improve the quality of the FLIR image by adding specific filtering and replacement functions. They default to ON and should be left that way for most users. • **Radiometry:** Enables using a temperature controlled scale for the FLIR camera output. This provides a more accurate picture of the scene regardless of the external temperature. Defaults to ON (recommended). • **Pre-FFC for RAD**: Check to turn on running the Flat Field Correction before capturing any images when Radiometry is enabled.
Tracker	Tapping this button sets the options when Color Tracker or Quad View mode is selected. These settings adjust how the Color Tracker image is displayed: • **Min Change:** The minimum difference (in 0.01 degrees Celsius) between the background and the new pixel for it to qualify as *Active* and should be shown in color instead of black and white. • **Min Grouping:** The minimum number of pixels that must be active and next to each other to maintain their active status. This helps eliminate isolated pixels that are not part of a larger object being shown as active. • **Color Amplifier:** The amount of color amplification that should be applied to active pixels to make them stand out more. • **Retune Rate:** How quickly the camera should adjust to background changes to make a new non-active value. Increasing this value makes the camera less able to adjust to changing background temperature, but less likely to tune out slow moving objects in the field.  • **Max ON:** The maximum number of seconds a pixel can be active before it is assumed to be a new part of the background. • **Show in Fusion:** Check to color the active pixels the same color as Fusion Relative. • **Use Negative:** Check to use pixels that are both colder than the background (negative) and warmer than the background (positive). Unchecked then only the warmer are used. • **Use Active Pix:** When checked the coloring of active pixels is determined only by the range of temperatures of the active pixels themselves. When unchecked, then the entire image temperature range is used to determine the color of the active pixels.
Reset Color Tracker	When Color Tracker or Quad View is selected the FLIR View will show the current Color Tracker based image. This uses the known background temperature to display everything non-moving in gray and only show in color those pixels that are Active and different than the background. However, when a camera is first placed it takes it some time to determine the background temperature map. Tapping this button jumpstarts it and forces it to immediately tune to the current view as the new background temperatures. The view will immediately change to all grays and from then on only new motion will show up in color.

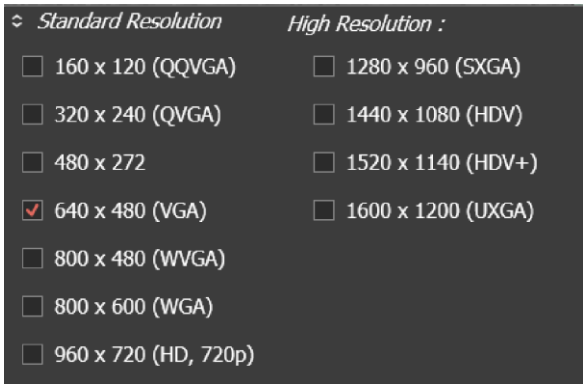
Video Camera Controls:

<table>
<tr><td>Visual</td><td>
The Visual options control how the video camera displays images:


Zoom Image: Check to zoom the video camera in.
Light Mode: Controls how the camera adjusts to light conditions. Choose from: + Auto + Sunny + Office + Cloudy +Home
Special Effects: Various special effects that can be applied to the video camera image including:
+ None + Blue + Red + Green
+ Monochrome + Sepia + Negative
Engage IR Filter: The camera has a special mechanical filter that it automatically puts over the camera during the day and removes it at night. This greatly improves the camera image during each time and is normally controlled by the system. However, you can manually Engage (filter is over the lens) or Disengage (filter is removed from the lens) using this check box.
IR Night Light: Built into the camera is a high power infrared night light that is invisible to humans but visible to the camera and is designed to illuminate the camera view up to 60’ away at night. This light is usually turned on automatically by the camera, however there are some options that can control how it is used:
+ Disabled (never turn on this light)
+ Low Light Only (turns on whenever the light level gets low at night)
+ Auto On (turns on and stays on, not recommended unless wall power connected and the camera is permanently in the dark!)
+ On Recording (turns on whenever capturing images or video regardless of light level)
+ Record+Night (turns on whenever capturing images or video when it is dark)
This option should only be changed to “Disabled” or “Record+Night” unless the user has a very good understanding of the power modes and usage of the camera night light.
Mirror Horizontal & Flip Vertical: Check these boxes to mirror the view horizontally or vertically.
Night Mode: Enables a special night mode in the camera that makes the view at night of higher quality. Does slightly reduce the quality of daytime views.

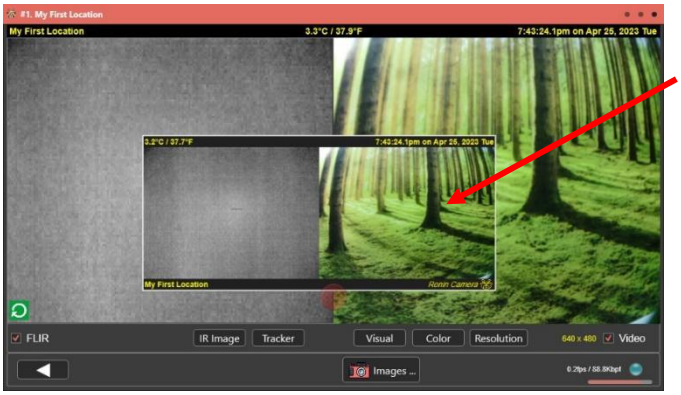
</td></tr>
<tr><td>Color</td><td>
The Color button accesses specific video camera view and color settings. Each slider can be increased or decreased to control that aspect of the camera view.


</td></tr>
</table>

Resolution	The Resolution sets the camera view pixel count from 160x120 to as high as 1600x1200. Note that the higher the resolution the larger the images from the camera. When communicating pictures by radio it is important to not pick such a high resolution, especially if also collecting video, that the transmission rate slows down to the point of making the system less useful. When using Radio to connect to the Ronin Camera, we recommend not using higher than 1440x1080 for Images and not higher than 960x720 for Video data collection.	

IV.a. Snap Camera Image

Tap the red Snap button at any time to capture the current camera image (just like any camera).



A small capture window will appear and float into the Images box at the bottom of the screen.

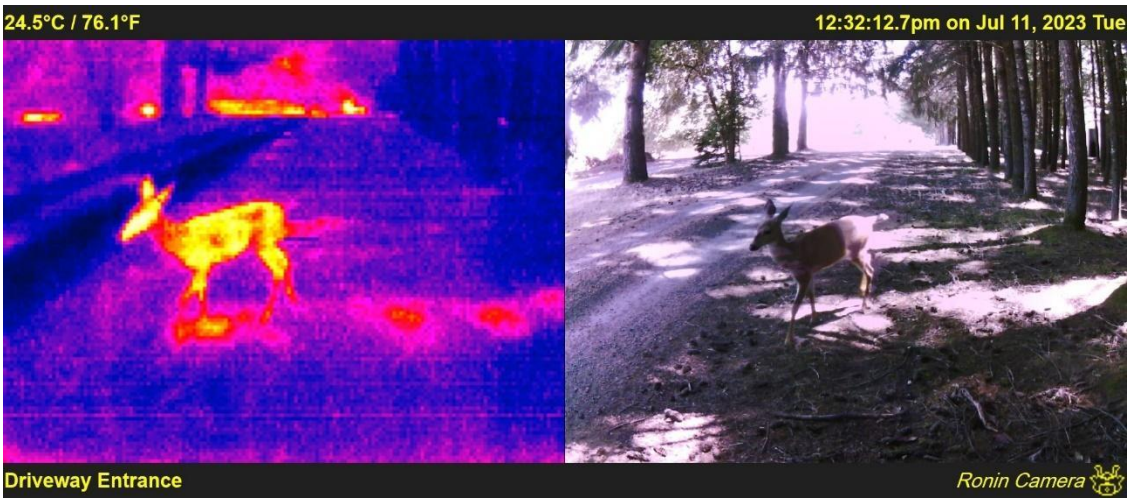
IV.b. FLIR View Mode

The FLIR camera has multiple view modes. These modes are available both during a Live View and for any saved image or video. The Sentinel supports changing the view mode on any picture *even after it has been downloaded*.

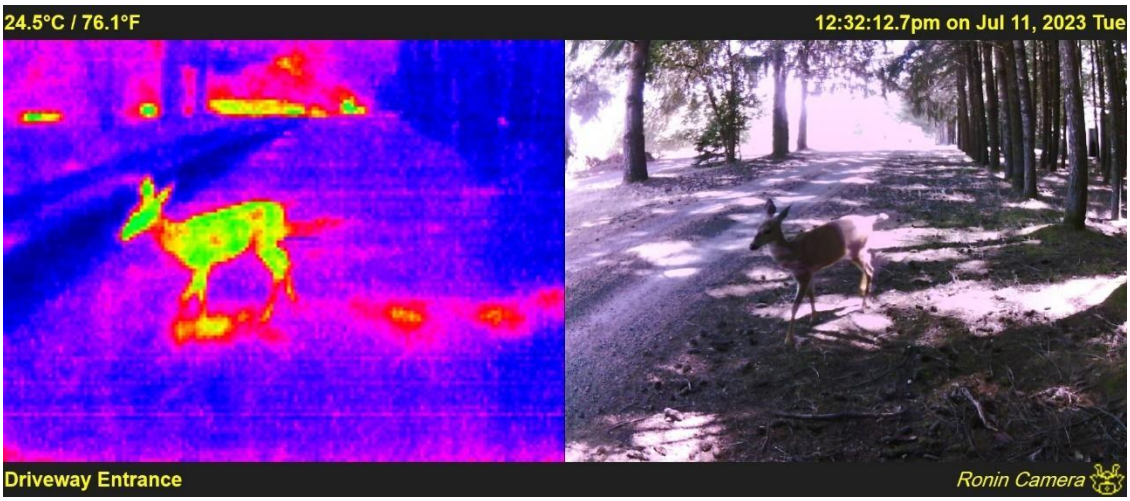
The following shows an example of the same picture in each of the view modes:

Color Tracker:

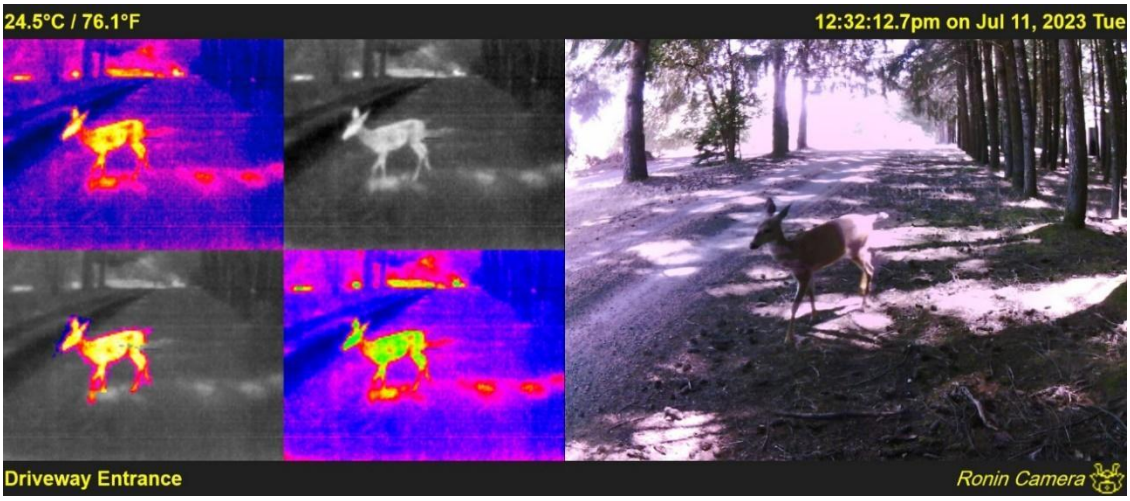
Fusion Relative or Fusion Absolute:



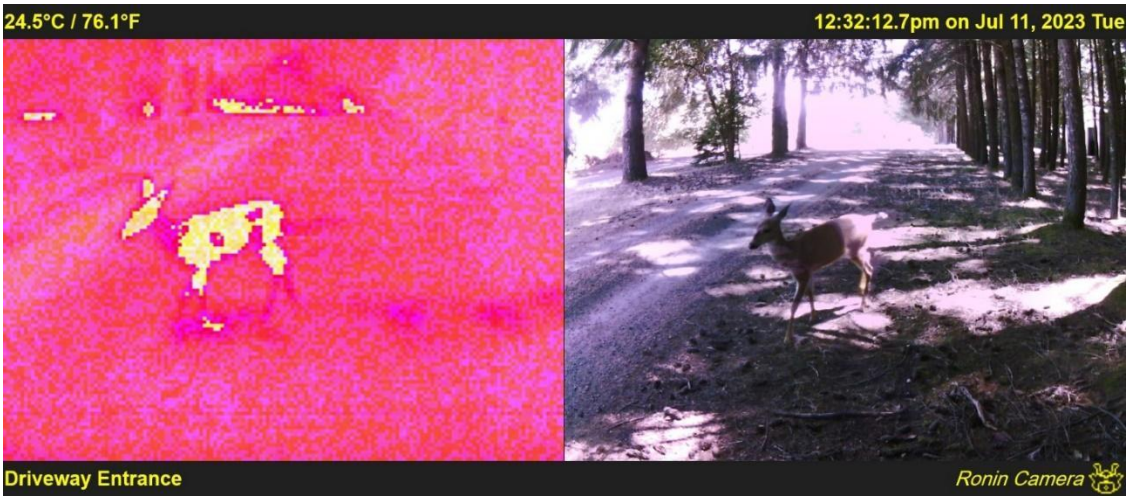
Rainbow:



Quad Mode:



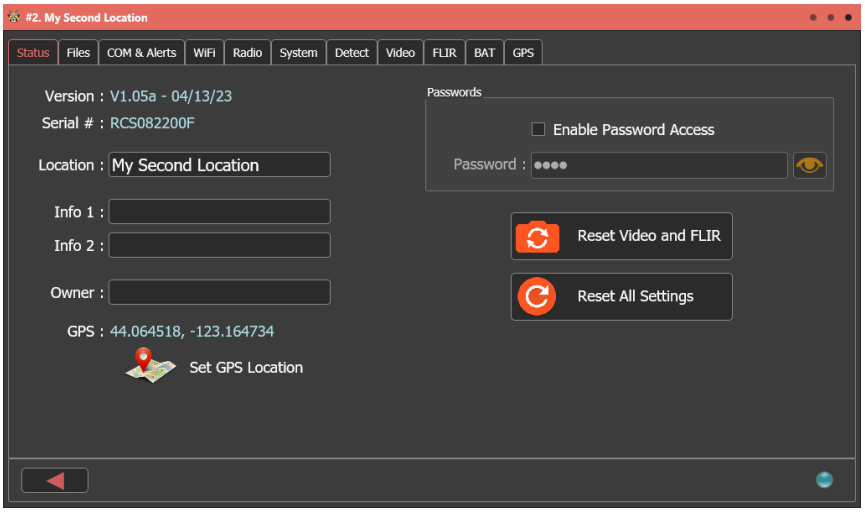
Raw:



V. Camera Configuration

The Ronin Camera is an advanced and highly versatile product with many features and functions. While many users may never want or need to change any of the advanced settings, and the camera is perfectly usable without doing so, some users may find the ability to adjust virtually any aspect of the cameras functioning to be vital to gathering the kind of pictures they wish to capture.

Tapping this icon anywhere will access the **Camera Configuration** screens which looks like this:



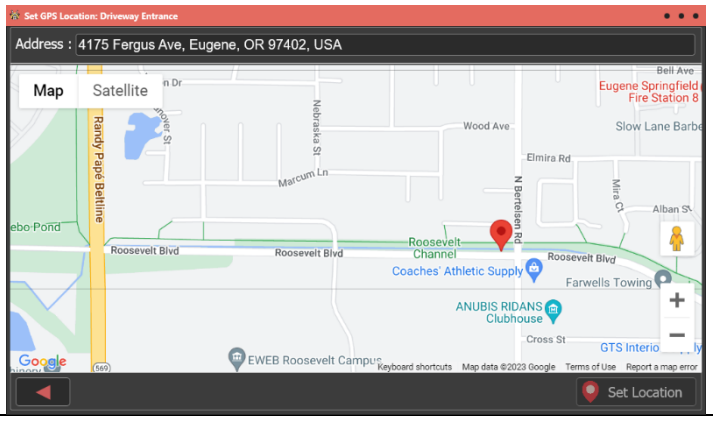
Across the top are 11 different tabs that group the different camera functions together. Each of these tabs is described in detail below. To access the specific functions, simply tap on the desired tab.

To change a value tap on it and enter in the new setting, information, or to access the specific button function.

V.a. Camera Configuration – Status

The main status page shows the current firmware and hardware version and the Ronin Camera serial number. This information will likely be needed for any customer support needs and it can be found here.

Setting or Function	*Description*
Location	A location description of where the camera is placed (up to 30 characters). This is a key value that is displayed in multiple locations from the Main Link Screen to the alert messages that are sent by email or text message. It is highly recommended to pick a unique and descriptive location name for each camera in the system.
Info 1	Optional secondary information about the camera location.
Info 2	
Owner	Optional name of the camera owner.

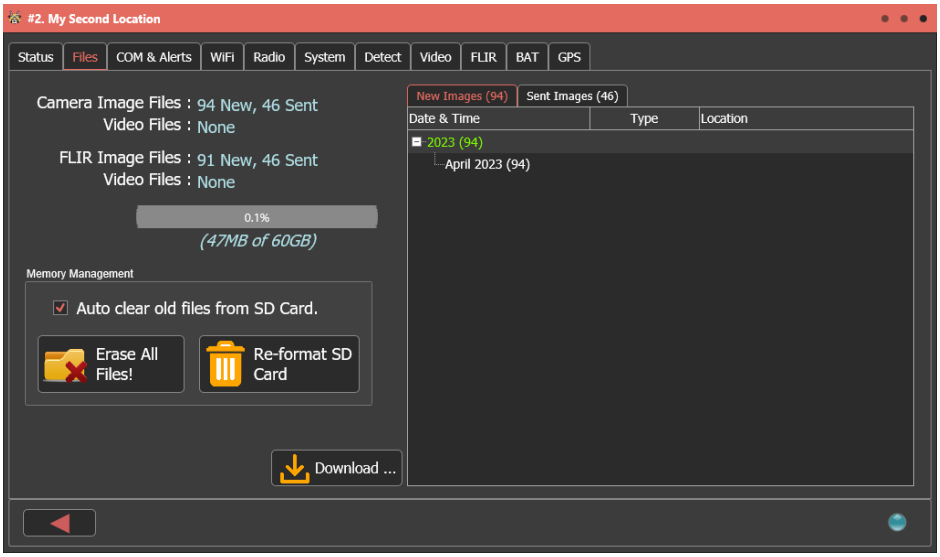
Set GPS Location	The current GPS location for the camera is displayed here. Tap on the Set GPS Location button to display this position on a map and/or to manually set the position using the map or a physical address. When this is tapped a window like this appears:  Type in a new address in the address bar to move the marker, or manually drag it to the desired position. When the marker is on the right spot, tap: Set Location

Enable Password access	Check this box to require passwords to access the camera. This affects both Live View and Camera Configuration.
Password	Enter in the password you want to use for the camera.

Reset Video and FLIR	Tap this button to force a reset of the FLIR Thermal Imaging camera and the standard Video Camera. This can be useful if you want to revert the cameras back to their default settings, or if you are having any camera issues that may be fixed by resetting them.
Reset All Settings	Tap this button to reset ALL camera settings to the factory default settings. Note that doing this to a connected camera will NOT change any setting required to maintain the camera link. For example, if you are connected by WiFi then resetting the camera does not clear the WiFi link information.

V.b. Camera Configuration – SD Card & Files

The camera has an SD card slot and requires an SD card to be installed for it to operate. The **Files** tab allows you to erase, reformat, and download files from this card using the link to the Sentinel:



There are four types of files on each camera kept in different folders:

New Images and **New Videos**: These are images and Videos that have been captured but not yet sent to the Ronin Sentinel.

Sent Images and **Sent Videos**: These are Images and Videos that HAVE been downloaded or sent to the Sentinel.

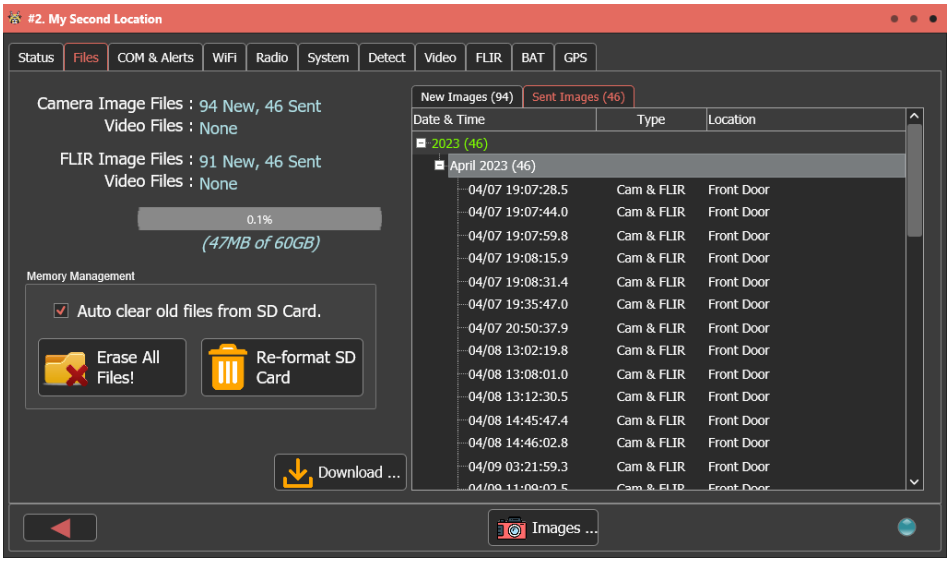
Downloading any of the New Images or Videos will automatically move them from the New to Sent folder.

Setting or Function	*Description*
Camera Image and Video Files	New and Sent Video Camera Images and Videos stored on the SD Card.
FLIR Image and Video Files	New and Sent FLIR Images and Videos stored on the SD Card.
(Used Bar)	The progress bar shows how much of the SD card has been used to store images and videos.

Auto Clear old Files	Check this box to automatically erase old files from the SD Card if it becomes necessary to free up space for new Images and Videos.
Erase All Files	Tap this button to erase all the files on the SD Card in all directories. Note that if there are a lot of files it is usually faster to just re-format the card instead.
Re-format SD Card	Reformats the SD Card and prepares it for use. All SD Cards are formatted using the ExFAT file table format which is compatible to the majority of operating systems.

V.b.1. View , Select, & Download Files

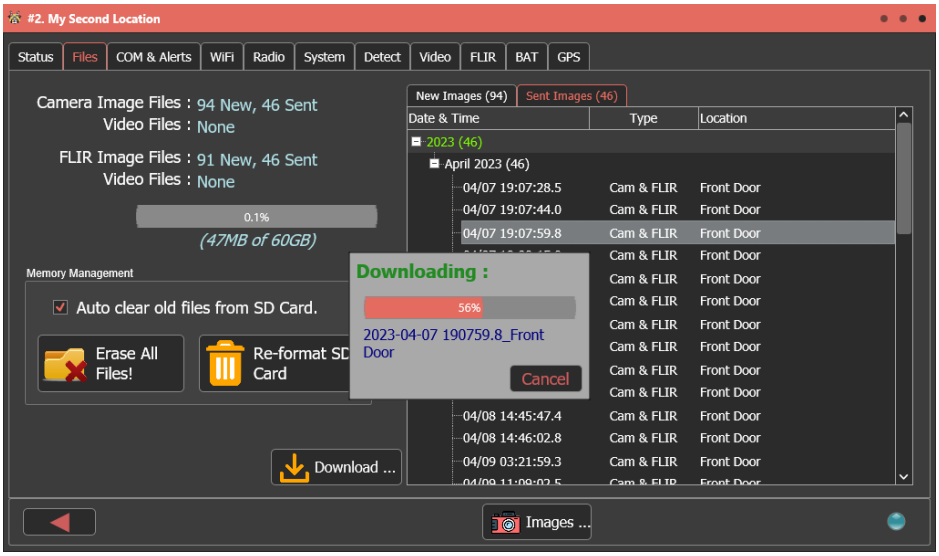
To view, select, and download files from the SD Card start by tapping the tab of the type of file you want access (**New Images or Videos**, or **Sent Images or Videos**) and then follow the steps below:



All files are put into Year and Month groups. Tap on the Year and Month you want to access and a list of available files in that period will be displayed.

The Date & Time of each file along with what type of file it is (usually Cam & FLIR which means both the FLIR Camera and the Video Camera were captured) and the Location when the Image or Video was recorded.

To download a specific file, highlight it and then tap the Download button. A window like this appears:

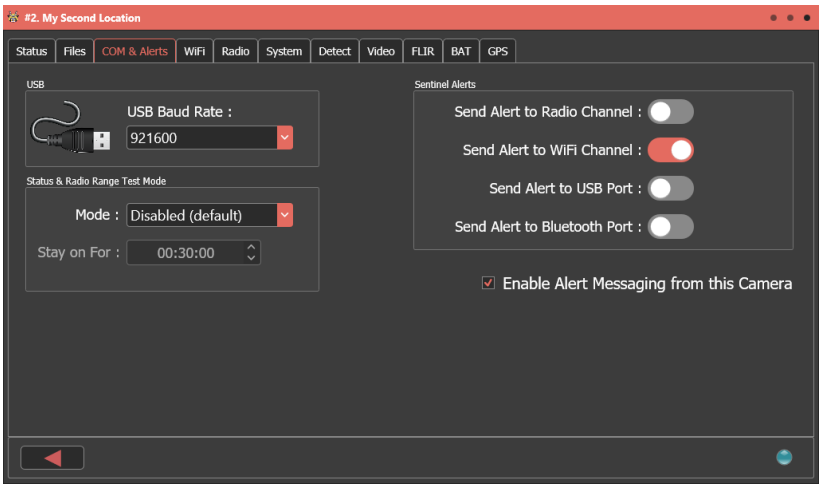


The downloading progress will show how long before the download is complete. When the download finishes, you can tap the Images or Videos button at the bottom of the screen to immediately view it.

Tap Cancel to abort the download at any time.

V.c. Camera Configuration - COM and Alerts

This tab controls the communication channel and the alert system from each camera:



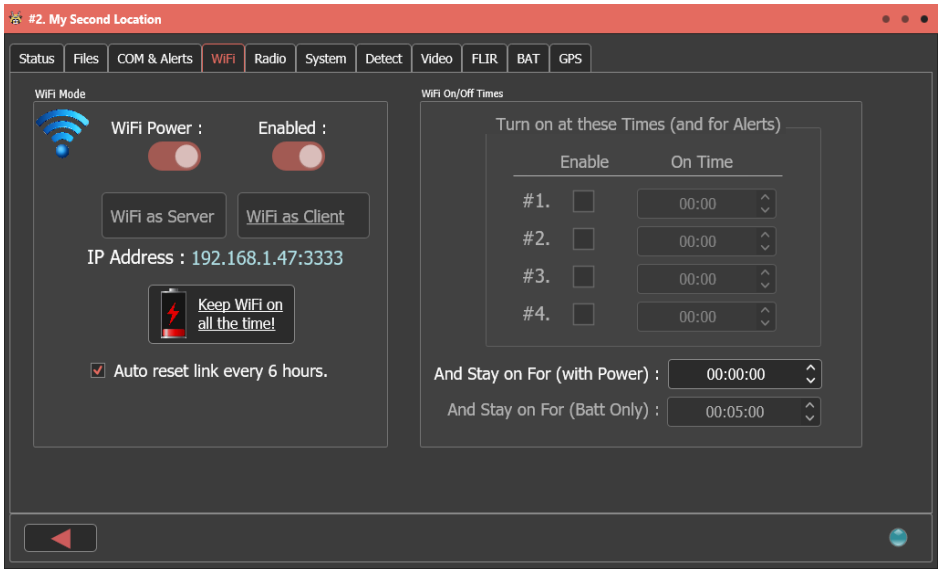
USB Setting	*Description*
USB Baud Rate	The baud rate used by the standard USB connection. Do NOT change this unless you are very aware of how the communication with the camera works.

Status & Radio Range Test	*Description*
Mode	This function is used to do long range testing of the radio signal. Most users will not need to access this ability, but in some circumstances it can be helpful to enable radio range testing. Refer to section **VIII.a. Radio Range Testing** for more information.
Stay On For	If the radio range test mode is enabled this setting determines for how long it will operate once started. See section **VIII.a. Radio Range Testing** for more information.

Sentinel Alerts	*Description*
Send Alert to Radio Channel	Enable the slide switch for each communication channel you want the camera to send a motion alert message to. By default this will be set to the same channel as the Ronin Camera is connected to the Sentinel, however additional channels can be enabled for advanced configurations.
Send Alert to WiFi Channel	
Send Alert to USB Port	
Send Alert to Bluetooth Port	
Enable Alert Messaging from this camera	Check this box to enable the Sentinel to send out Alert Email and Text messages when motion is detected. Unchecking this box turns off this function for this camera only.

V.d. Camera Configuration - WiFi

This tab controls the WiFi communication system from the camera. Note that if you are using this system to connect to the Sentinel, then not all options will be available to change:

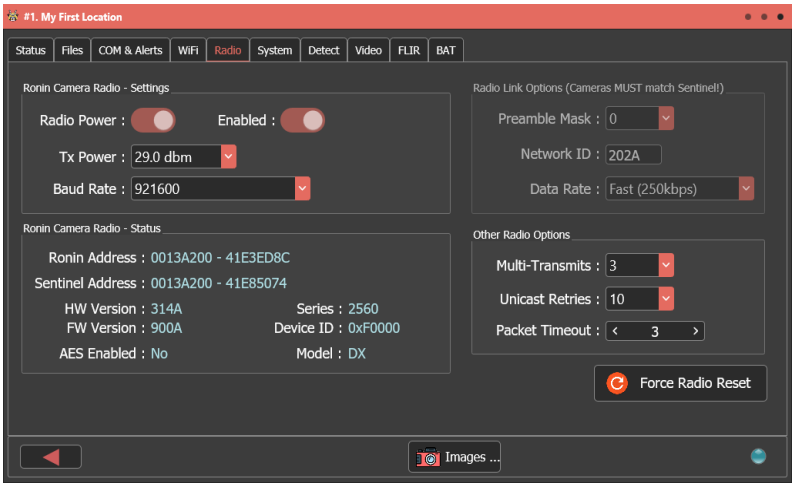


WiFi Mode	*Description*
WiFi Power	Slide switch to Turn On or Off the WiFi power. This is only available if Enabled is set to On.
Enabled	Slide switch to Enable or Disable the WiFi system. This can only be changed if the WiFi power is set to Off.
WiFi As Server / WiFi as Client	Tap this button to switch the WiFi between Server Mode (other devices link to its network) and Client Mode (the camera links to an existing WiFi Network).
IP Address	The IP Address : Port Number that is currently assigned to the WiFi.
Keep WiFi on all the time!	By default the WiFi shuts off after a few minutes (unless it is being used) to save power. Tap this button to force the WiFi to stay on all the time regardless.
Auto reset link every 6 hours	When using the WiFi in Client Mode, checking this box forces it to relink to the network every 6 hours. This is helpful in keeping the link alive when you do not have a lot of activations.

WiFi On/Off Times	*Description*
Turn on at these Times (and for Alerts)	You can specify up to 4 different times to automatically power up the WiFi and have it stay on and listen for a connection request. This is helpful in situations where you want to periodically link to the WiFi while saving power during the off times.
Enabled (#1, #2, #3, #4)	Check this box to enable this specific On time.
And Stay on For (with Power)	When in Small Solar, Large Solar, or Wall Power mode this determines how long the WiFi will stay on for any of the above times. Set it to "00:00:00" to keep it on permanently.
And Stay on For (Batt Only)	When in Battery Only or Batt+FLIR mode this determines how long the WiFi will stay on for any of the above times. Set it to "00:00:00" to keep it on permanently.

V.e. Camera Configuration – Radio

This tab controls the radio setup and configuration. If currently using the radio to link to a Sentinel, then not all options can be changed as these would break the link to the Sentinel.



Ronin Camera Radio – Settings	*Description*
Radio power	Slide switch to turn on or off the radio power. This is only available if the Radio is enabled.
Enabled	Enable or disable the Radio module. This can only be changed if the Radio is powered off.
Tx Power	The Transmission power for the radio. You can select: + 21.5 dBm + 27.0 dBm + 29.0 dBm The higher the value the stronger the signal, but the more battery power used. Typically, it is best to start with the highest value and then change it down to a lower value only after checking the signal strength received on the Camera Status View of the Main Link Page.
Baud Rate	Baud rate to communicate between the Radio and the Ronin Camera main processor. Do not change this value unless you receive specific instructions from Diamond Edge.

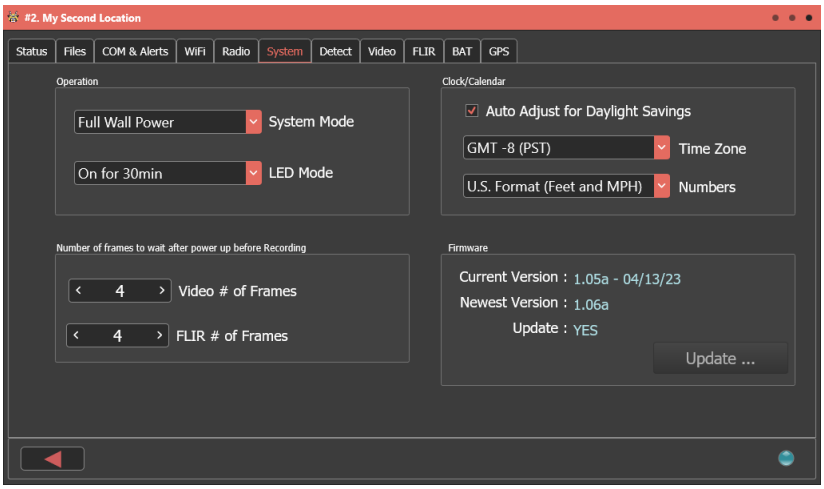
Ronin Camera Radio - Status	*Description*
Ronin Address	These values describe the current radio version and model inside the Ronin Camera.
Sentinel Address	
HW Version	
FW Version	
AES Enabled	
Series	
Device ID	
Model	

Radio Link Options (must match Sentinel)	*Description*
Preamble mask	The ID in the radio message preamble for this radio network. All radios on the same network must have the same Preamble Mask value.
Network ID	A four hexadecimal digit Network ID value for this radio network (from 0000 to 7FFFF). All radios in the network must have the same ID value.
Data Rate	The speed in which over-the-air communication will run. Like the other values, all radios in the same network must have a matching speed value.

Other Radio Options	*Description*
Multi-Transmits	How many times a broadcast radio packet should be repeated.
Unicast Retries	How many times a non-broadcast radio packet should be retried before giving up.
Packet Timeout	The number of character times of inter-character silence required before transmission begins when operating in Transparent mode.
Force Radio Reset	Tap this button to force a re-initialization of the internal Ronin Camera radio module.

V.f. Camera Configuration - System

System values control general camera options as follows:



Operation	*Description*
System Mode	The main system power mode. You can select: + Battery Only + Batt+FLIR + Small Solar + Large Solar + Wall Power See section II.e. for a complete description.
LED Mode	The camera front panel LED's are used to indicate the status of the camera as follows: *Green LED:* + Slowly blinks when camera is on. + Rapidly blinks several times whenever motion is detected. + Turns a steady on (except when motion is detected) if the WiFi links to an existing wireless network or if it is in Server mode and is waiting for other devices to link to it. *Red LED:* + Blinks slowly if the battery is actively charging. + Turns steady on when the battery is fully charged. + The Red and Green LED will flash back and forth in the event of a battery failure. Contact Diamond Edge for how to proceed in this situation. This setting controls how long these LED's will show the above activity as follows: **Always Off:** Keeps the LED's off at all times. **On for WiFi or 30min:** Turns on the Green and Red LED whenever the WiFi link is active or for 30 minutes after powering up. **On for 30min:** Turns on the Green and Red LED for 30 minutes when the unit first powers up or for 30 minutes after pressing the Wakeup pushbutton. **Always On:** Keeps the LED's on at all times.

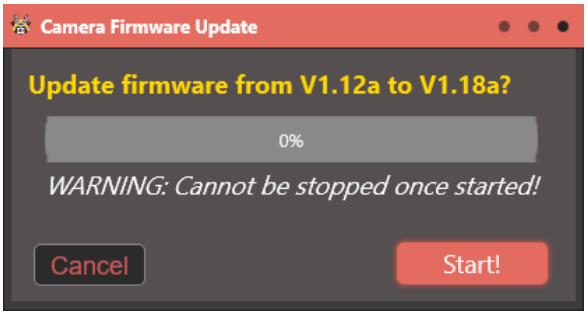
# of Frames to Wait after power up	*Description*
Video # of Frames	These important setting controls how many frames the camera should wait after powering on either the FLIR or Video camera before accepting an image from the camera for capture. The default value of "4" means that it will wait for 4 valid frames before taking the 5th frame as a good image.
FLIR # of Frames	In most situations this is most important at nighttime as it can take the video camera several frames to adjust to the light level being output by the infrared night light. A setting of "4" is a good compromise between trigger speed and image quality. The FLIR camera also can take a while to warmup and produce a good image, and a value of "4" will usually result in a good quality image.

Clock/Calendar	*Description*
Auto Adjust for Daylight Savings	Check this box to automatically adjust the clock/calendar for daylight savings time.
Time Zone	Select the time zone the camera is located in. Setting this correctly is necessary to make the GPS clock time match up to the camera time.
Numbers	Choose between U.S. Format (Feet and MPH) and Metric Format (CM and KPH) for any value that has a difference in these two formats.

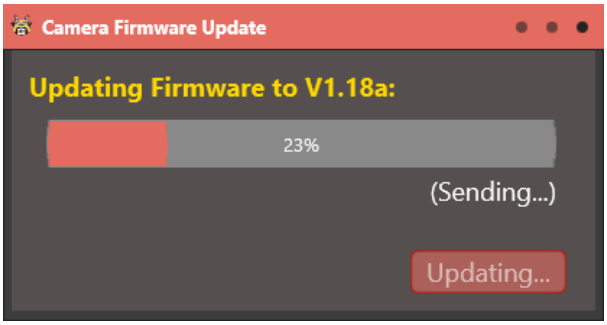
Firmware	*Description*
Current Version	The current firmware version inside the Ronin Camera.
Newest Version	The newest firmware version available on the Ronin Sentinel.
Update & Update **Button**	The "Update" text will say "YES" if an available firmware update for the camera is present on the Ronin Sentinel. This is most likely downloaded automatically when you select "Check For Updates" on the main link screen. When an update is available, tapping the Update button will start the firmware update process. Updates do NOT erase any saved images or videos and in most cases won't change camera setup (unless something is much different in the new firmware version).

V.f.1. Firmware Update

The Sentinel will automatically check for new firmware whenever a camera is connected by USB and you select Add New Camera. You can also manually start a firmware update from the System tab in Camera Configuration. In either case, the first thing that is displayed will be:



Tap Start! to begin the updating. A progress bar will show how it is proceeding:

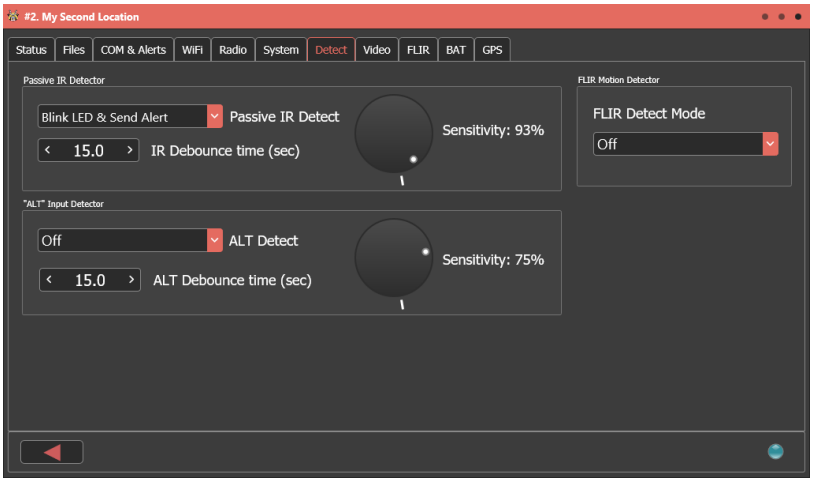


Once the update completes the Sentinel will reset the link to the Camera and attempt to re-connect. This may take a few seconds, after which you will be returned to the Camera Configuration or Add New Camera page.

V.g. Camera Configuration – Detect

The Detect tab controls the motion detection features of the camera. There are three ways to trigger the camera:

- From the Passive IR Detector
- From the "ALT" Detector Input
- From motion in the FLIR Camera Scene



The Passive IR detector is the black sensor right between the FLIR and Video cameras. It functions in all power modes.

The "ALT" detector input is an electrical input that can be tripped on a pin in the Power Input plug at the bottom of the camera case. This works in all camera power modes. See the Ronin Camera manual for more information on accessing this external trigger input.

Lastly, the FLIR Camera Scene detector works by using the Color Tracker system to find motion in the thermal image scene. This is the most accurate and long distant detector available, but you must be in Small Solar, Large Solar, or Wall Power mode to use it because the camera must constantly scan the FLIR image to detect motion.

Passive IR Detector	*Description*
Passive IR Detect	You can select between these options: **Off:** Do not use the Passive IR system for detecting motion. **Blink LED Only:** Blink green LED (if it is On) when motion detected, but do not trigger capture. **Blink LED & Send Alert:** Blink the green LED (if it is On) when motion is detected and trigger a full capture with Alert. This is the default mode to use the Passive IR sensor for capture. **Send Alert Only:** Capture the image and send the Alert message but don't blink the LED.
IR Debounce Time (sec)	The minimum length of time the camera will wait from one trigger to the next for capturing new Images or Videos.
Sensitivity	This dial sets the sensitivity of the Passive IR Sensor. A sensitivity of 100% means the slightest twitch on the sensor will set off a capture, and a sensitivity of 0% means it requires many seconds of constant activation to trigger a capture. For most uses, a sensitivity of 93% to 99% is ideal.

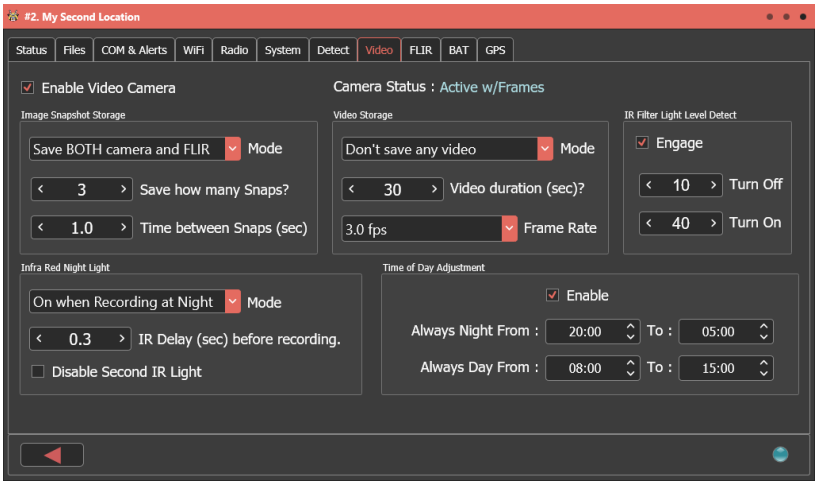
"ALT" Input Detector	*Description*
ALT Detect	You can select between these options: **Off:** Do not use the ALT Detect system for detecting motion. **Blink LED Only:** Blink green LED (if it is On) when ALT detected, but do not trigger capture. **Blink LED & Send Alert:** Blink the green LED (if it is On) when ALT Detect triggers and do a full capture with Alert. **Send Alert Only:** Capture the image and send the Alert message but don't blink the LED.
ALT Debounce time (sec)	The minimum length of time the camera will wait from one trigger to the next for capturing new Images or Videos.
Sensitivity	This dial sets the sensitivity of the ALT Detect system. 100% sensitivity means the slightest twitch on the ALT input will set off a capture, and a sensitivity of 0% means it requires many seconds of constant activation to trigger a capture. For most uses, sensitivity of 93% to 99% is ideal.

FLIR Motion Detector	*Description*
FLIR Detect Mode	You can select between these options: **Off:** Do not use the FLIR Camera for detecting motion for triggers. **Blink LED Only:** Blink green LED (if it is On) when motion detected by the FLIR Camera, but do not trigger capture. **Blink LED & Send Alert:** Blink the green LED (if it is On) when the FLIR Camera detects motion and do a full capture with Alert. **Send Alert Only:** Capture the image and send the Alert message but don't blink the LED. **Verify Passive IR Alerts:** Use the FLIR Camera to verify that the Passive IR sensor activation is valid. This mode uses both sensors to verify motion making the system the most reliable and least prone to false trips.

V.h. Camera Configuration – Video

The Video tab controls what kind of data is captured when the trigger is detected (Images and/or Videos) and other features such as the infrared Night Light, Time-of-Day Adjustment, and the IR Filter Light Level detection.

It is more common to use the Add New Camera function to set most of these values, but later adjustments can be made here at any time.



General	*Description*
Enable Video Camera	Check this box to enable the Video camera.
Camera Status	Displays the current Video camera status.

Image Snapshot Storage	*Description*
Mode	Selects the mode for Image capture when a trigger is detected as follows: **Don't Save Snapshots:** Disables saving images when a trigger is detected. **Save Just Camera Snapshot:** Enables saving just the image from the video camera. **Save Just FLIR Snapshot:** Enables saving just the image from the FLIR camera. **Save BOTH Camera & FLIR:** Enables saving both the Video and FLIR image when trigger detected.
Save how many Snaps?	If the mode is enabled, then this selects how many images should be captured each time a trigger is detected.
Time between Snaps	This is the length of time between each image capture when more than one image is to be captured for each trigger.

Video Storage	*Description*
Mode	Selects the mode for Video capture when a trigger is detected as follows: **Don't Save any Video:** Disables saving video when a trigger is detected. **Save Just Camera Video:** Enables saving just the video from the regular camera. **Save Just FLIR Video:** Enables saving just the video from the FLIR camera. **Save BOTH Camera & FLIR:** Enables saving both the regular and FLIR video when triggered.
Video Duration	How long of a video should be recorded when a trigger detected.

Frame Rate	The frame rate of the video to be recorded.

Infra Red Night Light	*Description*
Mode	Built into the camera is a high power infrared night light that is invisible to humans but visible to the regular camera and is designed to illuminate the camera view up to 60' away at night. This light is usually turned on automatically by the camera, however there are some options that can control when it is turned on: + Disabled (never turn on this light) + Low Light Only or Turn on at Nighttime (turns on whenever the light level gets low at night) + Auto On or Always On (turns on and stays on, not recommended unless wall power connected and the camera is permanently in the dark!) + On Recording or Turn on When Recording (turns on whenever capturing images or video regardless of light level) + Record+Night or On when Recording at Night (turns on whenever capturing images or video when it is dark) This option should only be changed to "Disabled" or "Record+Night" unless the user has a very good understanding of the power modes and the usage of the camera night light.
IR Delay (sec) before recording	How long the camera should wait from when it turns on the IR Light to when the Video Camera has adjusted to the new light level available.
Disable Second IR Light	The camera IR Night Light is built as two separate light arrays. Check this box to disable the second array. This will cut the power draw in half, but will reduce the amount of light sent out. If you want to reduce the amount of power or light then this is a handy option to check.

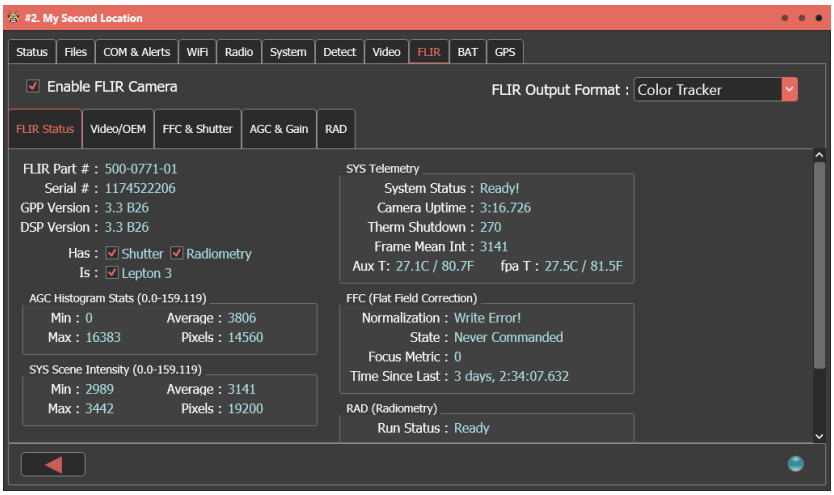
IR Filter Level Detect	*Description*
Engage	Check this box to engage the IR Filter over the camera. Uncheck it to remove the IR filter over the camera lens.
Turn Off	This is the light level reading that triggers an automatic switch from day to night mode. When this level is reached, the camera removes the IR Filter and will turn on the IR LED (if enabled) when it needs to record an image or video.
Turn On	The light level to reverse the process and switch from night to day mode (re-engaging the IR Filter and disabling the IR LED during image or video capture).

Time-of-Day Adjustment	*Description*
Enable	Sometimes car headlights or other external lights can fool the camera into thinking nighttime is actually day time. To prevent this, you can enable the Time-of-Day adjustment and force the camera to consider Night to be from a specific time to a specific time and Day to be a different specific time to specific time. Anytime not within those ranges will be handled by detecting the light level directly from the camera. The advantage to using this feature is that it can force the IR Night Light On even if the camera is being shined on by a car headlight.
Always Night From	
Always Day From	

V.i. Camera Configuration – FLIR

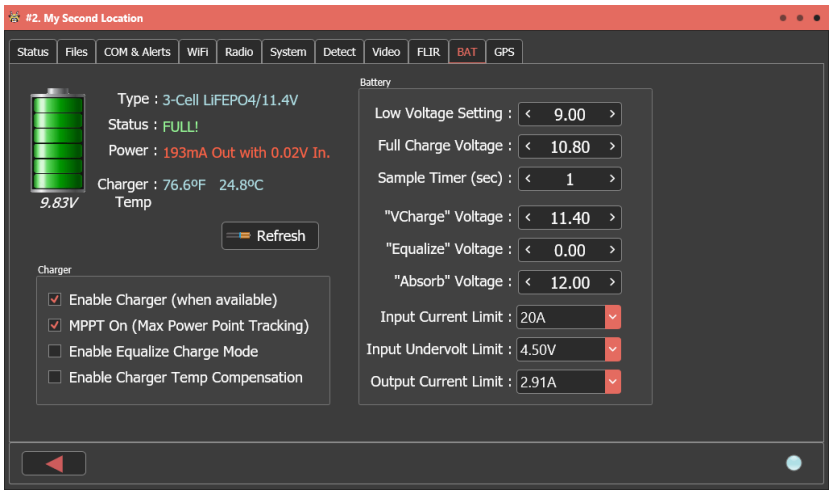
This tab displays literally hundreds of specific FLIR Camera settings and features. There are five sub-tabs that group the FLIR features into different categories of related statistics and functions.

A detailed description of these settings and information is beyond the scope of this manual. However, you can contact Diamond Edge for more information and a guide to these functions in greater detail. This information is provided as an aid to understanding the FLIR Thermal image.



General	*Description*
Enable FLIR Camera	Check this box to enable the FLIR camera.
FLIR Output Format	Selects the mode to display the FLIR thermal image. The default is "Color Tracker", but you can choose from: + Raw + Grayscale + Color Tracker + Quad Mode + Fusion Relative + Fusion Absolute + Rainbow The "Quad Mode" splits the view into four separate displays of Grayscale, Fusion Absolute, Color Tracker, and Rainbow. See Section IV for more information. IMPORTANT: The Ronin System allows you to change the view mode of any captured image or video after it has been recorded! This means it does not matter what view mode you pick here because you can always change it later using the View Images/Video function. Your choice here only sets the default view mode for the image or video and what format will be used when the image or video is sent to you by an email or text alert. See Section VI and IV.b. for more information on this very useful ability.

V.j. Camera Configuration – Batt



The Batt tab displays the current battery and battery charger information and allows you to control the charger settings.

One of the most useful items is the battery symbol which will be colored according to the current battery voltage level and whether active charging is taking place. This is very useful in verifying that solar panels or wall adapters are functioning properly.

Tapping the Refresh button will update the current battery status information. Repeatedly tapping this button can provide useful information on how the charger and battery system is functioning.

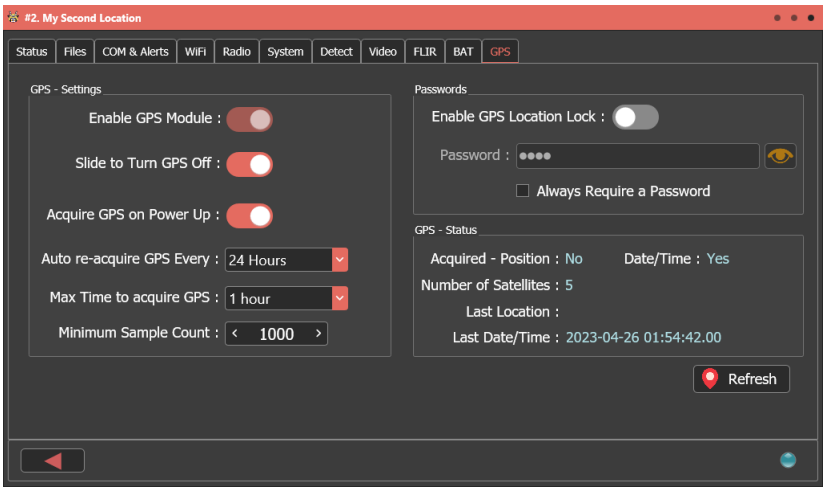
Charger	*Description*
Enable Charger (when available)	Check this box to enable the charger.
MPPT On (Max Power Point Tracking)	MPPT is an advanced charger system for improving the amount of power being used from Solar Panels. Enabling this feature maximizes the efficiency of solar recharging the batteries.
Enable Equalize Charge Mode	When checked the “Equalizer” charge mode is used when the battery charger first starts.
Enable Charger Temp Compensation	When checked the current temperature will be used to adjust charging parameters.

Battery	*Description*
Low Voltage Setting	The battery voltage that is to be considered “low”.
Full Charge Voltage	The battery voltage that is to be considered “fully charged”.
Sample timer (sec)	How often (in seconds) the battery charger system should be checked.
“VCharge” voltage	Controls the final charge voltage regulation servo level. To maintain inherent overcharge protection, only LiFePO4 appropriate charge voltage values can be selected.
“Equalize” voltage	Used to equal out the battery voltage across batteries (not used in LiFEPO4 charging).
“Absorb” voltage	Initial rapid charging voltage level.
Input Current Limit	The maximum amount of current that can be drained from the power input source.
Input Undervolt Limit	The minimum voltage level on the input to shut off the charger system.
Output Current Limit	The maximum output current to feed into the battery pack.

V.k. Camera Configuration – GPS

The final tab details the GPS functions and current status. The bottom right box describes the most recent GPS Status and can be updated in real time by tapping the Refresh button.

The remaining options control the various GPS setup and are described below.



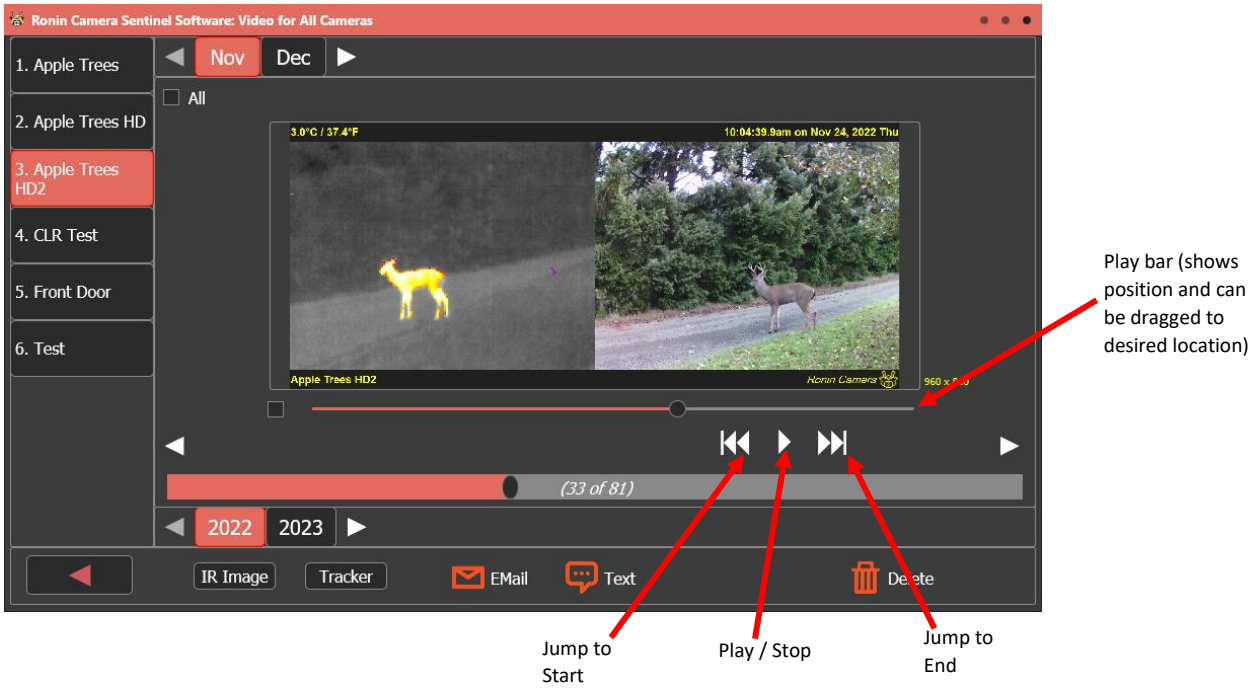
GPS - Settings	*Description*
Enable GPS Module	Slide to enable the GPS Module (only can be changed if GPS is off).
Slide to Turn GPS On/Off	Slide to turn on or off the GPS Module (only available is GPS module is enabled).
Get GPS Location on Power Up	Set this to ON if you want the camera to automatically scan for the current GPS location of the camera when it is first powered up.
Auto Re-acquire GPS Every	Select the length of time you want to automatically recheck the GPS location after the first time.
Max Time to acquire GPS	Maximum amount of time camera will wait to get a GPS location before shutting off module.
Minimum Sample Count	The minimum number of GPS location fixes before the position is locked. Increasing this value can improve the accuracy as the GPS chip has a longer time to get a valid location.

Passwords	*Description*
Enable GPS Location Lock	If this is checked the Ronin Camera will save the current GPS location and LOCK it into its memory. When it rescans for the location, or the next time it is powered on, if the location it gets is different than the locked location into the camera it will stop functioning until it receives a password from the user. In effect the GPS Location Lock will "brick" the camera until it receives a password if it moved from its location. This is an anti-theft feature which can help deter anyone who might steal the camera since it becomes useless unless it is returned to its original location.
Password	The password that must be entered to unlock the camera from a GPS location lock.
Always Require a Password	If checked, then passwords are enabled for accessing the camera anytime and not just when it is location locked. Users may want to enable passwords for increased security.

VI. Images & Videos Viewer

Built into the Ronin Sentinel is a complete Image and Video viewer. The Sentinel downloads and saves all alert messages from the connected cameras and allows users to review them at any time with an easy to use player and image processor. You can also easily change the FLIR View Mode of any captured Image or Video in the viewer and you can quickly email or text images or videos directly from the viewer.

If you are viewing Videos, an additional play bar and controls appear under the image like this:



VI.a. Viewer – Change FLIR View Mode

If you tap the IR Image button in the viewer a small window appears allowing you to select the view mode for the image or video. You can choose from:

+ Grayscale
+ Color Tracker
+ Rainbow
+ Raw
+ Fusion Relative
+ Fusion Absolute
+ Quad Mode

For example, if you were to switch the previous view to Fusion Relative the screen would immediately change to show:

You are free to change the view mode as often as you want and the Sentinel always remembers the last view mode you selected for each individual picture and will use that as the default the next time the image or video is seen.

VI.b. Viewer – Change Color Tracker

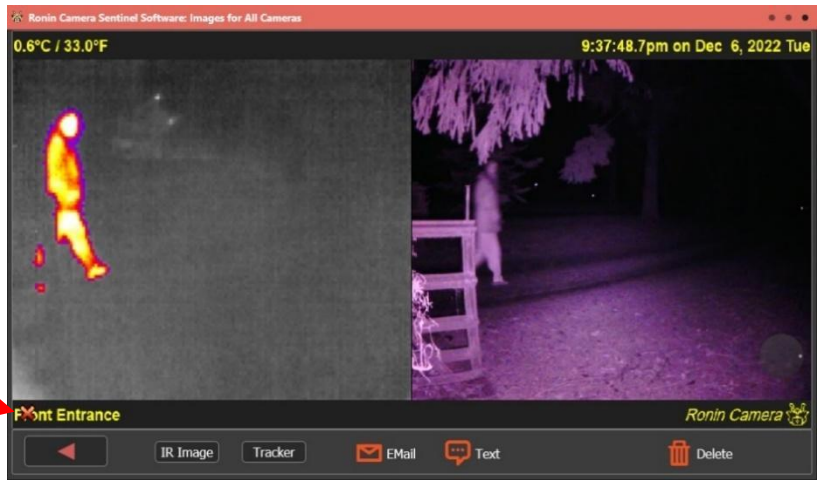
If the view mode is Color Tracker or Quad, a button labeled Tracker appears. Like the view mode, you can change the tracker options at any time to see the immediate effect on the image or video. The Color Tracker options are:

Tracker	Tapping this button sets the options when Color Tracker or Quad View mode is selected. These settings adjust how the Color Tracker image is displayed: • **Min Change:** The minimum difference (in 0.01 degrees Celsius) between the background and the new pixel for it to qualify as *Active* and should be shown in color instead of black and white. • **Min Grouping:** The minimum number of pixels that must be active and next to each other to maintain their active status. This helps eliminate isolated pixels that are not part of a larger object being shown as active. • **Color Amplifier:** The amount of color amplification that should be applied to active pixels to make them stand out more. • **Retune Rate:** How quickly the camera should adjust to background changes to make a new non-active value. Increasing this value makes the camera less able to adjust to changing background temperature, but less likely to tune out slow moving objects in the field. • **Max ON:** The maximum number of seconds a pixel can be active before it is assumed to be a new part of the background. • **Show in Fusion:** Check to color the active pixels the same color as Fusion Relative. • **Use Negative:** Check to use pixels that are both colder than the background (negative) and warmer than the background (positive). Unchecked then only the warmer are used. • **Use Active Pix:** When checked the coloring of active pixels is determined only by the range of temperatures of the active pixels themselves. When unchecked, then the entire image temperature range is used to determine the color of the active pixels.

VI.c. Viewer – Zoom

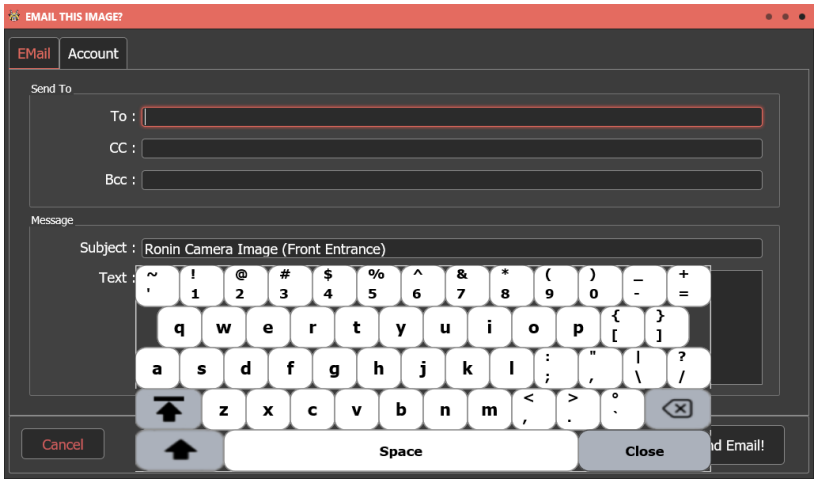
Tapping on any Image or Video will zoom in on the picture and fill the whole screen. From there you can manually zoom in or out with finger gestures to view a specific part of the picture.

A typical zoomed image looks like this:



VI.d. Viewer – Email

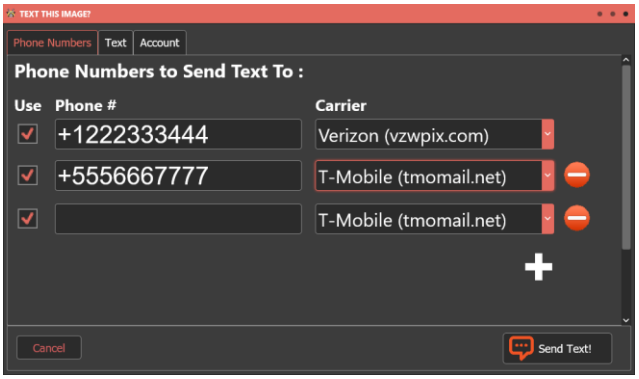
Tapping the Email button at the bottom of the viewer screen allows you to send an email with the selected Image, Video, or multiple Images or Videos (if selected). A window like this appears:



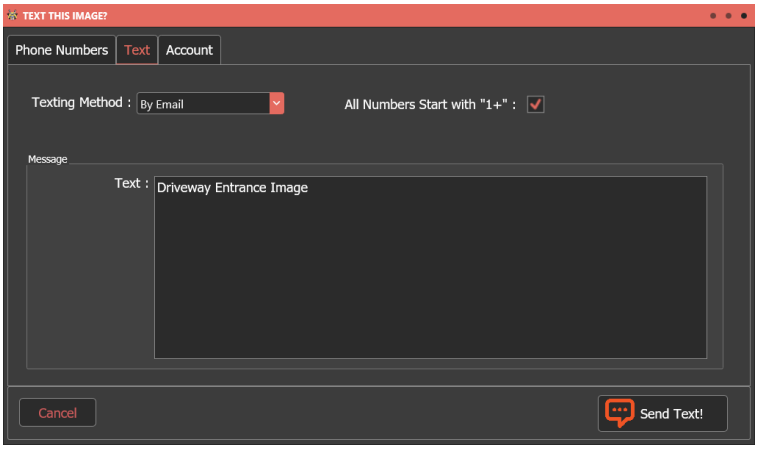
Enter in Email addresses or addresses (separated by commas) and then tap Send Email to send the image or video to the designated recipient.

VI.e. Viewer – Text

Like emailing you can easily send a text for any select Image or Video (or multiple if selected). Tap the Send Text button at the bottom of the viewer and the following screen will appear:



Enter in the phone numbers and the carrier that number uses. You can tap the Text tab to set additional text values like:



The "Account" tab controls what method the Sentinel uses for sending texts. Refer to Section VII for more information on setting up the service used by the Sentinel to send texts.

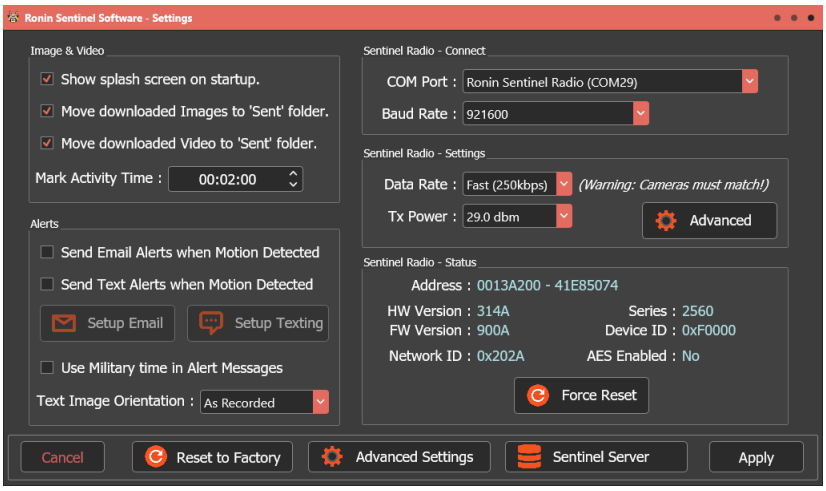
VII. Sentinel Settings

The Sentinel has a variety of controls and settings which affect how it operates. Many users may never need to access these values, but some will want to customize the operation of their Sentinel to meet their specific needs.

There are two main setting areas accessed from the main menu: **Sentinel Program Settings** and **Network Settings**

VII.a. Sentinel Program Settings

These are settings which affect how the Sentinel operates in general and with connected cameras. The main settings page looks something like this:



At the bottom are several buttons for advanced settings such as Reset to Factory , to reset Sentinel, Advanced Settings , and Sentinel Server which controls how the *Ronin Camera Link App* works with the Sentinel.

In the Sentinel Radio box there is an Advanced button to control other radio options and underneath that is a Force Reset button to force the internal Sentinel Radio to completely reset.

Image & Video	*Description*
Show splash screen on startup	When checked the Sentinel startup screen will display for a few seconds when unit first powers on.
Move downloaded Images to 'Sent' Folder	If checked, downloading an Image from any camera will automatically move it from the "New" folder to the "Sent" folder.
Move downloaded Video to 'Sent' folder	If checked, downloading a Video from any camera will automatically move it from the "New" folder to the "Sent" folder.
Mark activity time	The length of time a green box will appear around a camera after a new video or image is downloaded from an alert.

Alerts	*Description*
Send email alerts when motion detected	Check this box to enable sending email alert messages. This is an easy way to globally disable or enable the email system without changing any other parameters.
Send text alerts when motion detected	Check this box to enable sending text alert messages. This is an easy way to globally disable or enable the texting system without changing any other parameters.
Use military time in alert messages	When checked the Sentinel will report all times in military format. For example, 6pm will be reported at 1800 hours.
Text Image Orientation	This setting allows you to force images to either Vertical or Horizontal when sent as a text message. When Vertical, the FLIR will be on top and the Video Camera on the bottom. When Horizontal, the FLIR is on the Left and the Video Camera on the right.
Setup Email **and** Setup Texting **buttons**	Tap these buttons to go into the advanced Email and Texting setup.

Sentinel Radio - Connect	*Description*
COM Port	The port the radio is connected to inside the Ronin Sentinel case. Do not change this unless you completely understand what the consequences are.
Baud rate	The baud rate to communicate to the radio at. Like the above, do not change this without knowing how the radio system works and what the consequences could be.

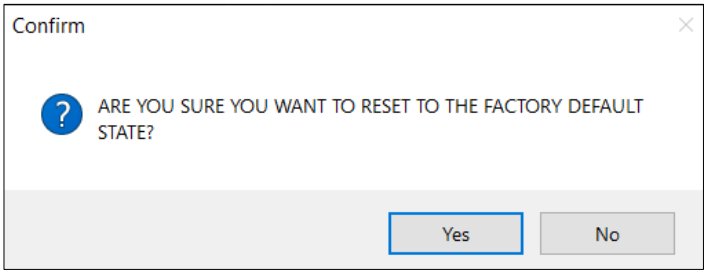
Sentinel Radio - Settings	*Description*
Data Rate	The speed rate for the radio. All cameras must use the same rate, so changing this after cameras are connected will disable them. Changing of the data rate of the radio after cameras are connected should only be done with the Toggle Camera View Mode functions described in section III.c.
Tx Power	The transmission power for the Sentinel radio. Typically this should be set to the highest value, but some users may be able to reduce it in certain configurations.
Advanced **button**	Tap this button to access the advanced Radio configuration options.

Sentinel Radio - Status	*Description*
Address	Information about how the Sentinel Radio is configured. This includes the radio address, network ID, and other information.
HW Version	
FW Version	
Network ID	
Series	
Device ID	
AES Enabled	
"Force Reset" Button	

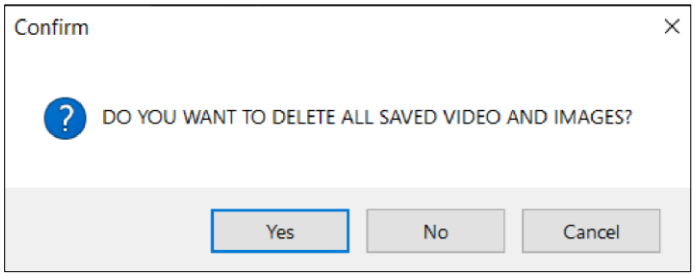
VII.a.1. Settings - Reset to Factory

Tapping this button will allow you to completely reset the Sentinel back to its factory default state.

You will first be asked to verify that you want to do this because it CANNOT be undone once started:



If you confirm you want to reset the unit, you will be asked if you want to also erase all the Images and Videos stored on the Sentinel. This is useful when transferring the Sentinel to a new user and you don't want to share your saved data:

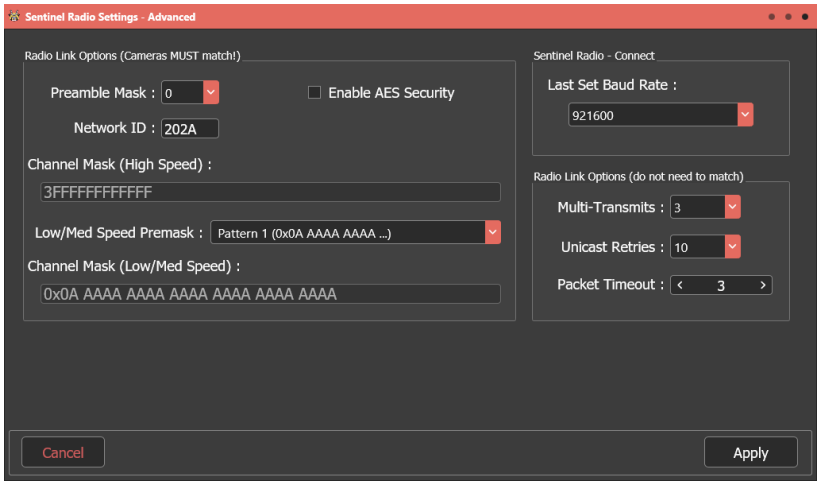


Select Yes to erase all the saved images and videos, or select No to continue the factory reset without erasing the saved Images and Videos.

VII.a.2. Settings - Advanced Radio

The advanced Sentinel Radio settings controls features of the radio system not commonly accessed by the average user. This includes the Channel Mask and AES Security features for improving overall radio communication security.

Note that changing these values will likely break your connection to existing Ronin Cameras that are linked by radio. These cameras should be deleted and the re-added to the Sentinel after making changes here to insure the remain functional.

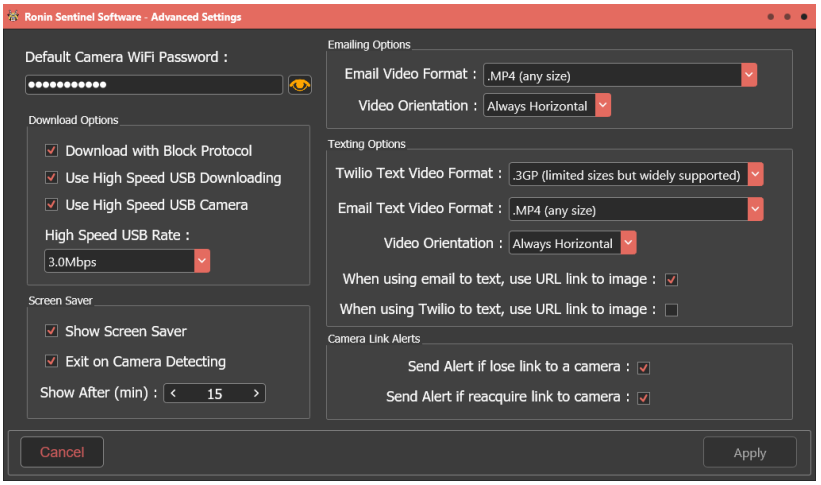


Radio Link Options (Cameras must match)	*Description*
Preamble mask	The ID in the radio message preamble for this radio network. All radios on the same network must have the same Preamble Mask value.
Network ID	A four hexadecimal digit Network ID value for this radio network (from 0000 to 7FFFF). All radios in the network must have the same ID value.
Enable AES Security	Check this box to turn on AES security for all radio links. This is a very secure method of communication, but does slow down the system.
Channel Mask (High Speed)	This read-only value shows the channels that will be used in High Speed (250kbps) mode.
Low/Med Speed Premask	Select a premask pattern for the radio channels to be used when in Low and Medium speed mode. If you are using multiple Sentinels, you can keep them from interfering with each other by selecting a different mask for each Sentinel in an area.
Channel Mask (Low/Med Speed)	This read-only value shows you what the mask pattern will be for Low and Medium speed modes.

Other Radio Options	*Description*
Multi-Transmits	How many times a broadcast radio packet should be repeated.
Unicast Retries	How many times a non-broadcast radio packet should be retried before giving up.
Packet Timeout	The number of character times of inter-character silence required before transmission begins when operating in Transparent mode.

Sentinel Radio Connect	*Description*
Last Set Baud Rate	This shows what baud rate the internal radio hardware was last programmed to be. In the case of a complete system wipe the software may revert to a baud rate that does not match the actual programmed baud rate of the radio. In that case, adjusting the last set rate can get access back to the radio if it has been lost. Contact Diamond Edge for specific instructions.

VII.a.3. Settings – Advanced Program



These settings are not often changed by users. However, they are available for those cases where it is necessary to make an adjustment (usually at the direction of Diamond Edge). Please make changes here very carefully!

The **Default Camera WiFi Password** is the SSID password the Add New Camera function will use to link to a camera by WiFi. The default is "rcspassword".

The other settings are detailed below:

Download Options	*Description*
Download with block Protocol	Check to enable using the high speed block protocol mode for downloading. This is faster than non-block downloading because it grabs the full image quickly and then later will correct any errors in specific locations.
Use high Speed USB Downloading	Check to use high speed when downloading Images and Videos from USB connected Cameras.
Use High Speed USB Camera	Check to use high speed when doing Live View from USB connected Cameras.
High Speed USB Rate	The high speed baud rate to use when either or both above options are checked.

Screen Saver	*Description*
Show screen Saver	Check this box to enable the screen saver after a period of no activity.
Exit on camera detecting	When checked, the screen saver will automatically turn off when activity such as a new Camera Alert is received.
Show after (min)	How long to wait (in minutes) for no activity before triggering the screen saver.

Emailing Options	*Description*
Email Video Format	Selects the video file format to use when attaching videos to emails. By default the ".mp4" format is used which is supported on most web email browsers. Other options are ".3gp" which is widely supported and ".avi" which is high quality but mostly supported on Windows platforms.
Video Orientation	Orientation of video when attaching it for emails. This can be Horizontal with the FLIR on the left and the video on the right or Vertical with the FLIR on the top and the video on the bottom.

Texting Options	*Description*
Twilio Text video format	If you have enabled Twilio as your texting service provider (bypassing the free texting system), you can choose the format for the videos attached to text messages. We strongly recommend .3gp for this format as it is most widely supported by iOS and Android.
Email Text Video Format	If you are using the default free email based texting system included with the Sentinel, this is the output format for videos attached to those text messages. You can choose ".mp4", ".3gp", or ".avi" with ".mp4" being the default and best supported.
Video Orientation	Orientation of video when attaching it to texts. This can be Horizontal with the FLIR on the left and the video on the right or Vertical with the FLIR on the top and the video on the bottom.
When using email to text, use URL link to image	Check to use a URL link to image or video embedded in text message begin sent by the email system. Recommended when doing free text by email that is included with the Sentinel system.
When using Twilio to text, use URL link to image	Check to use a URL link to image or video embedded in the text message sent by the non-free Twilio system. This NOT recommended since Twilio does a good job including it with message.

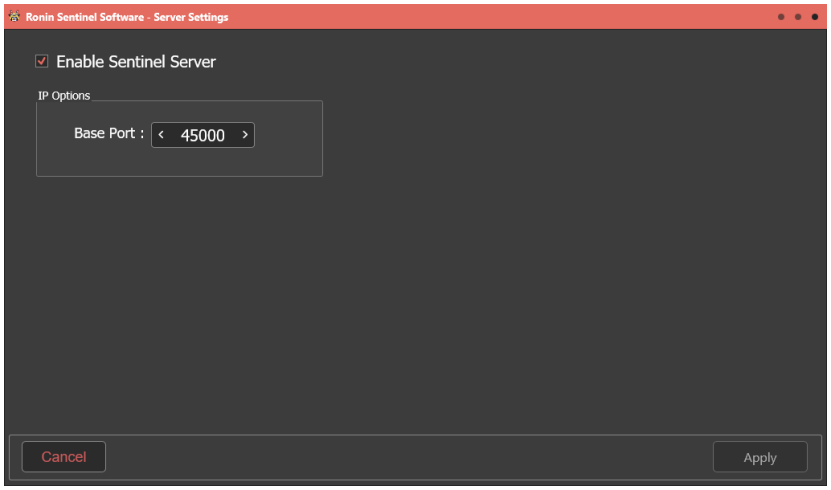
Camera Link Alerts	*Description*
Send alert if lose link to a camera	Check to send alerts when Sentinel loses a link to a connected Ronin Camera.
Send alert if reacquire link to camera	Check to send alerts when Sentinel re-acquires a lost link to a connected Ronin Camera.

VII.a.4. Settings – Server

The Server is the part of the Ronin Sentinel that supports the Ronin Camera Link App. You must enable the Server for the App to function.

Check the box to enable the Sentinel Server.

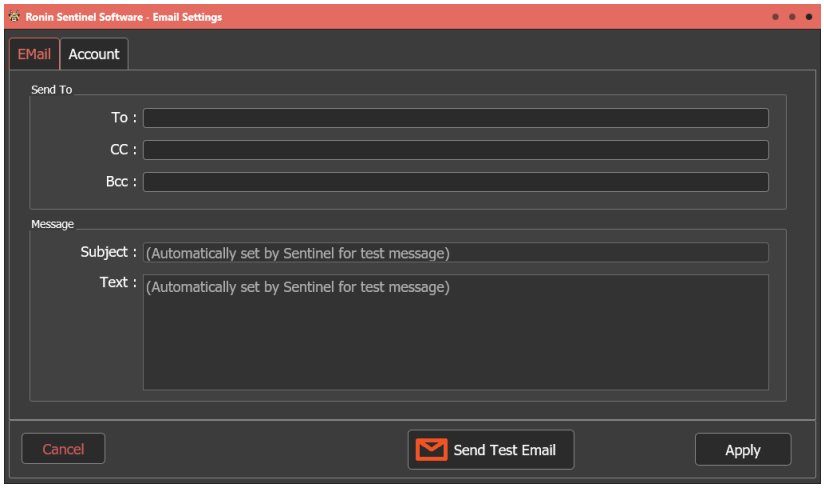
You can also specify the "Base Port" for the Sentinel Server to operate from. This usually doesn't matter, but some systems may require a different value depending on their security requirements. If you do change it here, be sure to change it on the Ronin Camera Link App too so the link continues to function.

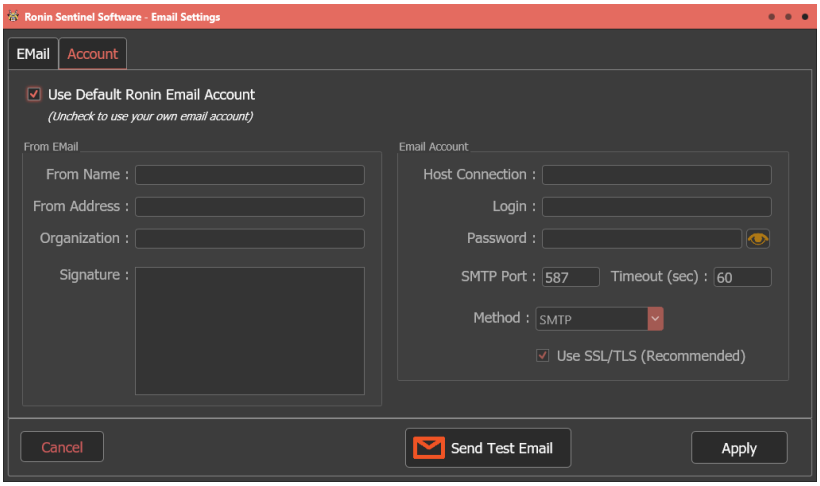


VII.a.5. Settings – Setup Email

This page allows you to set the email addresses for sending out email messages. The first tab labeled "Email" sets who you want to send emails to.

The second tab "Account" sets how the messages are sent.





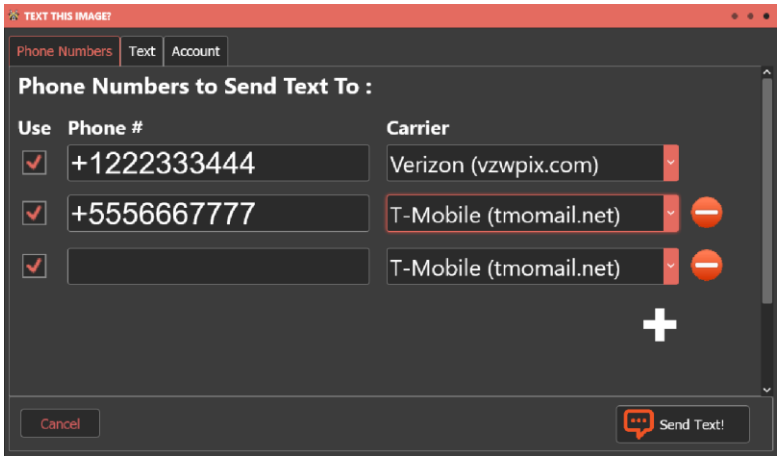
To change the account the Ronin Sentinel uses to send email messages, first uncheck the box "Use Default Ronin Email Account". Once that is unchecked you will be able to setup a new email account including the email host and login credentials for sending emails.

WARNING: You must be familiar with setting up email sending accounts in order to successfully change from the default account. Please proceed with caution when changing these values.

Tap Send Test Email to send a test message to your settings and verify that it is working correctly.

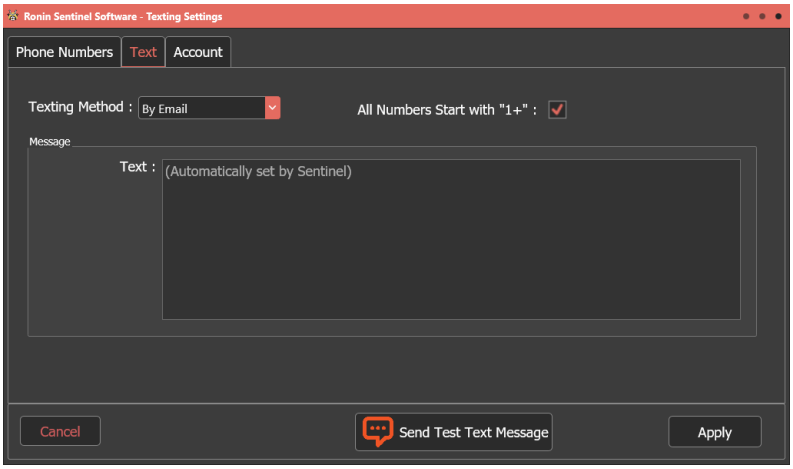
VII.a.6. Settings – Setup Texting

This page allows you to set the phone numbers and account information for sending text messages. The first tab is labeled "Phone Numbers" and sets who you want to send text messages to:



Enter the phone number you want to send and select the carrier this phone uses (Verizon, AT&T, etc). Tap the [+] and [–] buttons to add or remove numbers. You can also check or uncheck the box to the left of the number to temporarily enable or disable a number to send to.

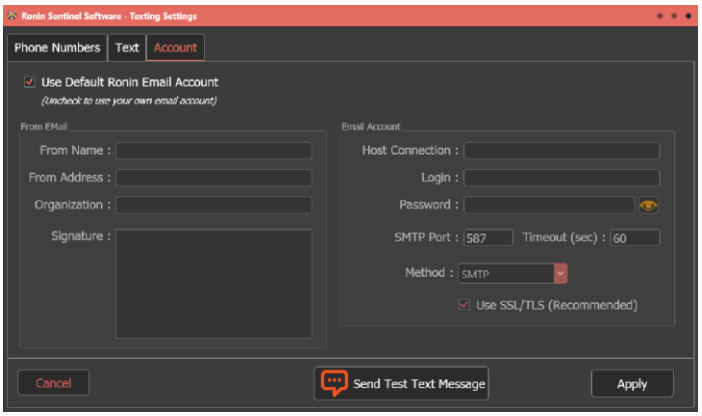
The "Text" tab sets some general options about how the texting should be sent:



The most important value here is the "Texting Method". By default it is "By Email", but you can change this to the fee based service known as Twilio by changing the option here.

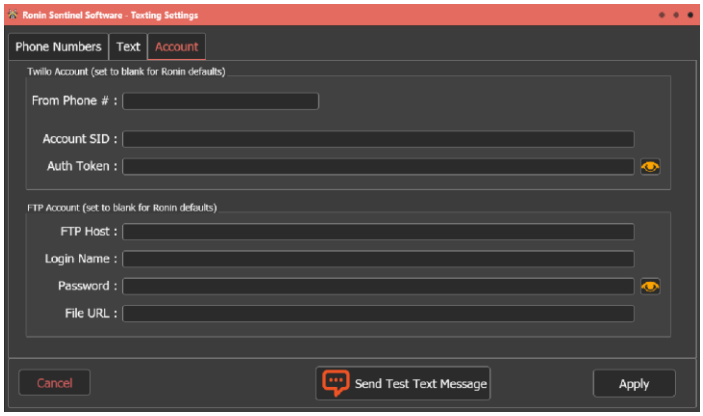
If you select Twilio then you will no longer need to specify the specific carrier and you will instead be allowed to enter in the Twilio service account information under the "Account" tab.

"Account" tab with free email based texting:



Uncheck the "Use Default Account" if you want to modify the email account used to send email based texts.

"Account" tab with Twilio based texting (not free):



Follow the instructions from Twilio to setup the specific account information for your configuration. Contact Twilio for help on setting up this ability.

Regardless of the method, tap [Send Test Text Message] at any time to send a verification message to your device to make sure it is working as intended.

VII.a.7. Understanding & Troubleshooting Alerts

Unfortunately, receiving alerts reliably and quickly can sometimes be difficult to achieve. The issue is likely not with the Ronin Sentinel, but rather with the wireless cell phone network the system uses to send alerts to your phone.

We believe very strongly in offering a "free" service for receiving alerts. There is nothing we consider more unfair than forcing our customers to pay a monthly fee for something after purchasing the equipment. However, we still must rely on existing systems to deliver the message to your phone and these systems can throw up road blocks to it working correctly. Most of the time the issues are an attempt by the service to prevent spam messaging.

Many products use "Notifications" rather than text messages. On iPhones, these are the blue boxes that indicate an app has a message for you. Other products that use text messages utilize an online commercial server to send out their message, and these services are usually designed for marketing purposes. Those kinds of messaging products normally have a monthly fee plus a cost for each message sent. The Ronin Sentinel supports this with a popular system called "Twilio" which users can activate and setup an account to send out their alert messages. Although we support Twilio, and you can enable this for use with the Sentinel in the Alert setup, we are not involved in subscribing to it and users are free to use it or not as they wish.

For "free" alert texts we rely on the fact that each wireless carrier allows your phone to receive text messages from an email account if the email is sent to your phone number at a specific domain. For example, if your phone uses Verizon and the number was 541-780-6869, then Verizon uses "vzwpix.com" as the domain. Sending an email to 5417806869@vzwpix.com would deliver the alert to your phone as a text message.

Carrier	*Email @*
Verizon	vzwpix.com
AT&T	mms.att.net
T-Mobile	tmomail.net
Boost	myboostmobile.com
Cricket	mms.cricketwireless.net
Sprint	pm.sprint.com
U.S. Cellular	mms.uscc.net
Virgin Mobile	vmpix.com

It is often useful to try this using your normal email account. Send yourself a message using your phone number and one of the above addresses to verify that you can receive text messages this way.

The default configuration of the Ronin Sentinel is to use the free email account that comes with each Ronin Sentinel to send a message using your phone number and one of the domain names listed in the previous table. When you setup text alerts, you enter in your phone number and the wireless carrier and the Ronin Sentinel will send alerts using the following configuration:

From: <Sentinel Serial Number>@detllc.com (for example: rss0821001@detllc.com)
To: <your phone number>@<your carrier> (for example: 5417806869@vzwpix.com)

If you find that you are not receiving alerts (or the alerts come in long after the activity) when using the default configuration, you may need to take some additional steps as detailed below.

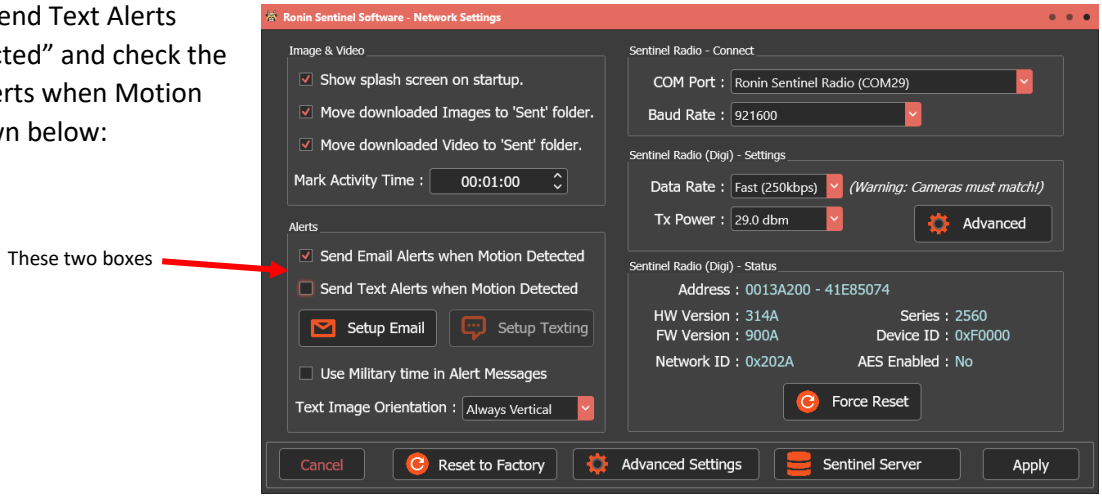
The most common cause for issues is because the wireless carrier is blocking the message from getting to your phone. The email address ending in "detllc.com" is not widely known, and sometimes the wireless carrier blocks all messages from it without you doing anything to indicate that this is what you want.

TROUBLESHOOTING ALERTS – SOLUTION #1 (forward from Gmail or other Email Service)

One of the easiest ways to fix slow or missing alerts is to switch to using a free email account from a provider like Google. Because Gmail is so widely known, and Gmail accounts are verified to a specific user, most phone carriers pass the messages from Gmail along very quickly. Follow the steps below to switch the Ronin Sentinel to this method:

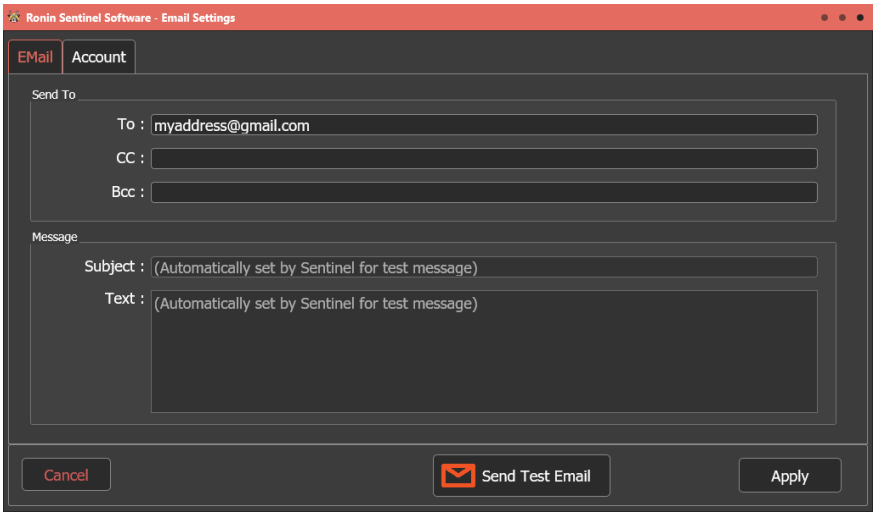
1) On the Sentinel, tap the Settings Icon and select "Sentinel Settings"

2) Uncheck the box "Send Text Alerts when Motion Detected" and check the box "Send Email Alerts when Motion Detected" like shown below:

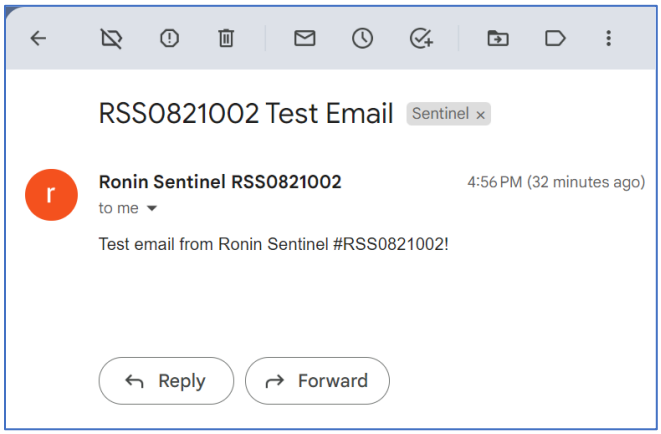


3) Tap the "Setup Email" button and enter the Gmail address or addresses you want to send alerts to. Separate multiple recipients with a comma:

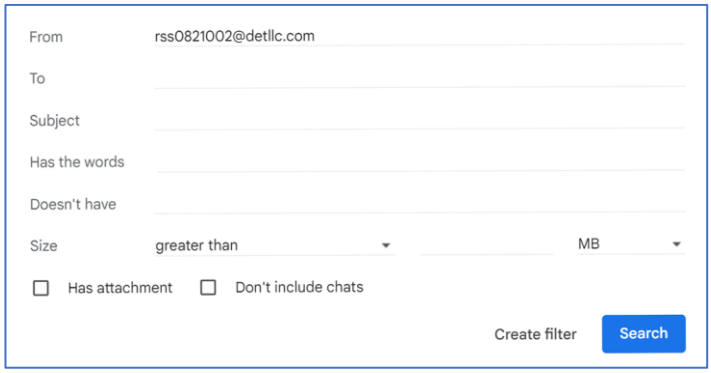
4) Tap the "Send Test Email" button. This will send an email to your Gmail account that you entered above.



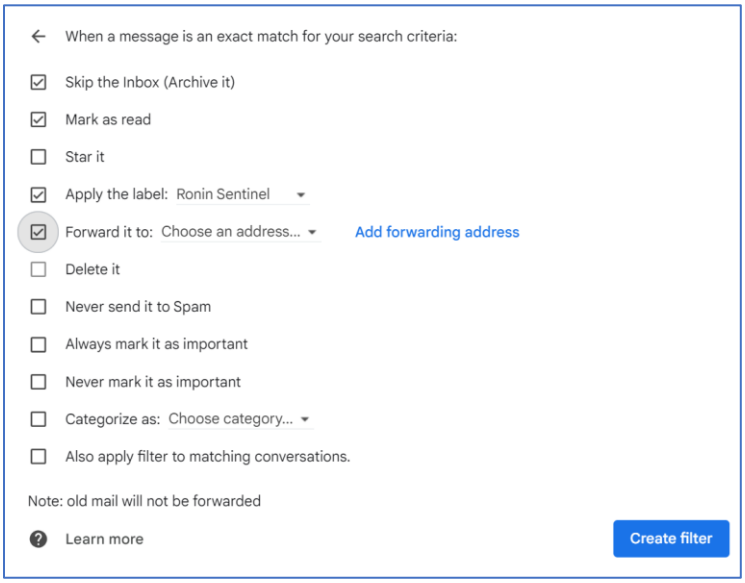
5) Open Gmail and find the message from the Sentinel. It will look something like this:



6) On the left side of Gmail tap the "+" icon next to the word "Labels". This will let you add a custom folder for your alerts to go into. Enter in a new label name like "Ronin Sentinel" and tap "Create".
7) Now setup your phone as a valid "Forwarding Address":
    a. Click on the gear icon at the top right of your Gmail account and select "See all settings"
    b. Click on "Forwarding and POP/IMAP"
    c. Click "Add a Forwarding Address".
    d. Enter in your phone number and the wireless carrier (i.e. 5417806869@vzwpix.com). You can find the different addresses from the table above, click Next, then click Proceed.
    e. You will receive a text on your phone with instructions. Follow the steps on your phone to verify the address (this is usually tapping a link from a text and then selecting "Allow").
    f. Once the forwarding address is setup, following the instructions below.
8) Go back to the test message from the Sentinel, click the 3 vertical dots and select "Filter Messages Like These":



9) Tap "Create Filter":



Check the box "Skip the inbox (archive it)".

Check the box "Mark as read" (if you do not want each alert to show up as an unread message).

Check the box "Apply the Label" and then select the label you created in Step #6.

Check the box "Forward it to:" and then select your already setup forwarding address to your phone.

NOTE: If you cannot click the "Forward it to" box, refresh your web page and restart from Step 8.

Click "Create Filter".

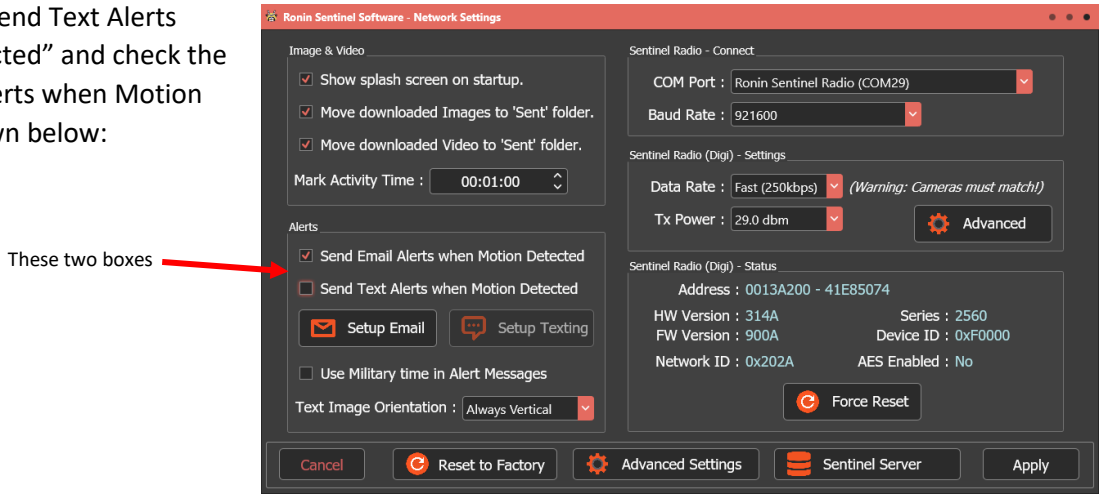
10) On Sentinel, tap "Send Test Email" again. If everything has been setup correctly, the following should happen:
    a. The Ronin Sentinel sends an email to your Gmail address.
    b. Gmail detects this and automatically forwards it to your phone (as well as moves it to the "Ronin Sentinel" folder). It should appear within a few seconds as a text on your phone.
    c. It is a good idea to add the message sender as a known "contact" on your phone. This will help prevent your phone from blocking the alert messages when they come in.
11) Manually activate a camera or wait for one to activate to get your first alert message. Using the above method can result in a very fast text message to your phone!

TROUBLESHOOTING ALERTS – SOLUTION #2 (use Gmail Notifications)

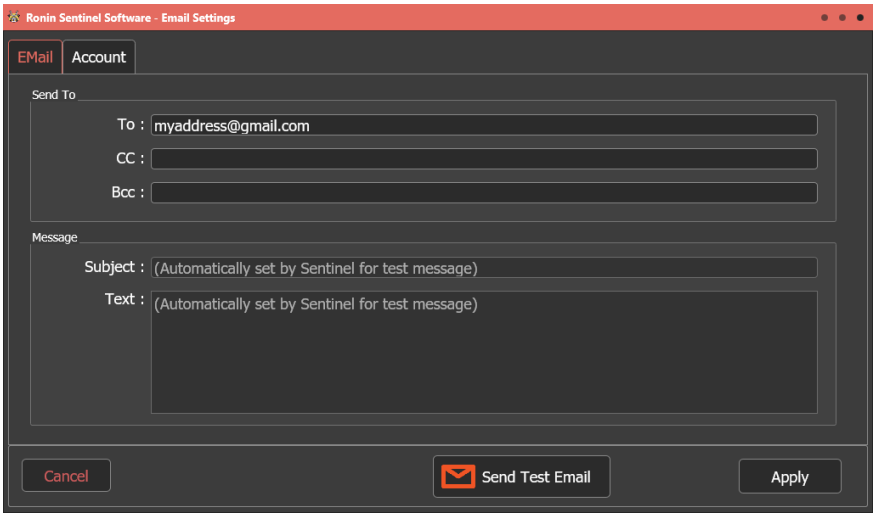
Similar to the first solution to texting issues, you can also use the Gmail app to notify you when a particular message appears. This is not exactly a text, but works very like one and is easy to setup. If you do not use Gmail, you can setup an account for free or apply this method to other mail servers who offer similar functionality. Follow the steps below to switch the Ronin Sentinel to this method:

1) On the Sentinel, tap the Settings Icon and select "Sentinel Settings"

2) Uncheck the box "Send Text Alerts when Motion Detected" and check the box "Send Email Alerts when Motion Detected" like shown below:

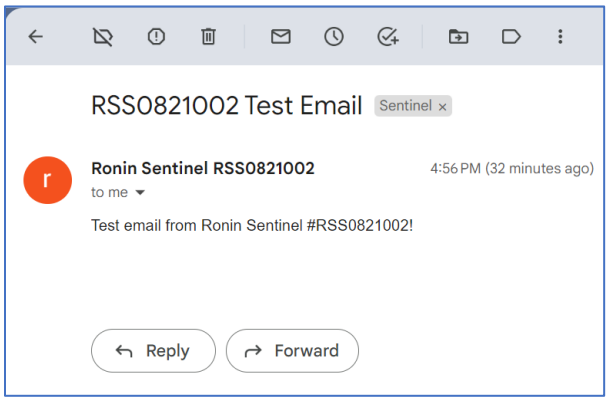


3) Tap the "Setup Email" button and enter the Gmail address or addresses you want to send alerts to. Separate multiple recipients with a comma:



4) Tap the "Send Test Email" button. This will send an email to your Gmail account that you entered above.

5) Open Gmail and find the message from the Sentinel. It will look something like this:



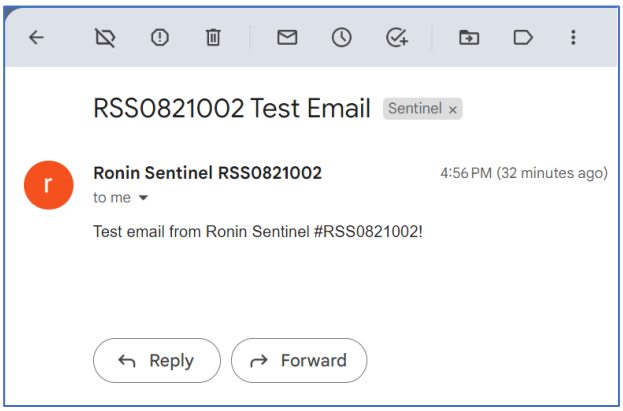
From this point the instructions are different for Android and iOS phones:

iOS Setup:

6) First create a new unique Gmail account for the Ronin Sentinel to use. On iOS you cannot send notifications for specific messages (only all messages), so it is better to have a dedicated Gmail account just for the Sentinel.
7) If you haven't done so yet, install the Gmail app from the app store.
8) Run the app and link it to your new Gmail account. If you have multiple Gmail accounts you can access them all here, but you want to make sure that you select the new account for the Sentinel to use for the steps below.
9) Make sure you "Allow" notifications from the app.
10) Click the Menu icon and select Settings.
11) Select the account you want to use for the Ronin Sentinel.
12) Tap "Email Notifications".
13) Select "All new mail".
14) Select the "Notification Sound" you want to use then tap Done.
15) On the Sentinel, tap "Send Test Email" again. If everything has been setup correctly, the following should happen:
    a. The Ronin Sentinel sends an email to your Gmail address.
    b. The Gmail app detects this and automatically notifies you of a new message within a few seconds.
16) Manually activate a camera or wait for one to activate to get your first alert message. Using the above method can result in a very fast text message to your phone!

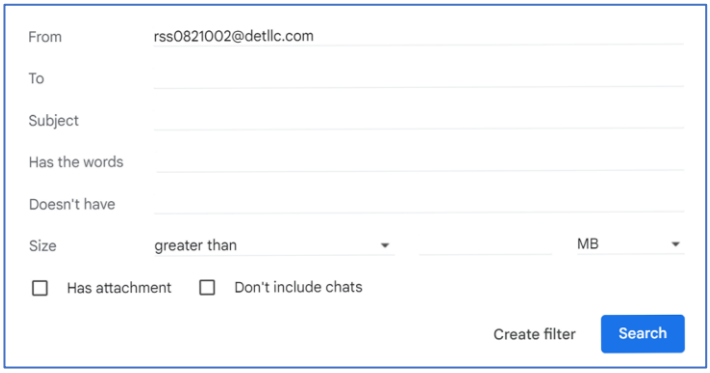
Android Setup:

6) Open Gmail and find the message from the Sentinel. It will look something like this:

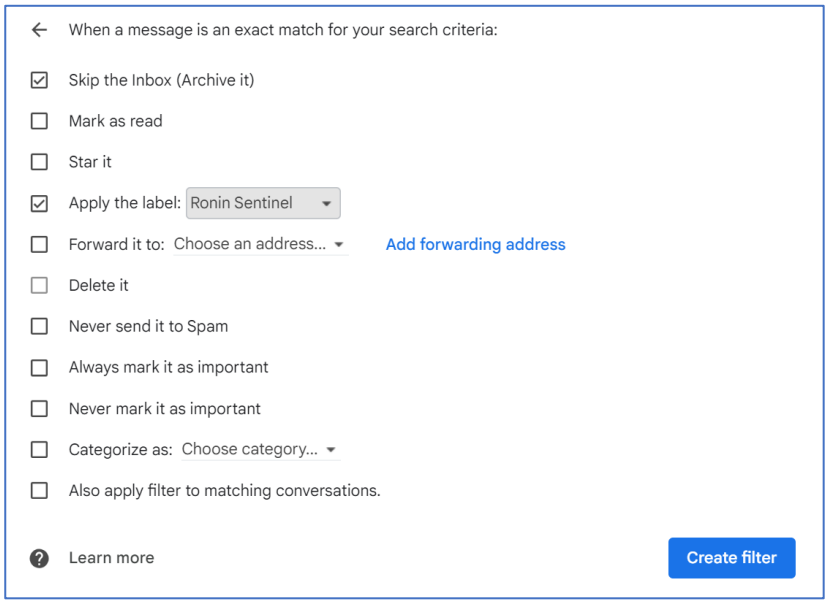


7) On the left side of Gmail tap the "+" icon next to the word "Labels". This will let you add a custom folder for your alerts to go into. Enter in a new label name like "Ronin Sentinel" and tap "Create".

8) Go back to the test message from the Sentinel, click the 3 vertical dots and select "Filter Messages Like These":



9) Tap “Create Filter”:



Check the box “Skip the inbox (archive it)”.

Check the box “Apply the Label” and then select the label you created in Step #6.

Click “Create Filter”.

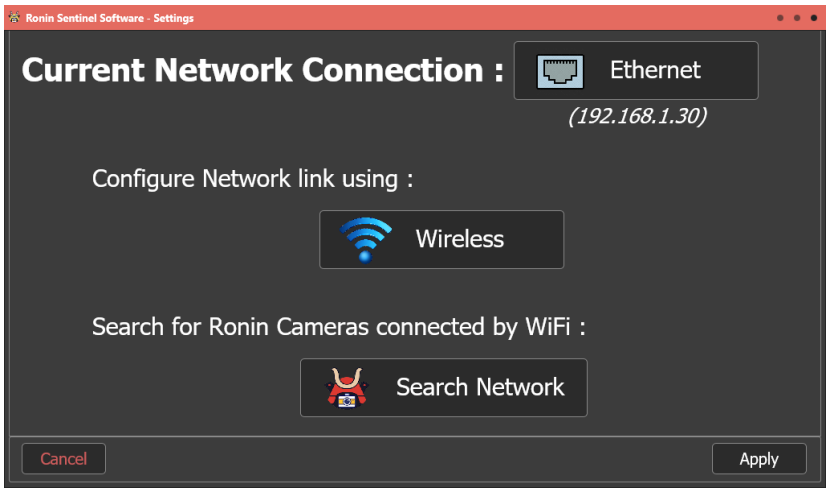
10) Open the Gmail app and link it to your Gmail account.
11) Make sure you “Allow” notifications from the app.
12) At the top tap the Menu icon and select Settings.
13) Select the account you want to use for the Ronin Sentinel and scroll to “Inbox Notifications”.
14) Tap “Manage Labels”, select the “Ronin Sentinel” folder you created above.
15) Tap “Sync Messages > Last 30 days or All”.
16) Choose the notification settings for that label.
17) Close everything and wait for Gmail to update (usually about a minute).
18) On Sentinel, tap “Send Test Email” again. If everything has been setup correctly, the following should happen:
    a. The Ronin Sentinel sends an email to your Gmail address.
    b. Gmail detects this and automatically forwards it to your phone (as well as moves it to the “Ronin Sentinel” folder). It should appear within a few seconds as a text on your phone.
    c. It is a good idea to add the message sender as a known “contact” on your phone. This will help prevent your phone from blocking the alert messages when they come in.
19) Manually activate a camera or wait for one to activate to get your first alert message. Using the above method can result in a very fast text message to your phone!

VII.b. Sentinel Network Settings

The network settings control both the Sentinel link to an external network and the link to WiFi connected cameras (if any).

Tap the Wireless or Ethernet buttons to configure the Sentinel to work with that type of network connection.

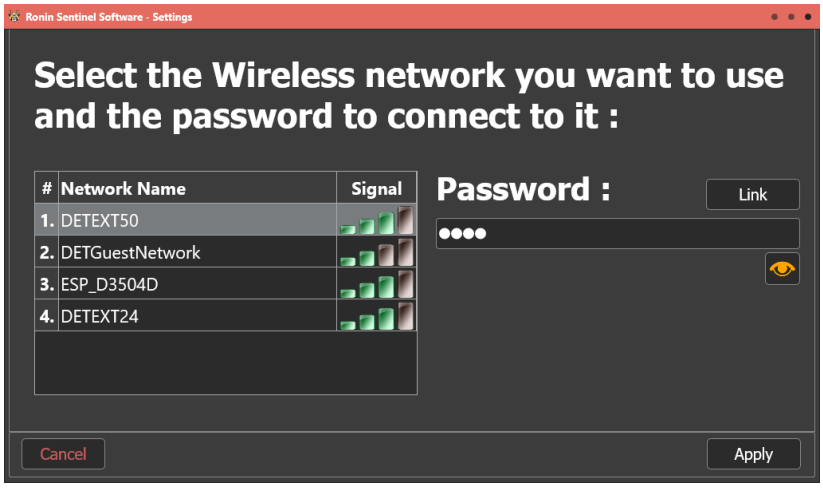
To search the local network for Ronin Cameras that are connected by WiFi, tap Search Network.



VII.b.1. Network – Connect to Wireless

Tapping the Wireless button opens a new window that displays the WiFi networks found by the Sentinel.

Select the network you want to connect to and the password for that network and tap Link. The Sentinel will try to connect to that network and report if it succeeds.



VII.b.2. Network – Search For Cameras

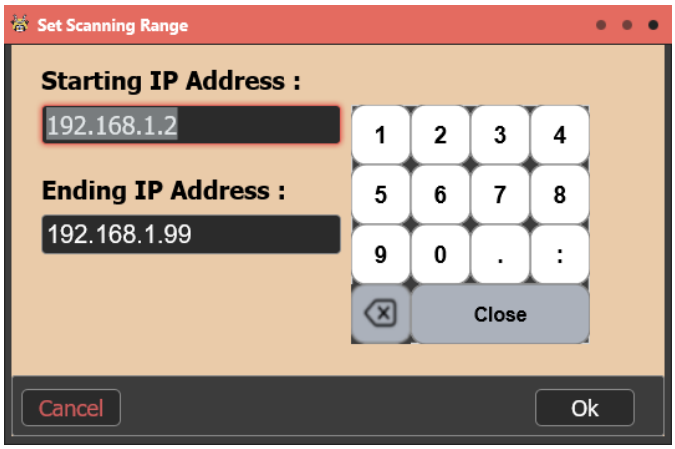
Tapping the Search Network opens a new window to start a detailed search of the currently connected network for any Ronin Camera.

At the top the progress will be displayed and any Ronin Cameras found will appear in the table.

If a NEW camera is found, you will be able to add it to the Main Link Screen. If a camera already linked to the Sentinel is discovered with a different IP Address, then you can update that IP Address automatically.

Tap Set Scan Range to control what part of the network is searched. A new window appears like this:

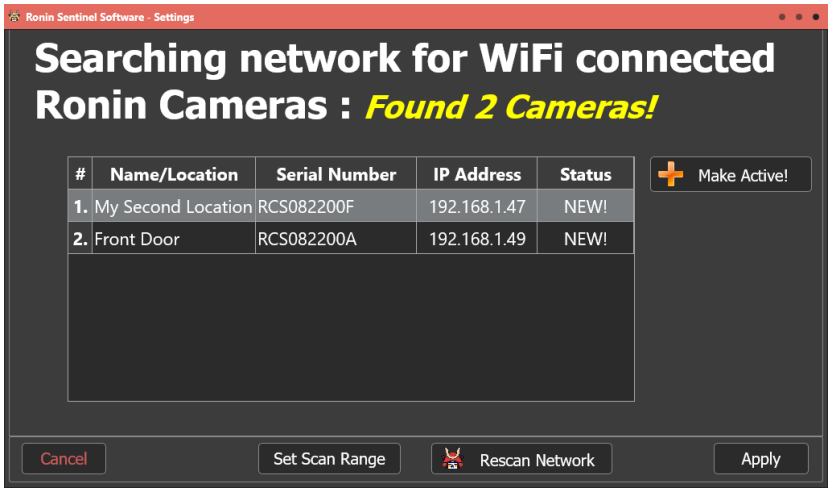
Enter the starting and ending IP address to scan for cameras. Tap Ok when done.



During the search and when it completes you will see a status of what was found like this:

Select any camera you want to add and tap + Make Active to add it to the main link screen.

Tap Rescan Network to search again, or tap Set Scan Range to select a new range to search.



VIII. Advanced Topics

The following sections detail out advanced topics that most users will not need to access.

VIII.a. Radio Range Testing

To Be Determined.