

PixController, Inc.

Raptor Wireless Camera System User's Manual

Cellular and WiFi Radio Version
Internal Motion Sensor or Wireless Motion Sensor Version



Revision: 1.13d-b

WARRANTY REGISTRATION

PixController, Inc. warrants products (Raptor Wireless Camera System) sold by it and guarantees to correct, by repair or replacement at our option, any defects of material and workmanship which develop under normal and proper use within six (6) months from the date of the original purchase when inspection proves the fault to be of manufacturing. Some circuit board components only receive a twelve (12) month warranty. All such Products must be returned to our service center. This warranty does not apply to any of our Products which have been repaired or altered by unauthorized persons or service centers in any way so as, in our judgment, to injure their stability or reliability, or which have been subject to misuse, negligence, or accident or which have had their serial number altered, effaced or removed.

We will not assume any expense or liability for repairs made by other parties without our written consent. PixController, Inc is not responsible for damage to any associated equipment or apparatus, nor shall we be held liable for loss of profit or other special damages. There is no other guarantee or warranty except as herein stated.

Returns for any unaffected products are permitted within 14 days from the date of receipt of merchandise. After such time, items will incur a 15% restocking fee. Returns of wrong ordered items are allowed. Returned merchandise will be accepted only if all conditions are met.

In no event shall PixController, Inc. be liable for any incidental, special, indirect or consequential damages, whether resulting from the use, misuse, or inability to use this product or from defects in this product. The Buyer is not permitted to tamper or remove any of the Raptor System electronics without voiding this warranty.

The Buyer, his employees, or others assumes all risks and liabilities for the operation, the use and the misuse of the product described herein and agree to defend and to save the seller harmless from any and all claims arising from any cause whatsoever, including seller's negligence for personal injury incurred in connection with the use of the said product. PixController, Inc reserves the right to discontinue models at any time or change specifications, price or design without notice and without incurring any obligation.

The express warranties are in lieu of all other warranties, guarantees, promises, affirmations, or representations, express or implied which would be deemed applicable to the goods sold hereunder. No express warranties and no implied warranties, whether of merchantability, fitness for any particular use or purpose, against infringement, or otherwise (except as to title) other than those expressly set forth herein, shall apply.

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2. What's Included & System Updates

PixController Raptor Systems contain the following

- Raptor Unit in waterproof/weather proof enclosure
- Appropriate removable antennas for installed wireless radios
- 12V SLA 3.4AH rechargeable battery
- 12V SLA AC wall charger
- 2GB USB Flash Drive
- External Trigger Raptor systems will include (1) Wireless PIR sensor
- CD with system manual and PC setup software

Raptor Wireless System Updates

Firmware updates and upgrades will be available free of charge from PixController, Inc. for the life of your product. Certain versions encompassing new product features will be available for sale.

Radio updates, new radio installations, and internal/external sensor updates will be available from PixController, Inc. for purchase at anytime. Customers choosing these updates will need to contact PixController, Inc. before sending the product back for these enhancements. Please contact us at:

PixController, Inc.
1056 Corporate Lane
Export, PA 15632

Phone: 724-733-0970
Fax: 724-733-0860
Email: support@pixcontroller.com
Web : <http://www.pixcontroller.com>

3. Raptor System Overview



Raptor Wireless System with built in motion sensor – Exterior



Raptor Wireless System with external wireless motion sensor – Exterior



Raptor Wireless System Internal Components

3.1 Introduction

The Raptor Wireless System will capture a photo and email it to you via a cellular network (*cellular radio option*) or Wi-Fi access point (*Wi-Fi radio option*) upon motion-activation. Cellular system includes an unlocked Quad Band GSM/GPRS cellular radio that will work on cellular networks worldwide. To activate the unit you will need to purchase a SIM card from any of these providers. You can either purchase a cellular data contract or use pay-as-you-go cards.

Photos are attached to an email using the popular POP3/SMTP protocol. Emails include the time, date, battery level, radio signal strength, and internal unit temperature.

The built-in camera will capture color photos at day and IR stealth photos at night that can be stored on the systems UBS Flash Drive. This battery operated system can last several months in a remote location making it the perfect security device.

PC software to setup the system is included. Features include day, night, 24 hr. operation, motion or time-lapse activation, delays between photos, option to send a daily status text email giving unit battery life, and a scheduler to disable to system during different times of the day - example: disable the system MON-FRI 8AM - 5PM for jobsite applications.

The system includes a rechargeable 12V battery and charger. Battery life depends on the number of photos taken but typically lasts several months on a single charge. There is an external charging port for solar panels or external batteries to extend field battery life.

The wireless motion sensor option allows the system to be located 50-80 feet away from the motion sensors. There is no limit to the number of wireless motion sensors that can be used.

4. Raptor System Specifications

- Size: 9-1/4"L x 7-3/4"W x 4-1/2"D
- Weight: 8 Pounds
- Waterproof Case
- Cast Steel Eye Bolts - Use MasterLock Python cable (sold separately) for unit locking
- 1/4"-20 Tri-Pod Camera Mount
- LCD Setup Screen
- Menu Setup Buttons
- On-board USB Host Port - Allows USB Flash Drive Devices for storage and program updates
- PC Setup Software Included
- Scheduler Included
- 12V 3.4AH SLA Battery & Charger
- PIR Trigger Time ~1 second
- Wireless Sensor Option for Covert Setup
- GSM/GPRS Quad Band 850/900/1800/1900 MHz Cellular Radio
- SMA Cellular Antenna Connector
- VGA Color Day/Night IR Camera (640 X 480)
- Cellular Transmission time ~30 second per photo
- PIR Motion Detection to 80 Feet
- PIR & Day/Night Sensitivity Adjusting POTS
- Email Protocol: SMTP/POP3
- FTP (File Transfer Protocol)
- Emails include photo, time/date, battery level
- Time-Lapse Mode
- Daily text status email of battery life (optional)
- Set delays between photos

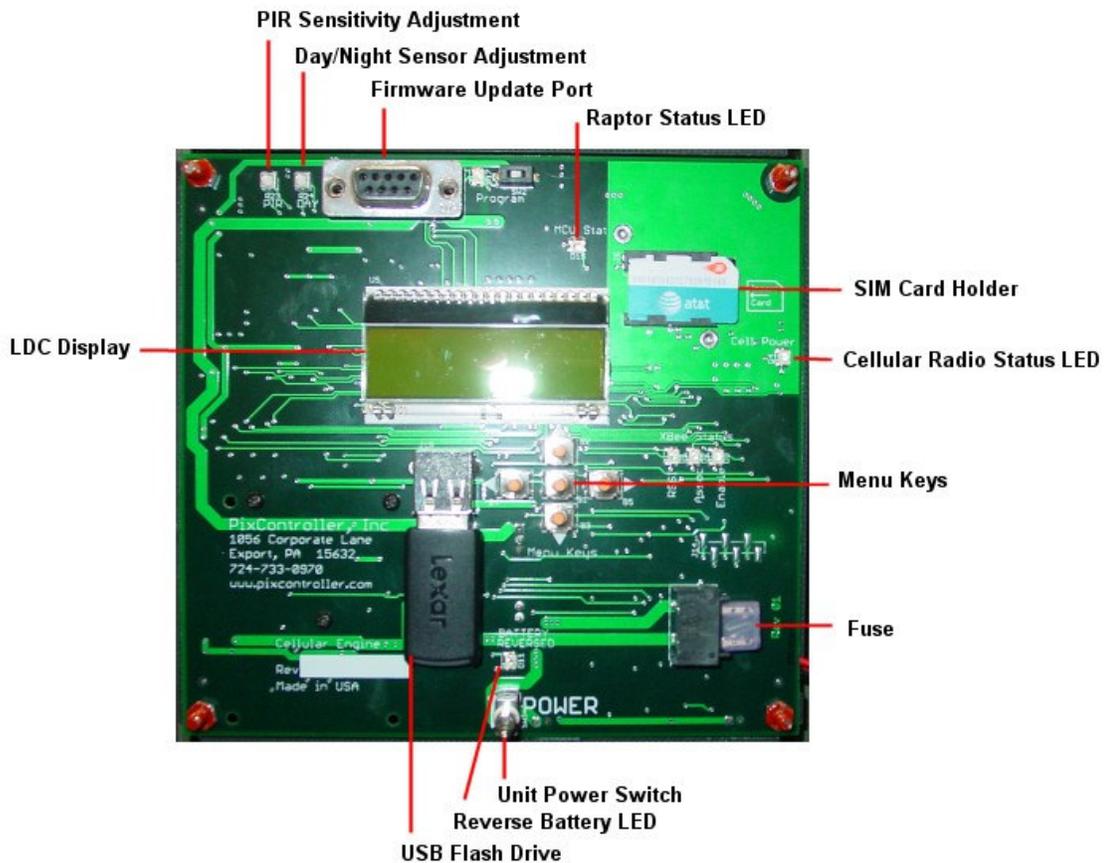
5. Raptor System Setup

5.1 Getting Started

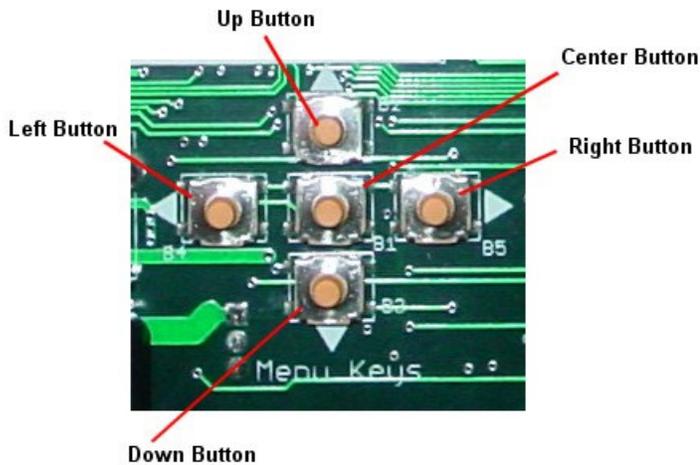
Before you power on your Raptor Wireless System we suggest you become familiar with the systems interior and exterior components as we will refer to them throughout this document. If you have purchased a cellular Raptor Wireless System you will need to purchase a SIM card from your local cellular provider with a valid data plan before you can begin using your system. We have provided details in this document which cover setting up the system using AT&T.

Be sure that your 12V battery is fully charged. There is a 12V wall charger which was included with your Raptor system. We suggest you remove the battery and charge the system before starting.

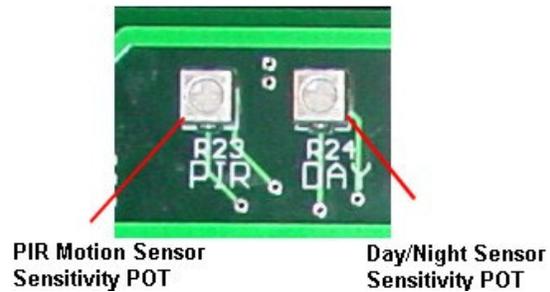
5.2 Raptor Electronics Overview



Raptor System Board



Raptor Menu Keypad



Adjusting Sensors

PIR Sensitivity Adjustment

You can adjust the sensitivity of the PIR motion sensor by adjusting the PIR Sensitivity POT. Typically you will not need to adjust this setting. However, if you need to make the PIR motion sensor more or less sensitive use a small Philips.

Note: This is a single turn POT and does not rotate continuously. Extreme caution must be made when turning the POT not to damage it.

- Rotate the POT ¼ turn to the Right to make the motion sensor “Less Sensitive”
- Rotate the POT ¼ turn to the Left to make the motion sensor “More Sensitive”
- The middle POT setting is the default sensitive setting

Day/Night Sensor Adjustment

You can adjust the sensitivity of the Day/Night sensor by adjusting the Day Sensitivity POT. The Day/Night sensor is located behind the PIR lens on the front of the Raptor Wireless Camera system. Typically you will not need to adjust this setting. However, if you need to make the PIR motion sensor more or less sensitive use a small Philips.

Note 1: This is a single turn POT and does not rotate continuously. Extreme caution must be made when turning the POT not to damage it.

Note 2: You must put the Raptor system into Diagnostic mode before adjusting this setting. Power on the Raptor system and press the “Center” menu button to go into Diagnostic mode. Move to configure mode by pressing the right or left menu keys until the first line of the LCD display says “[cfg] Cam Pwr”. Watch the “MCU Stat LED”. The MCU Stat LED will be lit when the sensor sees day and not lit when the sensor sees dark.

- Rotate the POT ¼ turn to the Right to make the day/night sensor “Less Sensitive”
- Rotate the POT ¼ turn to the Left to make the day/night sensor “More Sensitive”
- The middle POT setting is the default sensitive setting

Firmware Update Port

The port is for updating the firmware on your Raptor Wireless System. Using a RS-232 to USB cable we can update the firmware on your Raptor Wireless System. See section 13 of this manual for information on updating the Raptor Firmware

Raptor Status LED

The Status LED will blink for errors, system power up, and PIR walk test mode detection.

SIM Card Holder

This is where you will place the SIM card from your cellular provider. The card slides in/out from the right.

Cellular Radio Status LED

The LED will light up upon power up of the Raptor System letting you know if you have cellular connection.

Menu Keys

These 5 push button keys are used for changing or displaying Raptor System Settings shown on the LCD display.

Fuse

There is a 12V 3A fuse that will protect your Raptor System from any over power battery damage. If the fuse is blown please contact PixController, Inc. for a replacement.

Unit Power Switch

This is the main power switch of the Raptor Wireless System. Simply turn the power switch on when activating the Raptor System.

Reverse Battery LED

If the user connects the 12V SLA battery backwards by mistake, this LED will light up. Your Raptor System will not be damaged. Simply switch the battery connectors to fix the problem.

USB Flash Drive

Your Raptor System includes a 2Gb USB Flash Drive. This Flash Drive should be removed from the system and inserted into your PC when setting the system up for email and cellular provider settings and replaced into the Raptor System before use. Photos taken by your Raptor system will also be stored on the USB Flash Drive.

LCD Display

The LCD display will show you the status and settings of the Raptor System.

5.3 Installing the PC Software

On the Raptor System CD there is a folder labeled “**RaptorConfig**”. Simply drag this folder on to your PC or open the folder on the CD. Next, run the file **RaptorConfig.exe** by double clicking on the file name. Be sure you have removed the USB Flash Drive from your Raptor System and have it inserted into one of your USB drive ports on your PC. The settings changed in the RaptorConfig.exe program will be stored on the USB Flash Drive.

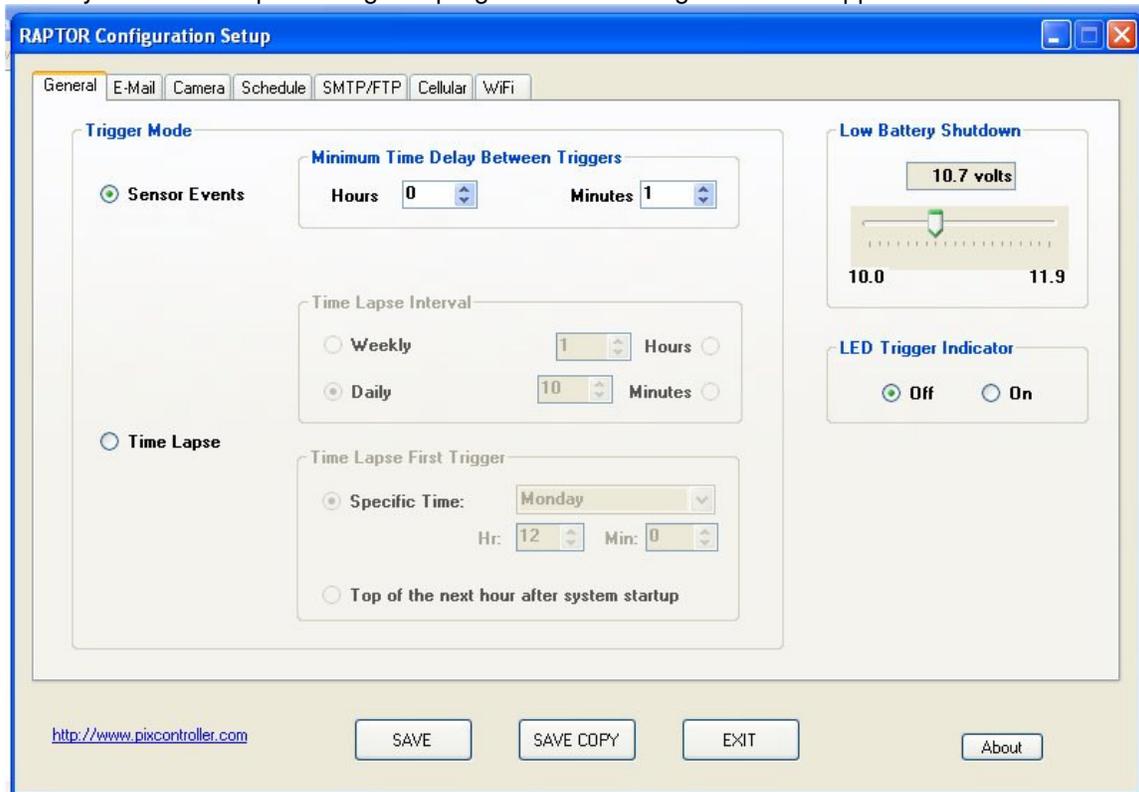


Insert the USB Flash Drive into your PC during the Software Setup Phase

6. Raptor PC Software Setup

6.1 Running the RaptorConfig.exe Program

When you run the RaptorConfig.exe program the following screen will appear



6.2 Raptor Configuration Setup – General Tab

Trigger Mode

The Raptor System can be configured to be triggered by the internal PIR motion sensor, or external wireless motion sensor depending on which system you have purchased, or the Raptor system can be setup in a Time Lapse Mode

When setting the Raptor System in PIR motion trigger mode select the “Sensor Events” option. Here you can setup the “**Minimum Time Delay Between Triggers**” in hours/minutes. This option is for limiting the number of photos that will be sent by the Raptor System. For setting in high traffic areas you may want to adjust the setting to 5 or 10 minutes. In low traffic areas you can keep the setting at the default setting of 1 minute.

Keep in mind that your battery life will be impacted greatly by the number of photos you send a day. If you are setting the Raptor System up in a high traffic area where you may be sending as many as 100 photos a day we highly recommend using a solar panel or external battery for keeping the system charged.

When setting the system up in “**Time Lapse**” mode you can specify the time between photos in the “**Time Lapse First Trigger**” box.

Low Battery Shutdown Slider

Slider control for setting the voltage below which normal camera operation will be suspended. Range is 10.0 – 11.9 volts in steps of 0.1 volt. On systems equipped with solar panels, the battery will be re-tested every 24 hours and the camera operation will be resumed when the voltage rises 0.25 volts above this setting.

Low Battery Shutdown

User-defined threshold voltage from the config program is used to shut down the Raptor to prevent battery damage. The battery voltage is compared to this threshold whenever a normal event occurs (sensor trigger, time-lapse trigger, or status e-mail). If the voltage is below this threshold, then the e-mail will be sent normally, but will include a “low-battery shutdown” message. The Raptor will then go into a low-power shut-down mode and stop responding to events. Every 24 hours, the battery will be re-tested, and if the voltage has recovered to at least 0.25 volts above the threshold, such as if a solar charger is installed, the Raptor will return to normal operation, and will send an e-mail notification of this fact.

Low Battery Start-up Warning

During self-test, if the battery voltage is below the user-defined threshold, startup will pause and a warning message will be displayed. Press the center button to continue start-up. Be advised, if the start-up is completed in this condition, the system will most likely go into shutdown mode after the first event (as described previously). In other words, only start up in this mode if you don't mind missing (at least) the first 24 hours and are confident the solar charger will bring the battery up to normal charge.

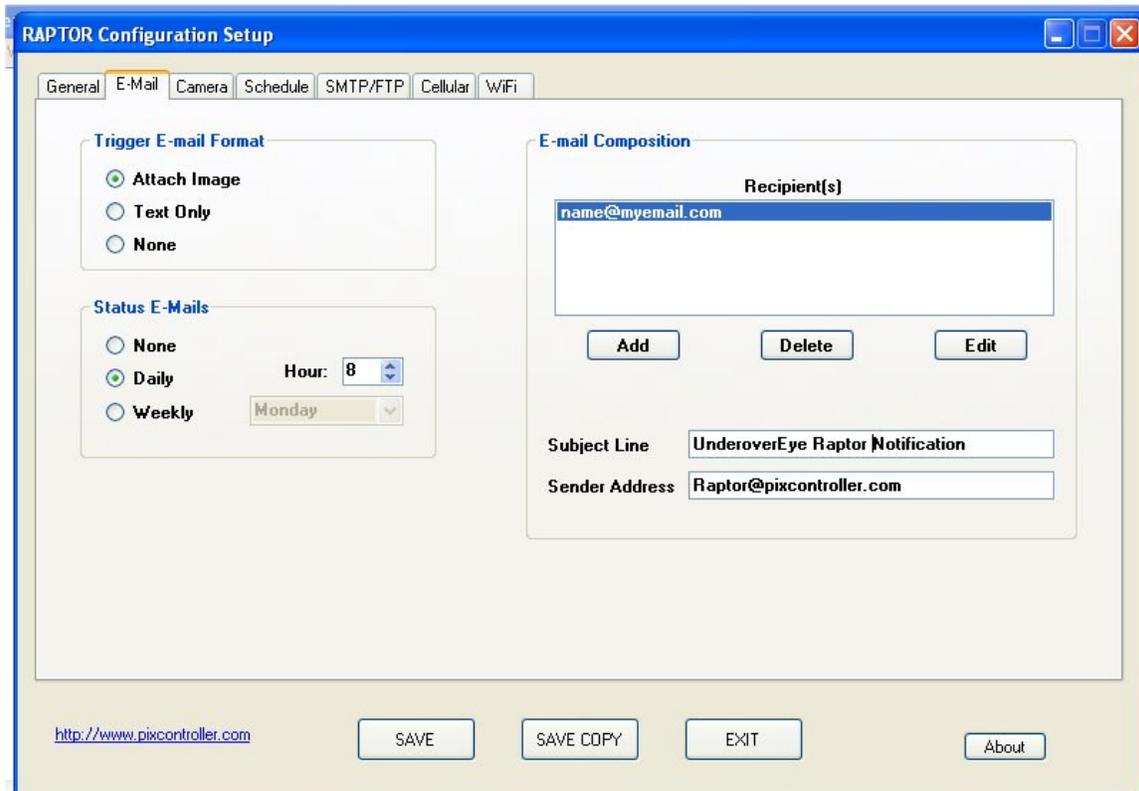
Low Battery Start-up Error

During self-test, if the battery voltage is below an absolute minimum value (set to 9 volts at this time), an error message will be displayed and the system will not start up. As with all failed self-tests, in Diagnostic Startup you can press the center button to continue into Diagnostic Mode.

LED Trigger Indicator

When this mode is set a LED will blink every time motion is detected from the PIR sensor. This will be lit up through the PIR lens on the Raptor System. The default mode is off.

6.3 Raptor Configuration Setup – E-Mail Tab



Trigger E-Mail Format

The Trigger E-Mail Format box lets you adjust how you are notified by the Raptor System. Selecting the “**Attach Image**” option will send a photo and text message with every trigger. Selecting the “**Text Only**” option will only send a text message when a trigger event happens, but the photo will be saved on the USB Flash Drive. The Text Only option can be used in situations where you are limited by cellular bandwidth or do not wish to charge your cellular account with data fees. Lastly, there is a “**None**” option. In this mode the Raptor System will not attempt to send any data via the cellular radio. This setting is used in areas where there is no cellular coverage but you wish to still collect photos with your Raptor System. In this mode photos will be stored to the USB Flash Drive only.

Status E-Mails

The Status E-Emails box lets you setup the Raptor System to send you a system status email based on the settings. If activated the Raptor System will email you once a day, or once a week, depending on how you set it up and give you a battery status, cellular signal status, and internal temperature status. This setting is very useful to make sure your Raptor System is working fine in the field.

E-Mail Composition

The E-Mail Composition window will let you enter the email addresses the Raptor System will send the emails too. Up to 10 email addresses can be entered. Note: you must change the default email address on initial setup by changing or removing the null@null.com email address. This is just a place holder.

In this box you can also change the “Subject Line” and “Senders Address”

6.4 Raptor Configuration Setup – Camera Tab

The screenshot shows the 'RAPTOR Configuration Setup' window with the 'Camera' tab selected. The window has a blue title bar and standard Windows window controls. The main area is divided into several sections:

- General:** 'Camera ID' is set to 0, with a note '(used for creating image file names)'. 'Camera Description' is 'Camera 1'.
- Camera Trigger Speed:** A slider is set to 0.1 sec, with a range from 0.1 to 5.0.
- Image Resolution (Built-In Camera Only):** Radio buttons for 640 x 480 (selected), 160 x 120, 320 x 240, and 80 x 60.
- Video Clip Duration (DVR Cameras Only):** Radio buttons for None, Continuous (30-second re-trigger) (selected), and Fixed. The Fixed option has 'Min: 0' and 'Sec: 30' spinners.

At the bottom, there is a URL <http://www.pixcontroller.com> and buttons for 'SAVE', 'SAVE COPY', 'EXIT', and 'About'.

Camera ID

The Camera ID setting is used to set the filenames the Raptor Systems sends to you, In the case that you are using more than one Raptor System you can set the Unit ID to let you know which system the file is sent from

Camera Description

This is a text box that will send this message in the body of each email sent by the Raptor System. You can include information about location of the unit and such.

Camera Trigger Speed

The Camera Trigger Speed setting lets you adjust how long the camera is powered on before the photo is taken. The longer the camera trigger speed the longer the camera sensor automatic gain can adjust to the lighting and produce a more color accurate photo. When adjusting the trigger time down to 1.0 second or under photos will have a pinkish tint to them.

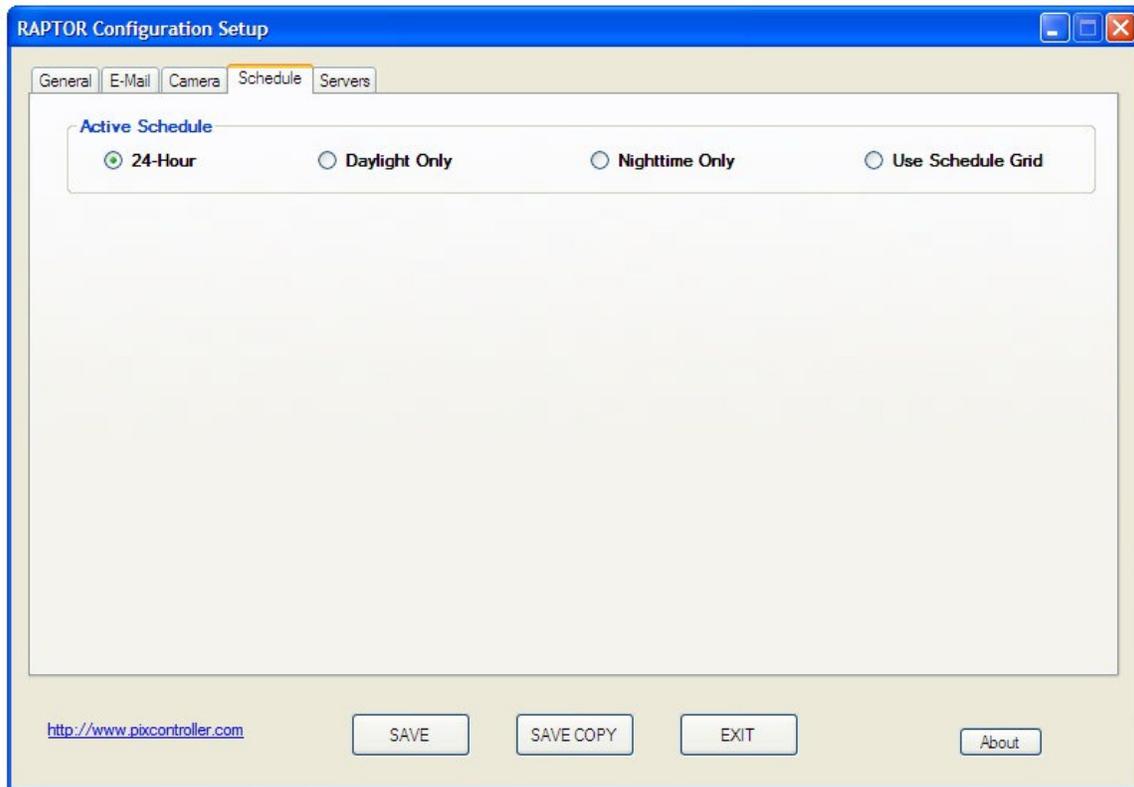
Image Resolution (Built-In Camera Only)

This setting allows you to adjust the camera resolution the photo is captured in. Lower resolution setting will transmit photos faster and save you on cellular data charges.

Video Clip Duration (DVR Cameras Only)

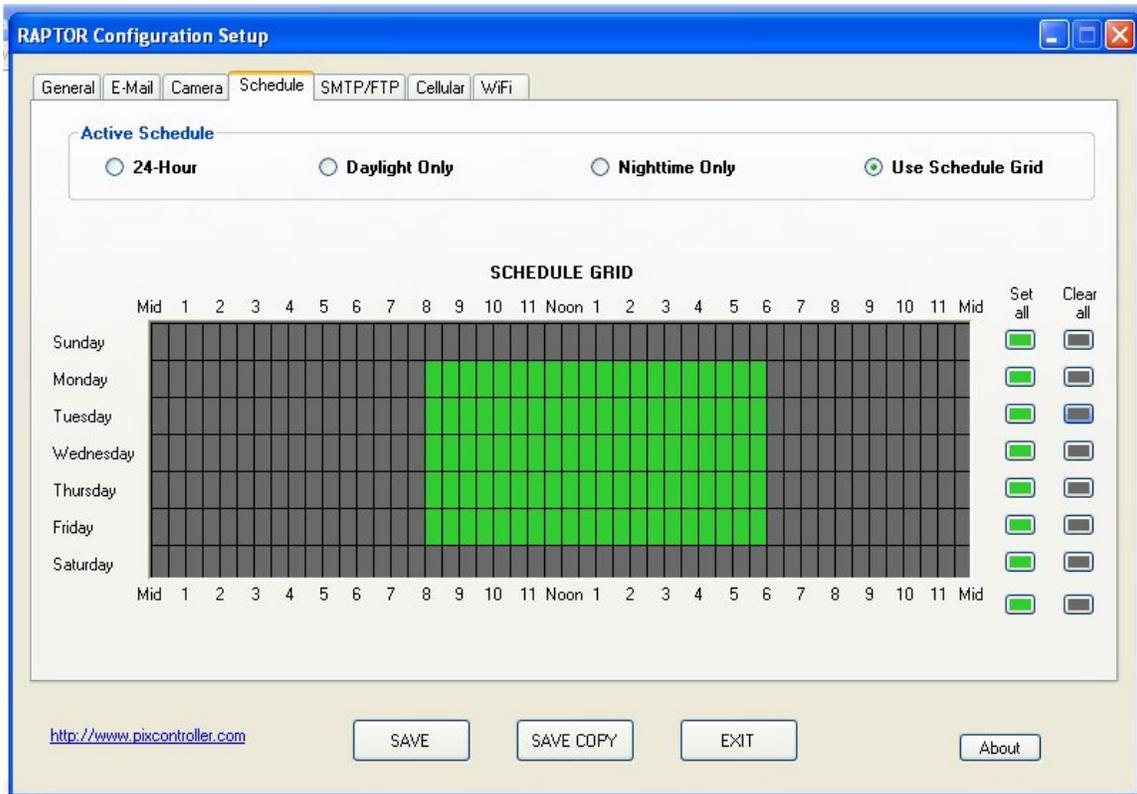
This setting is only for our Law Enforcement Systems which include a built-in DVR.

6.5 Raptor Configuration Setup – Schedule Tab



Active Schedule

The Active Schedule box lets you setup the Raptor System for 24-hour activity, Day only activity, or Night only Activity. There is also a “Use Schedule Grid” setting which is explained below.



Use Schedule Grid

When selecting the "Use Schedule Grid" setting this allows you to setup blocks of time where the Raptor System will not take trigger events. This is very useful when setting the Raptor System up in a work place setting where you want the Raptor System to be inactive during work hours.

Simply drag you mouse across the blocks to fill them in. The green high lighted colors will let you set times the Raptor System will be inactive. You can also set the "Set" or "Clear" buttons off to the right to set a whole day or clear a whole day.

6.6 Raptor Configuration Setup – SMTP/FTP Tab

The screenshot shows the 'Raptor Configuration Setup' window with the 'SMTP/FTP' tab selected. The window has a blue title bar and a light beige background. At the top, there are tabs for 'General', 'E-Mail', 'Camera', 'Schedule', 'SMTP/FTP', 'Cellular', and 'WiFi'. The 'SMTP/FTP' tab is active, showing two main sections: 'SMTP SETUP (E-mail Server)' and 'FTP SETUP'. The 'SMTP SETUP' section includes fields for 'Address' (cwmx.com), 'Port' (25), 'Use SSL' (unchecked), 'Use Authentication' (unchecked), 'Username' (voicestream), and 'Password'. The 'FTP SETUP' section includes a checkbox for 'Send images via FTP' (unchecked), 'Address' (ftp.null.com), 'Username' (username), and 'Password'. At the bottom of the window, there is a URL 'http://www.pixcontroller.com' and four buttons: 'SAVE', 'SAVE COPY', 'EXIT', and 'About'.

The SMTP/FTP tab is where you will be setting up the cellular provider information for sending data over the cellular provider's network. You will need to contact your cellular provider to get the APN and SMTP settings for their network. The default settings are for the AT&T network.

SMTP SETUP (E-Mail Servers)

New control group for E-mail server setup. The text-entry box for the SMTP Server Address has been moved here, along with new settings to permit full control of access to a variety of SMTP servers. The settings should be confirmed with your provider. The settings contained in this group are:

Address (Camera Tab, SMTP Setup Group) – This is the entry that was available in previous versions, which is the address of the SMTP server that is to be used by the Raptor for sending e-mails.

Port (Camera Tab, SMTP Setup Group) – This is the server port for SMTP (outgoing e-mail). This port is typically 25 or 587. With SSL it is sometimes 465.

Use SSL (Camera Tab, SMTP Setup Group) – Check this box if your SMTP provider requires the use of SSL (Secure Socket Layer).

Use Authentication (Camera Tab, SMTP Setup Group) – Check this box if your SMTP provider requires authentication. If you check this box, you must fill in the Username and Password text-entry fields with your correct log-in information

Username (Camera Tab, SMTP Setup Group) – This is the Username associated with the SMTP account. This is usually the username or e-mail address you use to log in to your e-mail.

Password (Camera Tab, SMTP Setup Group) – This is the Password associated with the SMTP account.

Send Images Via FTP (Servers Tab, FTP Setup group)

Check this checkbox to have images transmitted to an FTP server on triggers. This can be in addition to, or instead of, e-mail. When this checkbox is checked, the Address, Username and Password fields will be enabled. Note that, for “Trail Camera” mode, this box must be unchecked as well as selecting “None” in the Trigger E-Mail Format group on the E-Mail tab.

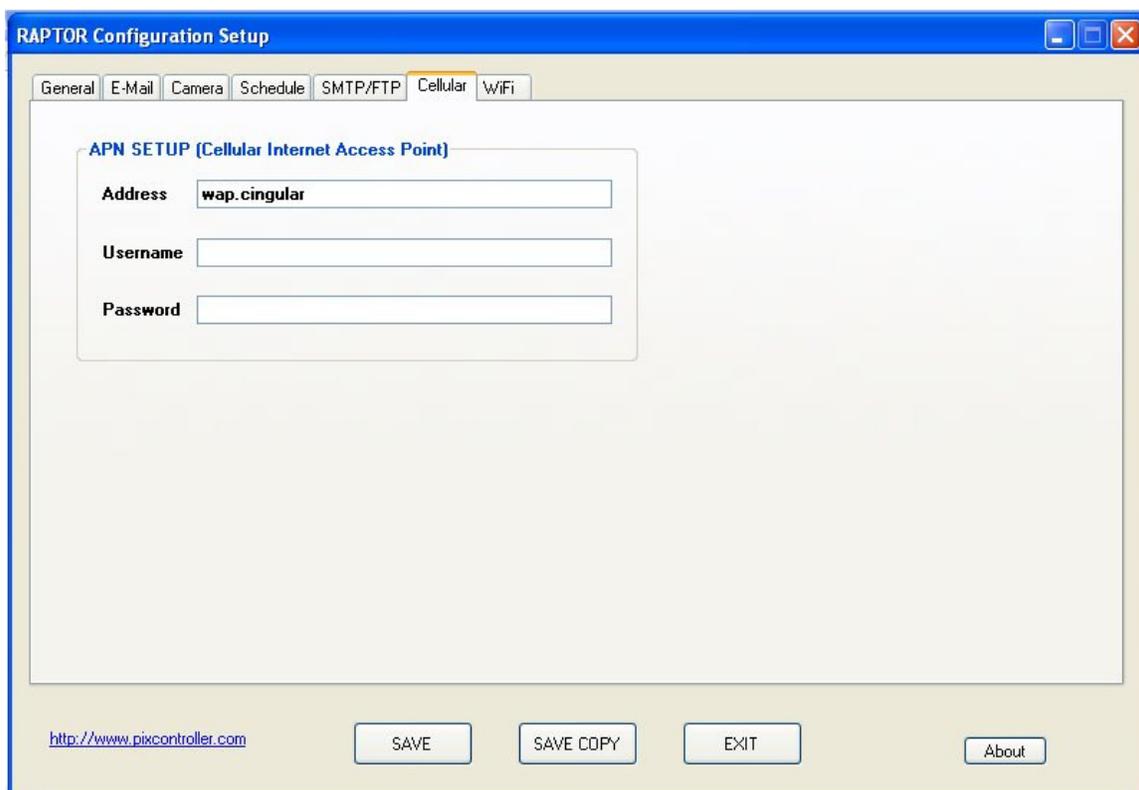
In normal operation, images captured during sensor triggers or time-lapse triggers can be transmitted to an FTP server in addition to, or instead of, transmission by e-mail, depending on the configuration setup done with the RaptorConfig program. It is also possible to send a text-only e-mail while also transmitting an image to an FTP server. Note that the FTP image will carry the same filename as the e-mail attachment, and the image will always be deposited in the initial directory on the FTP server.

Address (Servers Tab, FTP Setup group) – Address of the FTP server.

Username (Servers Tab, FTP Setup group) – Username for logging in to the FTP server.

Password (Servers Tab, FTP Setup group) – Password for logging in to the FTP server.

6.7 Raptor Configuration Setup – Cellular Tab



The screenshot shows the 'Raptor Configuration Setup' window with the 'Cellular' tab selected. The window has a blue title bar and a menu bar with tabs: General, E-Mail, Camera, Schedule, SMTP/FTP, Cellular, and WiFi. The main content area is titled 'APN SETUP (Cellular Internet Access Point)' and contains three input fields: 'Address' (with the value 'wap.cingular'), 'Username', and 'Password'. At the bottom of the window, there are four buttons: 'SAVE', 'SAVE COPY', 'EXIT', and 'About'. A URL 'http://www.pixcontroller.com' is displayed in the bottom left corner.

The Cellular tab will let you setup your APN or Internet Access Point for your GSM/GPRS Cellular provider.

APN SETUP (Internet Access Point)

The various GSM providers all use APNs but implement them differently. For example, some by default will not allow mobile terminated connections while others use RADIUS servers and require user name/password authentication in addition to SIM authentication.

6.8 Raptor Configuration Setup – Wi-Fi Tab

The screenshot shows the 'Raptor Configuration Setup' window with the 'WiFi' tab selected. The window has a blue title bar and a menu bar with tabs: General, E-Mail, Camera, Schedule, SMTP/FTP, Cellular, and WiFi. The main content area is divided into three sections: 'WiFi Network Setup', 'Network Security', and 'Time Synchronization'. In the 'WiFi Network Setup' section, there is a text input field for 'WiFi Network Name (SSID)'. The 'Network Security' section contains five radio buttons: 'None' (selected), 'WEP (64-bit)', 'WEP (128-bit)', 'WPA', and 'WPA2', followed by a text input field for 'Password (or Key)'. The 'Time Synchronization' section has two text input fields for 'Primary Time Server' (nist1-la.ustiming.org) and 'Secondary Time Server' (nist1-ny.ustiming.org), a dropdown menu for 'Time Zone [-12 to +12]' set to '0', and a checked checkbox for 'Use Daylight Savings Time'. At the bottom, there is a URL <http://www.pixcontroller.com> and four buttons: 'SAVE', 'SAVE COPY', 'EXIT', and 'About'.

Wifi Network Setup (Wifi Tab) – New control group for Wifi server setup. This is where the network settings are entered. Future versions will permit dynamic detection of and connection to unsecured Wifi networks, but as of this release the network you want to connect to must be specified explicitly here. You may need to check your wireless router settings or speak to your IT department to get the correct settings.

NOTE: Some ISP's require the sending email address be the same emails address of the ISP provider. You will need to change the default email address from Raptor@pixcontroller.com to your ISP email address when using the WiFi SMTP option.

Wifi Network Name (Wifi Tab, Wifi Network Setup Group) – Enter the name of the Wifi network that you will be connected to. This is also referred to as the SSID.

Network Security (Wifi Tab, Wifi Network Setup Group) – There are 5 different Wifi security protocols to choose from, some of which require a passphrase or security key to be entered:

- **None** – Select this for an unsecured Wifi network. For this selection, no password is required.
- **WEP64** – This is 64-bit WEP (Wired Equivalency Privacy) security. If this is selected, you must enter the correct key. A 64-bit WEP key is always exactly 10 characters long, and all characters must be hexadecimal character (0-9, a-f, or A-F). If the key entered is not 10 characters or contains non-hexadecimal characters, an error will be indicated and the key will not be accepted.
- **WEP128** – This is 128-bit WEP (Wired Equivalency Privacy) security. If this is selected, you must enter the correct key. A 128-bit WEP key is always exactly 26 characters long, and all characters must be hexadecimal character (0-9, a-f, or A-F). If the key entered is not 26 characters or contains non-hexadecimal characters, an error will be indicated and the key will not be accepted. NOTE: This release of Raptor does not support 128-bit WEP security.
- **WPA** – This is Wifi Protected Access security, which is much more secure than WEP. If WPA is selected, you must enter the correct passphrase. WPA requires a password of at least 8 characters, and an error will be raised if the passphrase entered is less than 8 characters. Note that, unlike WEP, WPA permits most characters in a passphrase.
- **WPA2** – This is an improved version of WPA, and all passphrase rules are the same for WPA and WPA2.

Time Synchronization (Wifi Tab) – New control group for Wifi time-synchronization setup. Unlike a cellular system, Wifi networks do not automatically provide local time updates. Therefore, you will need to specify the address of one or two special-purpose time servers that the Raptor can access to synchronize time. Since the time server may be in a different time zone, you will also need to enter your time-zone and daylight-savings information.

Primary Time Server (Wifi Tab, Time Synchronization Group) – Enter the name of the Internet time server you wish to use for time synchronization. The U.S. government agency National Institute of Standards and Technology (NIST) provides a number of such servers for public use. One recommended server to use is [nist1-la.ustiming.org](http://tf.nist.gov/tf-cgi/servers.cgi). A full listing can be found at <http://tf.nist.gov/tf-cgi/servers.cgi>

Secondary Time Server (Wifi Tab, Time Synchronization Group) – Enter the name of the Internet time server you wish to use as a backup for time synchronization. One recommended server to use is nist1-ny.ustiming.org.

Time Zone (Wifi Tab, Time Synchronization Group) – Set this to the standard-time time-zone specification of the Raptor's location, relative to GMT/UTC. For example, the U.S. Eastern Time zone is -5, Central Time is -6, Mountain Time is -7, and Pacific Time is -8.

Use Daylight Savings Time (Wifi Tab, Time Synchronization Group) – Check this box if the Raptor's location observes daylight savings time.

SAVE COPY

This button allows you to save a copy of your configuration file to a different location. When you click this button, you will be presented with the standard Windows "Save As" dialog, so you can save a copy of the file with a name and location of your choosing, such as your hard drive or a second swap/backup flash drive. If you save the file with a different name, remember to rename it RAPTOR.CFG if and when you copy it to the flash drive on the Raptor.

Error Log:

A file is stored (ERRORLOG.TXT) on the flash drive containing error information. Each error appends a new line onto the log file, consisting of a time stamp and text describing the error. Note that this file is only appended during normal operation. Errors encountered during diagnostic operation are displayed on the LCD and are not stored in the error log.

Image Subdirectories

Images are now stored on the flash drive in subdirectories off PIX\IMAGES. The directories will be PIX\IMAGES\00000, PIX\IMAGES\00001, etc. The directories are created automatically and each will hold up to about 500 images. The file-naming convention remains the same.

E-mail body

The flash drive filename shown in the body of the e-mail now shows the full path rather than just the file name. Example:

Filename on flash drive: \PIX\IMAGES\00003\02060132.jpg

7. Choosing a Cellular Provider

7.1 Cellular Provider Overview

Raptor Cellular Systems contain an unlocked GSM GPRS/EDGE Quad Band cellular radio which supports most domestic and international GSM GPRS/EDGE networks. In the USA we suggest using the AT&T/Cingular network. Other carriers with built-in support include SunCom, Rogers, T-Mobile, Petrocom, as well as a custom selection. Connectivity options vary amongst these providers, so please check with your provider for details.

GSM (Global System for Mobile Communications) is the most popular standard for mobile cellular systems in the world.

Note, popular US carries such as Verizon and Sprint use the CDMA cellular network, which are not GSM compatible, and will not function with a Raptor System.

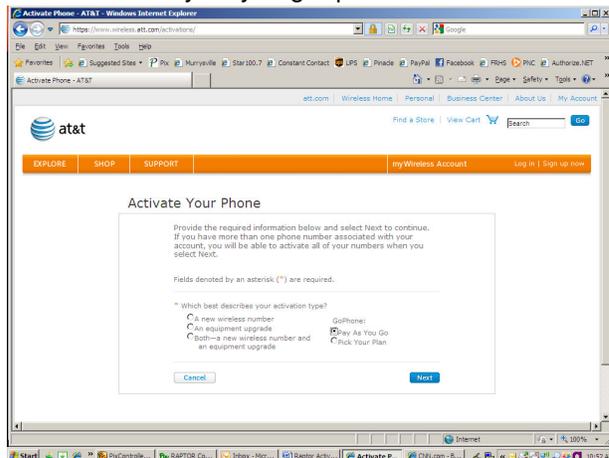
7.2 Activating your AT&T Cellular Account with the Included SIM Card

IMPORTANT: Before you begin have a credit card, your Raptor system, and your SIM card handy. If you had PixController set up your system for you, you can skip to section 8.

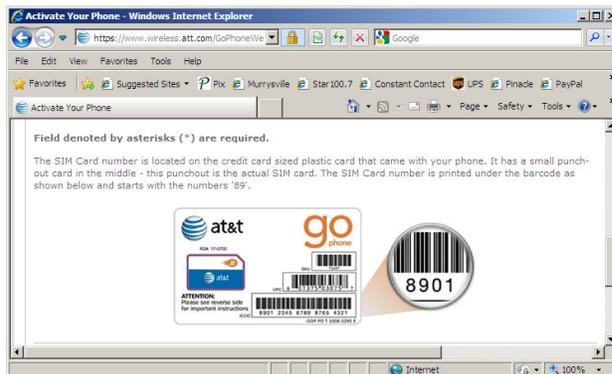
NOTE: Be sure to have the APN Server setting set to **WAP.CINGULAR** and the SMTP Setting set to **CWMX.COM** using the PC Setup software to configure the AT&T server information. See section 6 for more information.

First you will need to activate your At&t account. Log into: www.ATT.com/activations.

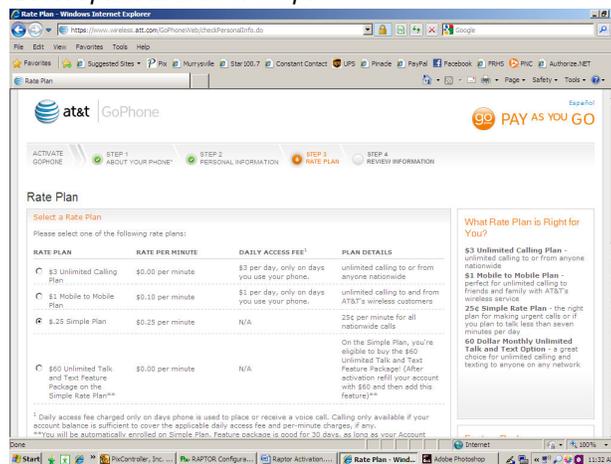
- Choose the “Pay as you go” plan.



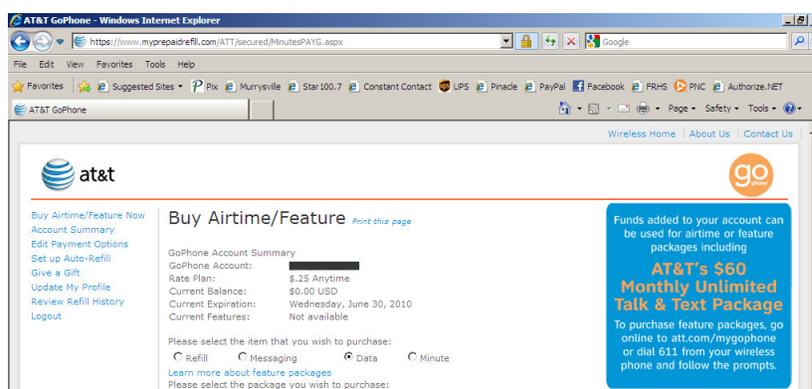
- Enter your SIM card number



- Enter your service zip code.
- To determine your IMEI number:
 - Turn your Raptor power switch ON (with no SIM card in place)
 - Immediately hit the center orange button in your system to take it into diagnostic mode. *Note: Screen should say "Diagnostic Mode" at this point. If not, power system off and on again and restart process.* Wait a moment while system runs through its SELF TEST mode.
 - When message comes up saying: SIM not detected, press the center orange button again to bypass that screen.
 - Scroll (right/left buttons) to: MODEM
 - Scroll (up/down buttons) to: IMEI
 - Enter this number online and power down your Raptor system.
- On the next screen, enter all of your personal contact information.
- Once that is complete, you will come to the RATE PLAN screen. Here you will choose the \$.25 Simple Plan. *Note: Since you will not be using your system for TALK, this plan allows you to daily pay nothing per month for that service. You will select a DATA plan in a later step.*



- On the Next Screen you will review your information and hit SUBMIT.
- Your Account will be activated. Once you get to the YOUR ACTIVATION IS SUCCESSFUL Page, but sure to print it or write down your New Wireless Number and Passcode. *You will need this to log into your account.*
- Scroll down on the page and select YES to add money to your plan.
- On the ADD MONEY screen, choose "One Time Payment Using Credit Card."
- On the next screen, select: Buy Airtime/Feature Now.
- On the BUY AIRTIME/FEATURE page, choose: DATA, then choose: 100mb data.



- On the next screen, you will need to log into your account using the New Wireless Number and Passcode you received earlier.
 - The next screen requires you to log in again.
 - Once you log in again, you will be taken to a screen that asks you for your new passcode. This is a new code that will be sent to your Raptor System to verify that you are indeed the owner of the “phone” that you registered.
 - To get this new passcode, you will need to insert your SIM card into the slot on your Raptor system.
 - Power up you Raptor like before, pressing the center orange button immediately to take it into Diagnostic Mode. Again, wait through self test.
 - Scroll (left/right buttons) to MODEM.
 - Scroll (up/down buttons) to SMS (This is where you are able to read your incoming text messages)
 - Select the center button to read.
 - Scroll (left/right button) through messages.
 - Select the (down button) to read the entire message.
 - One of the messages will include your new passcode.
 - Enter your new passcode online. Once you enter this, immediately you will be asked to update the passcode to one of your choosing. Be sure to write this number down. This will be your *final passcode!*
 - Complete the rest of your AT&T account set up.
- Next, you will want to test your Raptor System. *Note: You will need to wait approximately ½ hr after AT&T setup before your account becomes fully active. You may not be able to complete the following steps before that time.*
 - Install the RAPTOR CONFIGURATION SOFTWARE that is located on the included CD onto your computer.
 - Remove the Jump-drive from your Raptor system and insert it into your computer. Select the EMAIL tab. Insert test email address/es. Hit SAVE and OK. Remove drive.
 - Insert Jump-drive back into your Raptor system.
 - Power Raptor up as before, hitting center button immediately and waiting through self-test.

- Next, you will want the system to take a test photo and email it to the addresses you chose. To do this, you will need to:
 - Scroll (left/right button) to MANUAL PHOTO ACQ.
 - Select (center button) to take a photo.
 - Scroll (right button) to MANUAL EMAIL + ATT.
 - Select (center button) to send. *Note: If you get an ERROR, you may not have waited enough time for your AT&T account to activate. Turn system off and try again later.*
- Once it says sending was successful, check your email and see that the photo arrived.
- Your system is now tested and ready to begin using.

7.3 Using a World GSM/GPRS SIM Card

World GSM SIM is a prepaid SIM card mobile service that allows you to use your Raptor Wireless Camera anywhere in the world. Typically a World SIM card will charge more for data charges than a SIM card locked to a single cellular provider, but the World SIM gives you the freedom to place your Raptor Wireless Camera anywhere in the world where there is cellular service. We recommend a World SIM for Raptor Cellular customers outside of the USA.

Mobal World SIM card is a provider we recommend. See: <http://www.mobal.com/>
Mobal SIM cards work on the AT&T (850/1900 MHz) and T-Mobile (850/1900 MHz) in the USA. The SIM card cost is \$19 and the data charge is \$0.14 per 10K, which cost about \$0.50 to \$0.75 per photo.

When you use the Mobal World SIM there is no contract and the SIM card never expires. The Mobal SIM card will work in over 190 countries.

Mobal World SIM Server Settings:

Will need to setup the APN and SMTP server information in the PC Setup software before using the Mobal World SIM card. **See section 6 for more information.**

Use the following settings:

APN Server: **mobile.o2.co.uk**
APN Username: **mobileweb**
APN Password: **password**

SMTP Server: **smtp.o2.co.uk**
(No SMTP Username/Password needed)

Note: To save money on data transfer costs we suggest using a FTP server to send Raptor photos since the data size is 1/3 less than sending photos using SMTP due to Base64 encoding.

8. Powering the system on

Before powering on your UndercoverEye Raptor system in the field be sure you have the external video cable and bullet camera connected to the UndercoverEye Raptor system. Next, setup the wireless PIR motion sensors within range of your UndercoverEye system.

When turning power on to your Raptor System LCD screen will display the current firmware version number then begin a self test of all of the modules present in your Raptor System. These modules will be shown on the LDC screen they are tested.

Next, if the Raptor System is configured with a cellular radio the Raptor will connect to the cellular network and display the cellular signal strength. Note, if you need do increase your cellular signal level you can attach a Yagi Direction antenna in place of the small monopole cellular antenna included with your Raptor system.

Next, the system will show you the battery level and system time & date pulled from the cellular tower. After this period the Raptor System will enter a 1-minute walk test mode. The red LED will blink 5 times letting you know it's entering this mode.

At this point you can move around the camera setup and check out the PIR area. The green LED's will light when motion is detected. After the 1 minute automatic walk-test phase expires the red LED will blink 5 times letting you know the camera system will now become active.

The Raptor system will now enter a sleep mode to save battery power. Once a wireless sensor is triggered the Raptor system will wake up, capture a photo from the camera and start the DVR into recording mode. The photo will then be emailed to the email addresses setup on the USB flash drive. After complete the Raptor system will be put back into sleep mode.

9. Diagnostics Mode

To enter diagnostic mode power the System on and hold down the center menu key button. In this mode you can check the status of the cellular or WiFi signal, battery voltage, and see all of the system parameters. This is a powerful option to test the Raptor Wireless System. Photos can be manually taken and sent via SMTP (Cellular or WiFi) or FTP (Cellular or WiFi).

Usage:

Press the “Right” and “Left” menu keys to go to each Diagnostic Menu item. Press the “Up” and “Down” menu button to see all options available for each displayed option.

Config Menu (Diagnostic Mode)

More config parameters are now visible, and many can be edited using the LCD and the buttons. Config menu is indicated by [Cfg] display at top left of LCD. Also on the first line is the parameter name. The setting is on the second line (second and third line for un-editable text fields), and the third line shows the current button functions.

Typically, the North/South buttons are used to select the previous and next config parameter, and the Center button is used to go into Edit Mode for a particular parameter. The Right/Left buttons move out of the Config Menu and to the next/previous diagnostic screen.

In Edit Mode, the Up/Down buttons are used to adjust the parameter setting, while the Center button is used to finish editing and accept the modified parameter. For parameters with a fixed number of choices, each Up or Down button press/release will advance to the next value. For those with a numerical range of values, pressing the Up or Down button will cause the value to change one step; continuing to hold the button will change the value to rapidly until released.

Configuration values for Wifi network name, Wifi security protocol, Wifi password/key, Wifi time servers, and Wifi time specs. Note that these values will only be visible when the Raptor hardware is configured for Wifi operation. The APN specs for Cellular internet connection is now only visible when the Raptor hardware is configured for Cellular operation. The new Config menu lineup is shown below:

Label	Editable?	Values
Cam Pwr	Yes	Off, On (not saved in config file)
Sched	Yes	24-hour, Daylight only, Nighttime only, Schedule Grid
Mode	Yes	Sensor, Time Lapse
Next Trig	Yes	1 – 1439 minutes
Email Fmt	Yes	None, Text Only, Attach Image
Stat Mail	No	Status e-mail frequency and time
Low Batt	Yes	10.0 – 11.9 volts in 0.1 volt increments
LED	Yes	Off, On
Cam AGC	Yes	0.100 – 5.000 sec in 0.1 sec increments
Img Res	Yes	640x480, 320x240, 160x120, 80x60
DVR Mode	Yes	Continuous, Fixed, None
DVR Time	Yes	30 – 600 minutes (this item is only visible when DVR Mode is set to Fixed)
Cam ID #	Yes	1 – 99
Cam Descrp	No	Camera description text
APN Addr	No	APN server address ³
APN User	No	APN username ³
APN Pass	No	APN password ^{1,3}
Wifi SSID	No	Name of the Wifi network selected ⁴

Wifi Cxn	No	Security Protocol: Unsecured, Secure (WEP64), Secure (WEP128), Secure (WPA), Secure (WPA2) ⁴
Wifi Key	No	Wifi Passphrase (WPA) or key (WEP) ^{1,4,5}
Time Srv1	No	Primary time server address ⁴
Time Srv2	No	Secondary (backup) time server address ⁴
Wifi Time	No	Time zone specifier (hour offset from UTC/GMT) and daylight-savings setting. ⁴
FTP Addr	No	FTP server address ²
FTP User	No	FTP username ²
FTP Pass	No	FTP password ^{1,2}
SMTP Addr	No	SMTP server address
SMTP Misc	No	SMTP port number, Authentication (Y or N) and SSL (Y or N)
SMTP User	No	Username for SMTP authentication
SMTP Pass	No	Password for SMTP authentication ¹
Subject	No	E-mail subject line
Mail From	No	E-mail sender address
Rcpt n	No	One or more e-mail recipient addresses

Note 1: Passwords are hidden with **** format

Note 2: FTP items are only displayed when FTP is selected in the RaptorConfig program.

Note 3: APN items are only displayed when the Raptor is configured with cellular hardware.

Note 4: Wifi items are only displayed when the Raptor is configured with Wifi hardware.

Note 5: Wifi Key is only displayed when the Raptor is configured for a secure connection.

For the un-editable text fields, if they are too long to display on the 2nd and 3rd line of the LCD display, they will be truncated with an ellipsis (...) at the end. If more than one e-mail recipient is configured, each will be displayed as a separate parameter.

Self-Test: During self-test, a new step will be seen if Wifi is installed. This is noted as “Flashing NVRAM” where the configuration settings are checked and the Wifi NVRAM is updated if necessary. Note that if certain items are changed in the configuration program, this step can take up to 30 seconds for the changes to register. The “Flashing NVRAM” message will be displayed during this process.

Signal Meter: In Wifi mode, the signal meter will display the name of the Wifi network at the bottom of the LCD display. In diagnostic mode, the signal level is reported as 0-100% (rather than the dB display used for Cellular).

Modem Information Menu: The modem information menu in Diagnostic mode contains information relevant to the Wifi modem and the current Wifi connection, including modem software revision, and connection security protocol. The modem information menu is unchanged when a Cellular modem is installed.

Cellular Modem Information Menu: Cellular-equipped Raptor systems will include a new item in the modem information menu (Diagnostic Mode):

- **Phone #:** This is the cellular telephone number associated with the wireless SIM card currently installed in the Raptor.

Wifi Modem Information Menu: Wifi-equipped Raptor systems will include two new items in the modem information menu (Diagnostic Mode):

- **MAC:** This is the Media Access Control address, which is unique to each Wifi modem.
- **IP Addr:** This is the current IP address assigned to the Raptor by the Wifi access point.

Modem Menu (Diagnostic Mode): On Raptor units equipped with cellular capability, a new item will appear in the Modem menu. This item is denoted in the menu as SMS. When this item is displayed, the LCD will show how many received SMS text messages are currently in memory. If there are no messages, this is all that will be displayed. If there are messages, then instructions will show that you can hit the center button to read the SMS messages.

SMS Menu (Diagnostic Mode): Once the SMS menu is displayed, a preliminary screen will be displayed instructing that the East/West buttons can be used to select the next/previous text message; the North/South buttons can be used to scroll through a currently displayed text message; and the center button can be used to bring up a sub-menu.

The Sub-Menu gives 3 or 4 selections:

Selection	Action(s)
QUIT MESSAGE READER	Return to the Modem menu
DELETE MESSAGE	Delete the current message (if applicable)
DELETE ALL	Delete all text messages
BACK TO MESSAGE	Return to displaying the current message without performing any other actions.

When a text message is displayed, the LCD will contain header information and the contents of the text message, all of which can be scrolled using the North/South buttons:

Display Position	Content
Line 1	Message number, where #1 is the most recently received, and sender ID (typically the cell phone number from which the message was sent).
Line 2	Date and time stamp of the message
Subsequent lines	The contents of the text message

Remember that, while displaying a text message, besides scrolling the message with the North/South buttons, you can select the next/previous message with East/West buttons, or bring up the action sub-menu by pressing the center button.

10. Raptor System Emails

When the Raptor Wireless System is setup to send emails in SMTP format this will include a photo attached in JPEG format and the email text body. The email will include a descriptive text body which includes important information about the Raptor Wireless system including battery level, radio signal strength, internal temperature, and GPS position if the GPS receiver option is installed in your unit.

Note: If the GPS unit is installed a link to Google Aerial Map photo and Bing Aerial Map photo are embedded in the email text body. By clicking on these links will bring up a browser window showing you the current location of your Raptor Wireless System.

10.1 Email Example with Photo and GPS

Raptor System Email with Photo Attached Example

Subject: Raptor Cellular Camera
Date: 30 Jul 2010 10:09:46 -0700

Camera Description: PixController, Inc. Raptor Cellular Camera - Cellular Demo Camera #6

Trigger Date: Fri, 30 Jul 2010
Trigger Time: 10:08:26 -0400
Trigger Source: Built-in PIR

Signal Strength: Excellent (5/5)
Cellular Operator: AT&T
Battery Level: 100% (12.7 volts)
Internal Temperature: 88F (31C)

MOST RECENT GOOD GPS POSITION:

Lat/Long: 40.40324°, -79.60368° (40° 24.1946' N, 79° 36.2206' W)
Elev: 1149' (350 m)
Quality: Good
Timestamp: 30 Jul 2010 10:08:00 -0400

```
<html><body><a href="http://maps.google.com/?q=40.40324,-79.60368+(Raptor%20Camera)&z=18&t=h">Click for Google Map</a><br><a href="http://www.bing.com/maps/default.aspx?v=2&cp=40.40324~-79.60368&style=h&lvl=18&sp=Point.40.40324_-79.60368_Raptor%20Camera">Click for Bing Map</a><br></body></html>
```

Filename on flash drive: \PIX\IMAGES\00009\03314433.jpg
Attachment Filename: Cam00_20100730_100826.jpg

<<<This e-mail auto-generated by the PixController Raptor V1.13d>>>



10.2 Status Message Example

Raptor System Status Text Message Example

Subject: Camera 1 Status

Date: 29 Jul 2010 08:01:18 -0700

Camera Description: Raptor Cellular Camera

Trigger Date: Thu, 29 Jul 2010

Trigger Time: 08:00:00 -0400

Trigger Source: No trigger - this is a status e-mail

Signal Strength: Fair (2/5)

Cellular Operator: AT&T

Battery Level: 100% (12.8 volts)

Internal Temperature: 75F (24C)

CURRENT GPS POSITION:

Lat/Long: 40.41424°, -79.65140° (40° 24.8543' N, 79° 39.0839' W)

Elev: 1084' (330 m)

Quality: Good

<html>

<body>

Click for Google Map
Click for Bing

Map
</body>

</html>

<<<This e-mail auto-generated by the PixController Raptor V1.13b>>>

10.3 Sending photos to your cellular phone

You can send photos to your cellular phone as well as your PC. Sending photos to your cellular phone is a very powerful feature of the Raptor Wireless System. If your cellular contract is setup to receive photos you will need to put the address of your cellular phone into the Raptor Wireless Camera using the following format show below. These examples show the most common USA cellular providers. Please contact your cellular provider

AT&T

[10-digit phone number]@mms.att.net

example: 2045551234@mms.att.net

Sprint

[10-digit phone number]@pm.sprint.com

example: 2045551234@pm.sprint.com

Verizon

[10-digit phone number]@vzwpix.com

example: 2045551234@vzwpix.com

T-Mobile

[10-digit phone number]@tmomail.net

example: 2045551234@tmomail.com

11. Wireless RF Sensors

11.1 Using the Wireless KeyFob

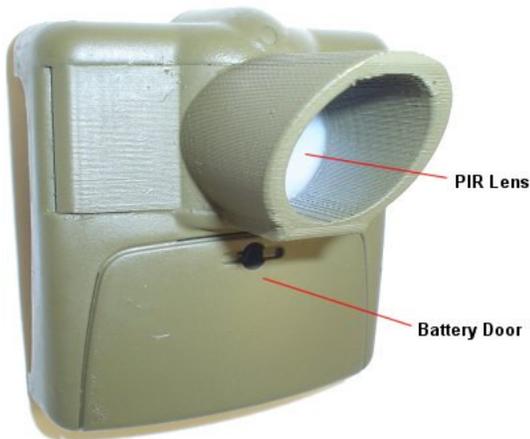
The wireless remote KeyFob is an option item you can purchase from PixController, Inc, to manually control a Raptor unit setup for the external wireless motion sensor.

By pressing the “On” button you can manually trigger a Raptor photo from a distance up to 100 feet.



*Wireless Remote Control
KeyFob*

11.2 Using the Wireless PIR Motion Sensor



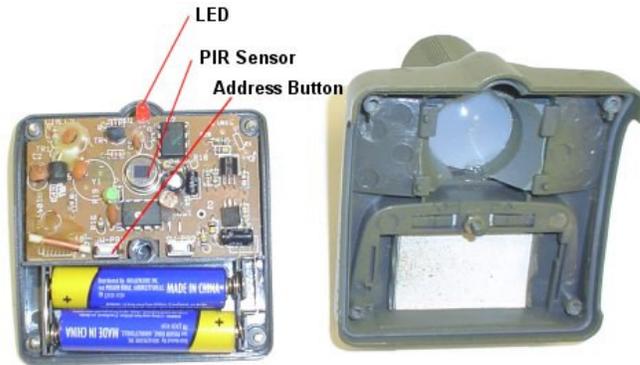
The Wireless motion sensor is a device which will sense motion and send a wireless signal back to your Raptor system (wireless motion sensor version). The sensor can send a signal over about 50 to 60 feet.

There are 2 AAA batteries that power the motion sensor which will last for a year of continuous use. To replace them just remove the battery door.

Never touch the PIR lens as this could damage the PIR sensor

Setting Wireless PIR Motion Sensor Addresses

Each wireless PIR sensor can be setup to send out a unique address. Wireless PIR sensors are assigned an 'address', which consists of addresses between “A” to “P”.



To change the Address that the Wireless PIR transmits: First, remove the 4 screws from the back of the case and take off the cover as shown. Press and hold the **Address** button (under the battery compartment lid) the red LED flashes first and then blinks the current setting (once for A, twice for B, etc.). Release and immediately press the button the desired number of times for the House Code you want to set (once for A, twice for B, etc.) and **hold the button on the last press**. 3 seconds after the last press (while holding the button) the red LED blinks back the number of times for the code you set. Release the button.

Mounting the Wireless PIR Motion Sensor



To mount the Wireless PIR motion sensor first remove the battery door and remove the AAA batteries. You will see 2 screw holes in which you can mount a small mounting plate or screw it to the surface of the mounting area.

Try to keep the sensors at 2' to 3' from the ground if you want to get the best detection of targets on the ground.

The range of the PIR detection is 40' to 80' depending on air temperature and temperature of the target. The hotter the target the longer detection range you will have. For example a car can be seen at a greater distance.

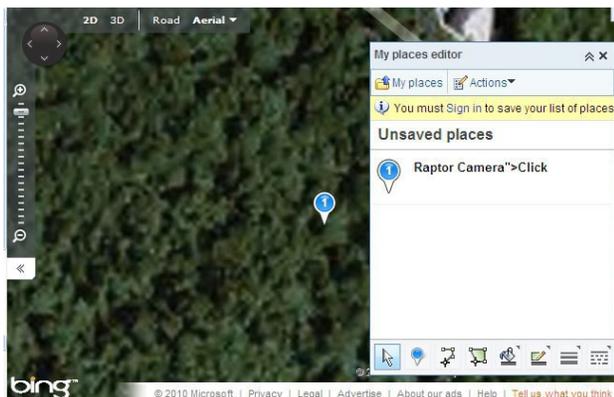
The RF wireless range back to the DigitalEye unit is about 100' to 150' depending on line of sight.

12. GPS Option

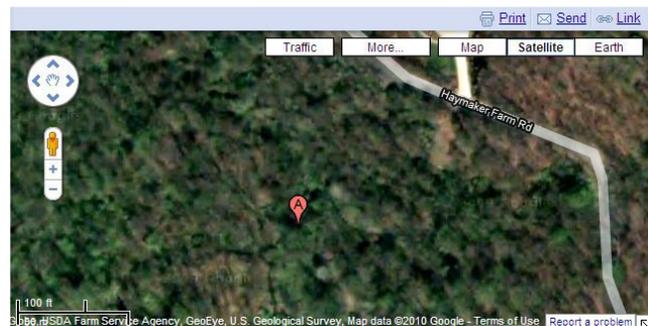
The Raptor Wireless System can be equipped with a 50 Channel GPS receiver at time of purchase or be updated after purchase. The GPS will send the latitude, longitude, and elevation position of your Raptor System upon trigger event or status message. If you need to update a Raptor Wireless System with the GPS receiver contact PixController, Inc. at sales@pixcontroller.com.

Be sure to place your Raptor Wireless System with GPS receiver in an area that has good view of the sky. Obstructions such as inside buildings, metal enclosures, and heavy tree canopy can degrade or block the GPS signal.

The Raptor Wireless System will acquire a new GPS fix upon system power up, trigger event, and status message. When the Raptor Wireless System sends a trigger email or status email links to Google and Bing Aerial maps will be embedded in the text body. Example of aerial maps are shown below.



Bing Aerial Map



Google Aerial Map



Bing "Birds Eye View" Aerial Map

12.1 Sending a SMS text message to retrieve Raptor GPS location

To request a GPS location, simply text "20" to the Raptor's phone number. There should be nothing in the text message other than the two digits "20" (i.e. without quotes).

The next time the Raptor wakes up, it will immediately reply with a text message containing the most recent GPS fix saved by the Raptor, with a time/date-stamp indicating when that fix was acquired. This may be out-of-date and may not reflect the current position. Therefore, the Raptor

will next attempt to get a new fix at the current location. Once the new fix is acquired, the Raptor will send a second text message with the newly acquired coordinates. If the unit is in motion, the speed and direction will also be included in the text message. If a new fix cannot be acquired within approximately 10 minutes (e.g. the Raptor is inside a building, in a location where it cannot acquire a GPS fix), then the second message will not be sent.

Note that, in V1.13c, there will be only one good-fix text response. In other words, you must text "20" to the Raptor again each time you want to receive further text messages.

In this version, the Raptor will only respond to a location-request text message at the following time:

- 1) The next time the unit is powered up, OR.
- 2) The next time unit is triggered by motion, OR
- 3) The next time the unit wakes up to send a status message.

(whichever occurs first).

13. Updating the Raptor Firmware

To update the Firmware version on your Raptor Wireless System you will need to purchase a Serial to USB cable. We suggest the Gigware **Model: 26-949** Serial to USB cable or similar. The Gigware cable can be purchased on-line or at your local RadioShack store.

Firmware updates are available from www.pixcontroller.com via download.

To update the firmware on your Raptor Wireless Camera follow these steps.

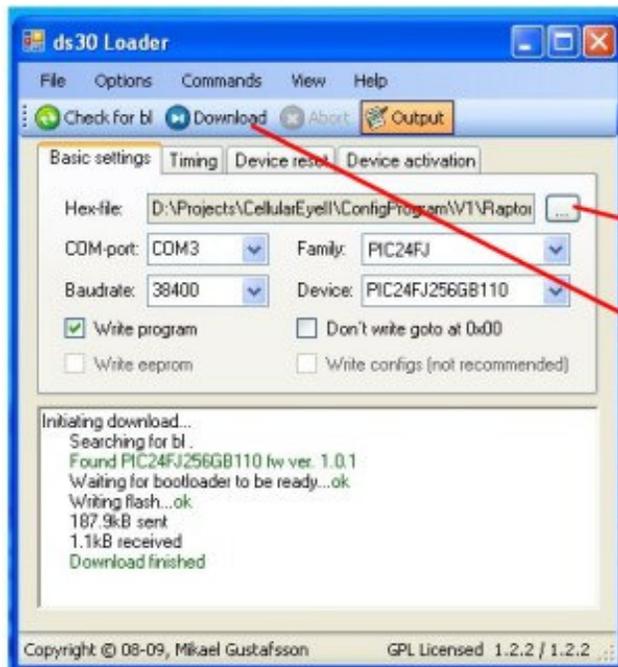
1. Install the ds30 Loader from the Raptor CD on your computer.
2. Connect the Serial to USB cable to your PC. Note, the DB9 Serial cable is connected to the Firmware update port on the Raptor system and USB cable to your computer as shown below.
3. Power up the Raptor system and pressing the "Up" and "Down" menu key buttons at the same time. You should see the following message on the Raptor LCD display:

PIX BOOTLOADER
Firmware update
mode

4. Run the ds30 Loader software and load the .HEX file as shown below. Press the "Download" button to install the Firmware on the Raptor system. The MCU Stat LED will start blinking when the download starts. Do not power down the Raptor system or unplug the cable until the firmware update is complete.



Connect the Serial to USB Cable to your PC



1. Load the .HEX File

2. Press "Download" to install Firmware

Run the ds30 Loader to install the Firmware update on your Raptor System

14. Long-Range WiFi

Your Raptor Wireless Camera system can be equipped with either a GSM Cellular Radio or WiFi Radio. This option can be changed at any time during the life of this product. Contact PixController, Inc., sales@pixcontroller.com for radio update options.

The WiFi option is a 2.4GHz 802.11 protocol radio device. There are many ways to configure the Raptor Wireless Camera with the WiFi radio option. There are many products available on the market today to enhance the signal strength of this popular wireless protocol.

Specially shaped antennas, such as the Yagi antenna, can be used to increase the range of a Wi-Fi transmission without a drastic increase in transmission power. High gain antenna may be of many designs, but all allow transmitting a narrow signal beam over distances of several kilometers, often nulling out nearby interference sources. Obstacles are among the biggest problems when setting up a long-range Wi-Fi. Trees and forests degrade the microwave signal, and rolling hills make it difficult to establish line-of-sight (LOS) propagation.

To prevent transmission signal loss due to obstacles such as trees and vegetation it will be necessary to mount the Raptor Wi-Fi antenna as high as possible. The Raptor Wi-Fi unit was design with a removable antenna with a standard SMA antenna mount for connecting other antennas.

Using a High Gain Yagi such as the 16dBi ANT001 Raptor Wi-Fi antenna you will need point the antenna in the direction of the Wi-Fi Access Point. It's best to place the Wi-Fi Access Point as high as you can, and also upgrade the Access Point to higher gain antennas such as antenna ANT003, 9dBi OMNI antenna. For the best range possible use ANT002, 15dBi outdoor OMNI antenna for our Wi-Fi Access Point.

The high gain OMNI antennas for your Wi-Fi Access Point are 360° in direction which allows many Raptor Wi-Fi Systems to access a single Access Point. There is not limit to the number of Raptor Wi-Fi systems that can be used with an Access Point. Below are some common antenna setups and expected ranges.

Standard Wi-Fi Antenna - 300 foot range LOS



**Raptor Wi-Fi System
with standard OMNI antenna**

Outdoor Indoor



Using the standard OMNI Raptor Wi-Fi antenna transmitting to the Linksys WAP54G Access Point with the standard Linksys antennas will yield a maximum transmission distance of about 300 feet. This range can be slightly increased by replacing the Linksys Access Point antennas with the 9dBi OMNI antennas under our Accessories page, part number ANT003. To obtain the

maximum transmission distance you must have clear line of sight (LOS) between the Raptor Wi-Fi system and the Linksys Wi-Fi Access Point. Be sure your Wi-Fi access point is placed high inside with little obstructions to the outside including metal walls.

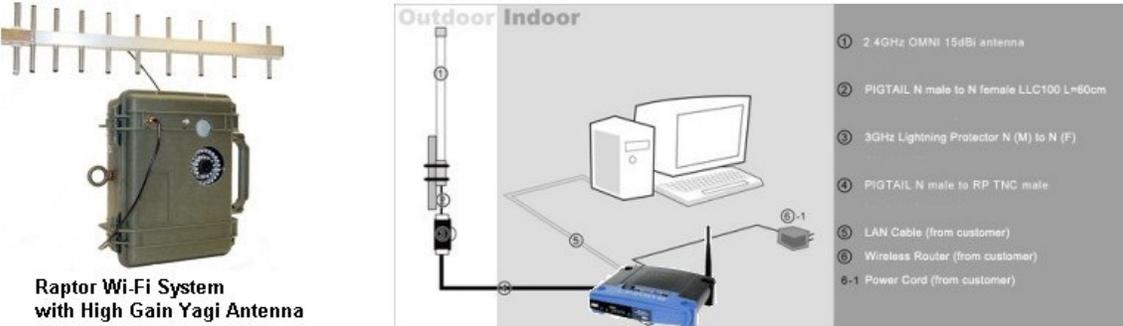
High Gain Yagi Antenna - 800 foot range LOS



**Raptor Wi-Fi System
with High Gain Yagi Antenna**

Adding the optional high gain Yagi antenna to your Raptor Wi-Fi system can increase transmission distances up to 800 feet line of sight (LOS). The 16dBi Yagi antenna, part number ANT001 from our [accessories page](#) is a direction antenna meaning it must point towards the Wi-Fi Access Point. This range can be slightly increased by replacing the Linksys Access Point antennas with the 9dBi OMNI antennas under our Accessories page, part number ANT003. To obtain the maximum transmission distance you must have clear line of sight (LOS) between the Raptor Wi-Fi system and the Linksys Wi-Fi Access Point. Placing the Yagi antenna from the Raptor System as high as you can will increase transmission distances. Be sure your Wi-Fi access point is placed high inside with little obstructions to the outside including metal walls.

High Gain Yagi Antenna with High Gain OMNI Access Point Antenna - 1/2 to 1 Mile LOS



**Raptor Wi-Fi System
with High Gain Yagi Antenna**

Transmission distances from 1/2 mile to 1 mile can be obtained by adding the optional 16dBi high gain Yagi antenna to your Raptor Wi-Fi system, and the 15dBi OMNI Mast Antenna, part number ANT002, to your Wi-Fi Access Point. Both antennas can be purchased from our accessories page. The OMNI mast antenna must be placed outside as high as possible. The OMNI mast antenna includes a 23 foot cable and lightning protector, which is cabled back to your Wi-Fi access point. To obtain the maximum transmission distance you must have clear line of sight (LOS) between the Raptor Wi-Fi system and the Wi-Fi Access Point. Placing the Yagi antenna from the Raptor System as high as you can will increase transmission distances.

Parabolic Wi-Fi High Gain Antennas - Several Miles LOS



WiFi biquad dish antenna by [Eliot Phillips](#)

Using a parabolic antenna will net the longest Wi-Fi transmission distances, but these antennas are often expensive, large, and difficult to setup due to their very narrow transmission beam. There are many long range Wi-Fi antennas on the market today due to the popularity of Wi-Fi networks.

One very interesting long range Wi-Fi antenna was built using a DirectTV dish by [Eliot Phillips](#), <http://www.engadget.com/2005/11/15/how-to-build-a-wifi-biquad-dish-antenna/>

. Eliot was able to detect an access point over 8 miles away with his DIY antenna design.

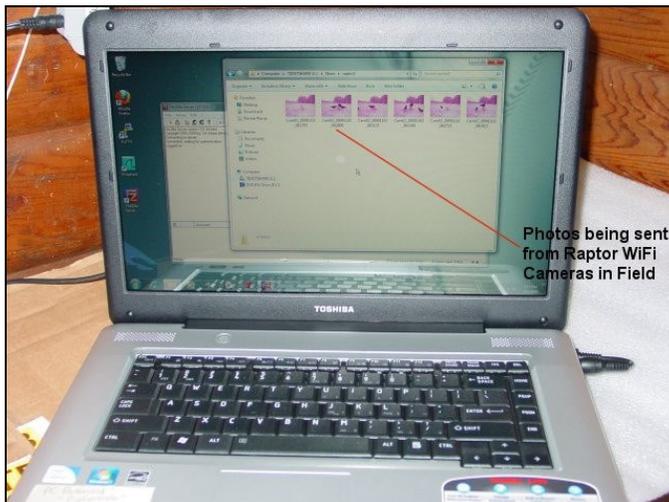
14.1 WiFi Repeaters

The Linksys WRT54G router is capable of working in repeater mode with third party firmware like DD-WRT. A WiFi repeater is a device that will connect to another wireless access point and redistribute the signal. Repeaters are typically used to extend the coverage of a network.

It is possible to place a WRT54G router in a waterproof enclosure using a high gain Omni mast antenna for input and high gain direction output antenna to extend WiFi networks over hilly terrain.

14.2 Using WiFi option without Internet Connectivity

It is possible to setup a WiFi network without Internet connectivity. For remote applications such as building security, border security, or wildlife research which may not have an Internet connection you send photos to a FTP server configured on a standalone computer as shown below. Free FTP server software such as FileZilla Server, <http://filezilla-project.org/>, are an open source, simple to use, and free to download.



“PC Base Station” running FileZilla FTP software receiving Raptor WiFi Photos

15. Raptor Camera

The Raptor camera is a still IR (Infrared) VGA Camera which will capture photos at a maximum resolution of 640 x 480. The smaller resolution is needed to keep image file size down in order to send photos quickly over low bandwidth cellular networks.

Since the camera is an IR camera day and night photos will have a pinkish tint to them. By increasing the trigger time from 1 second to 5 seconds can have a slight effect on the day and night color by removing some of the pinkish tint. However, increasing the trigger time will likely result in missing what triggered the camera

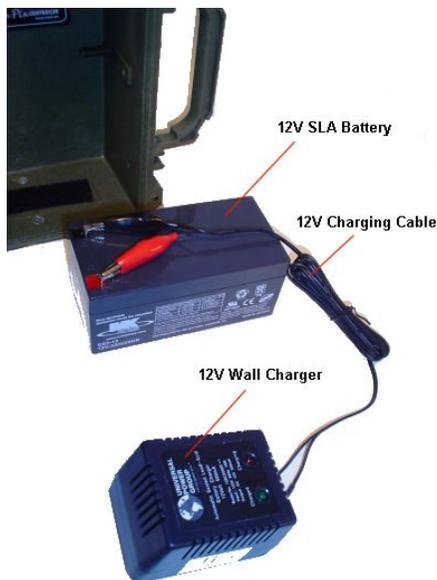


Photos will have a pinkish tint to them exposed to bright sunlight and a fast trigger time.



Photos from low light settings and slower trigger times will result in less of the pink tint due to the IR camera.

16. Charging the 12V Battery



Included with your Raptor unit is a rechargeable 12V SLA (Sealed Lead Acid) battery and 12V charger. The 12V battery is completely removable from the Raptor unit for replacing or recharging. To recharge the 12V battery simply connect the red alligator clip from the 12V wall charger to the positive terminal on the 12V SLA battery, and the black alligator clip to the negative terminal on the 12V SLA battery.

When charging the red LED on the wall charger will be lit and will change to green when the 12V SLA battery is fully charged.

Replacement 12V SLA batteries can be purchased from www.pixcontroller.com, or you can use the UB1234, 12V 3.4AH or similar battery.