RaptorEye Manual

AIRBORNE INNOVATIONS LLC

2170 Eugene Street
Hood River, OR 97031

info@airborneinnovations.com
Phone: 541-380-0928
Fax: 253-276-9765

Version 2.3.6, 24 July 2008

Revision Date	Description
21 Nov 07	Created.
16 Dec 07	Added RaptorEye network info, some new configuration commands
24 Dec 07	Added QuickStart section, PC configuration info, more details on VNC usage
13 Jan 08	Added initial info on Spook application
15 Jan 08	Added troubleshooting info
7 Mar 08	Added Prosilica configuration, new higher resolutions, SatCamGnd dialog documentation
27 Apr 08	Updated for new release, triggering modes, SIMCAMERA option, VIP radio configuration
18 May 08	Added info on camera script support, hardware interface
25 May 08	Added info on ROTATENADIR option, changes in system tab interface
24 July 08	Added info on flight plan based image triggering, misc configuration info

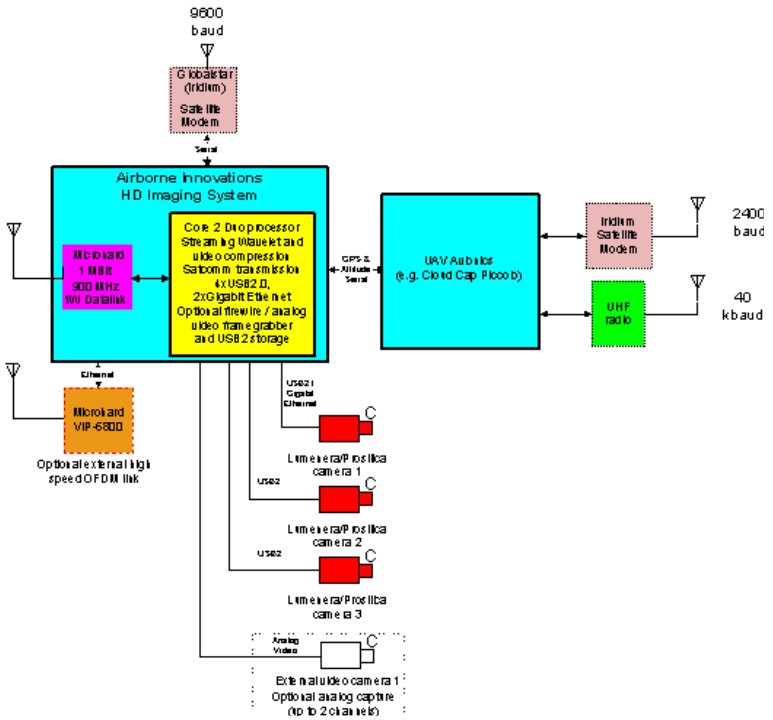
Table of Contents

1 Introduction

The RaptorEye system is a high performance imaging system designed to transmit large format images, with selectable compression and bandwidth usage, scalable from the highest performance OFDM links to ultra low bandwidth satcomm. The system can make use of cameras with USB2, Gigabit ethernet, and optionally analog video and firewire interfaces.

1.1 Block Diagram

This is a sample configuration illustrating some possiblities.



1.2 Hardware interface

The RaptorEye contains the following connectors:

The HD44 connector provides the main system interface, providing 9-36V power, two RS232 serial ports, at least two USB2.0 interface ports, and either two gigabit eithernet ports or one gigabit ethernet port and two additional USB2.0 interface ports (for a total of four), depending on how the system is configured. If your unit has a label indicating 'dual gigabit' then it is configured for two gigabit ethernet ports rather than for 4 USB2.0 ports.

The HD15 connector is VGA video output which can be connected to an analog RGB monitor (e.g. 1600x1050 typical, or up to 2048x1536). This can be used for testing and configuration. Note that you can also simply log in to the system via a remote desktop assuming you have an ethernet connection (and you can also do this over an ethernet radio such as the Microhard VIP 2400 or 5800 series or the Microhard IP921 radios).

Other optional ports depending on the configuration:

Up to 2 Video inputs via SMA connectors (potentially up to 4 available).

A UHF RF output on an SMA connector for an internal high speed radio (such as the Microhard IP921 series or internal broadband 2.4 GHz / 5.8 GHz radio).

Another option is an internally mounted lightweight radio with equivalent or better performance to the Microhard VIP series radios.

There is also an optional GPIO port available which can control other payloads, trigger cameras, etc. Optional regulated 12V power is also available if configured.

2 System Configuration

2.1 Radio Image Transmission QuickStart

This section shows how to log into the system and begin transmitting images.

2.1.1 RaptorEye system hardware setup

Plug in the RaptorEye system and the developer's cable. Do not plug in the network cable into a local router. If an internal radio is fitted attach an appropriate antenna to the UHF connector (right side of the panel).

If you have a system which is configured for external dual gigabit connections (rather than 4 USB ports) please make sure that your cable is compatible. Check the unit for a 'Dual gigabit' sticker and verify that you have the correct dual gigabit harness.

If using an external VIP radio plug the Gigabit 1 cable into the 'LAN' connector on the radio.

If using a Prosilica gigabit camera, plug the Gigabit 0 cable on the RaptorEye into the radio.

If connecting to a Piccolo, make sure the build you have is configured for the Comms SDK version of Piccolo system software you are using (probably 2.0.4 by default), and plug the Piccolo into the COM1 cable on the RaptorEye.

Power up the system.

2.1.2 PC Network configuration

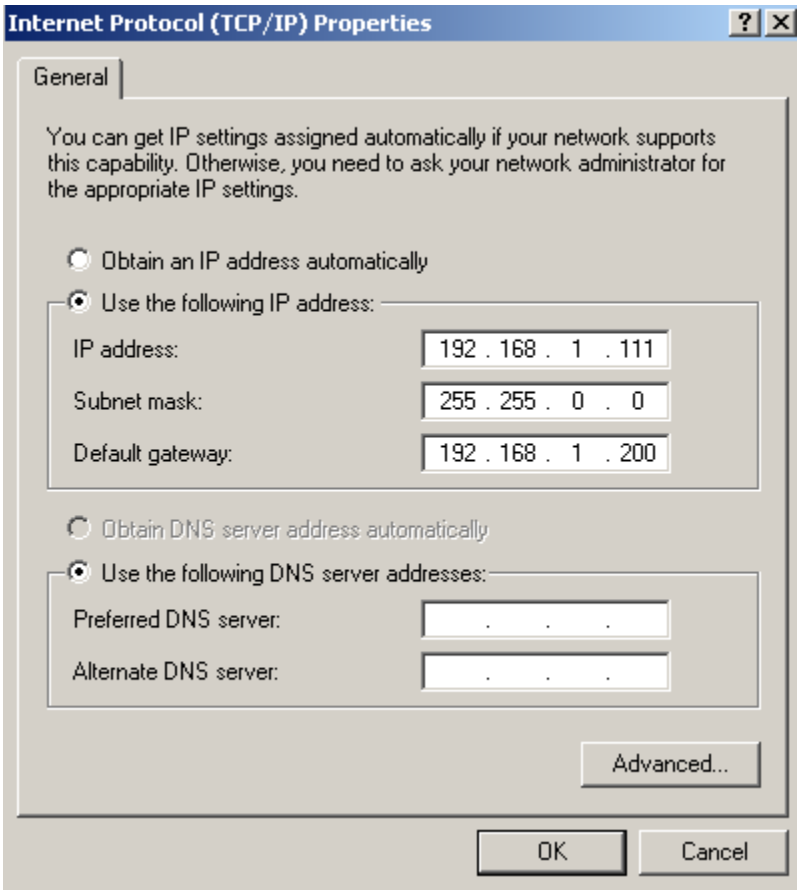
Set up the RaptorEye ground station. Plug in power and a UHF antenna of appropriate frequency. Plug a crossover (usually red) cable from the ethernet port of the ground station directly to the PC.

Disable any wireless network adaptor the PC / laptop may have.

Copy the RaptorEye directory to the PC if not already installed.

Configure the PC to have these network settings (example given for XP):

Internet Protocol (TCP/IP), properties



This tells the system to use the Microhard ground station as the primary network gateway. Click on ok.

At this point you should be able to ping:

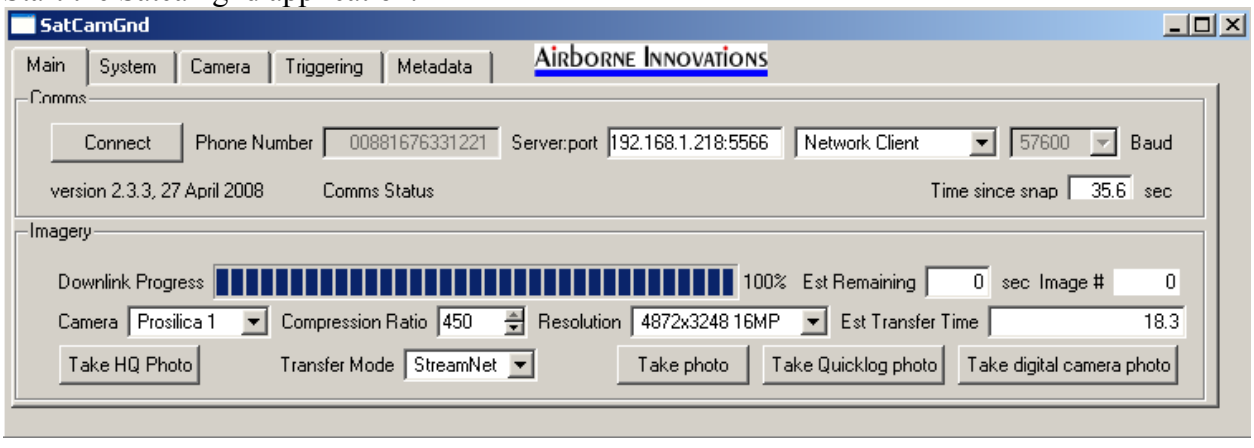
192.168.1.200 (the ground station radio)

192.168.1.201 (the airborne radio)

192.168.1.218 (the RaptorEye system through the radio link)

2.1.3 Start the ground application

Start the Satcamgnd application.



Verify the IP address (192.168.1.218:5566 for the radio connection, otherwise determine and use the local IP address and port 5566).

Click on the Connect button.

Check the camera, compression ratio, and resolution settings (start at high compression ratio and low resolution). The defaults should be fine.

Click on the take photo button. Images should begin to arrive. You can dynamically change the compression ratio and resolution.

Known issues:

If images stop downlinking, change to a higher compression ratio (e.g. 300) and click take photo.

If you somehow lose the connection the system should reconnect, but you if needed you can try to disconnect and reconnect (or switch from network client to serial mode and back).

2.2 Logging into the system

The standard login user is 'airborne' and password is 'satcam'.

You can plug in a standard USB keyboard and mouse into any of the USB ports, and plug in a standard monitor cable into the HD15 VGA port. This will allow you to log into the system and perform configuration and administration tasks.

2.3 Network Usage and Server applications

2.3.1 SSH and SFTP

The system is configured to run an OpenSSH server. This means you can log into the system using SSH, or SFTP.

A good SSH application for Win32 is Putty. This is included in the tools directory of the dev kit.

A recommend SFTP application is FileZilla. FileZilla will allow you to easily transfer files to and from the system.

2.3.2 Dual gigabit ethernet ports and IP addresses

The system has two internal ethernet ports. Eth0 is normally reserved for the internal radio, and Eth1 (sometimes eth2) is the external ethernet port.

The IP address of the eth0 port is 192.168.1.218. This is the port connected to the radio. This is the IP address you use when connecting to the system via radio.

Note that the external ethernet port is configured by default to obtain a DHCP network address. This functions best when plugged into a router or network connection. The system will obtain an IP address from your router. This address should be consistent from boot to boot.

If you are unsure of the IP address you can either connect a monitor to the system or use a tool like arp. A command like 'arp -a' will usually give a list of local machines that the system has

detected IP addresses for. Another way to find the IP address of the system without plugging in a monitor is to log into the administration tool for your router.

If desired you can configure the system for a fixed IP address on the external ethernet port. This may help you connect to the system if using a crossover ethernet cable.

2.3.3 VNC

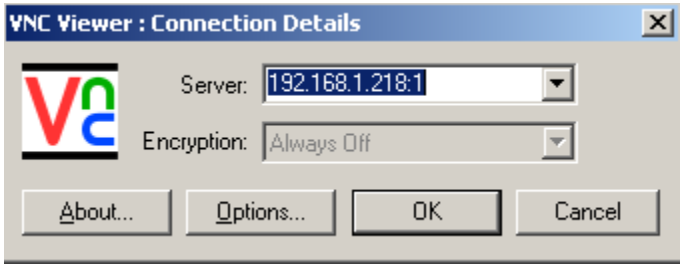
Another useful server running is VNC. This allows a remote desktop like functionality with relatively low bandwidth.

You can even get a remote desktop over the radio system by connecting to it using a VNC client.

For best monitoring of status messages it is advisable to run the main application over the VNC link.

The recommended client for Win32 is UltraVNC or RealVNC. They are both included in the tools directory of the dev kit.

To log into the system using VNC, use the network IP address of the RaptorEye system and :1 to indicate the 2nd desktop, for example: 192.168.1.218:1 should be entered in the VNCViewer Server box. If the RaptorEye system is plugged into the local wired ethernet connection the wired ethernet IP address should be determined and used.



2.4 Startup configuration

2.4.1 Startup scripts

The system runs a few custom startup scripts from the /etc/rc.local file.

This includes setting up a ramdisk, configuring the two ethernet ports so that they will both be usable simulataneously, and starting the main application.

By default the system is set up to start the /satcam/satcamair application automatically from this script.

2.5 Configuring the airborne application

The main application is called /satcam/satcamairomp (multiprocessing version).

It loads a configuration file called SatCamConfig.txt.

2.6 Configuration Files

The aircraft application, simulated aircraft application, and ground application use a configuration file to select startup options.

Parameters may be commented out by inserting a ';' or '#' character at the beginning of the line.

2.6.1 Sample ground side configuration file

This configuration is set up for network communications to the imaging system.

```
IRIDIUMENABLE=FALSE
BAUD=57600
P=5

PHONENUMBER=00881676331000
#Current RaptorEye radio IP address:
SERVER=192.168.1.218:5566

DEFAULTTRANSFERMODE=2

DEFAULTCAMERA=5
DEFAULTRESOLUTION=2
DEFAULTHQCAMERA=5
DEFAULTHQRESOLUTION=3
DEFAULTHQCOMPRESSIONRATIO=260
ARCHIVEENABLED=TRUE
ARCHIVEPATH=imgarchive
```

2.6.2 Description of ground and aircraft side configuration file entries

DEFAULTTRANSFERMODE=

Possible transfer modes are:

0 RELIABLE_TRANSFER_MODE

1 BURST_TRANSFER_MODE

2 STREAMING_NET_MODE

SERVER= This is the network address and port of the aircraft side for TCP/IP mode image transmission. By default this is 192.168.1.218:5566

LISTEN=

PICCOLO=

XRESn=

YRESn=

EXPOSUREMS=k Exposure time in milliseconds. -1 for auto exposure.

IMAGETYPE= 0 = JPEG, 1= JPEG2000, 2=RAWBAYER, 3=RAWTIFF

Types 2 and 3 are currently supported for Prosilica cameras only.

JPEGCOMPLEVEL= JPEG compression level used for downlink.

INDEPENDENTDIGICAMP=

ARCHIVEENABLED=

The following parameters are relevant for each application:

Aircraft application

BAUD, IRIDIUMENABLE, DEFAULTCAMERA, PICCOLO, NMEA, METADATABAUD, WFOVDEG, HFOVDEG, WFOVDEGn, HFOVDEGn, ARCHIVEPATH, ARCHIVEDEVICE

Ground application

BAUD, IRIDIUMENABLE, DEFAULTCAMERA, GROUNDELEVATION, WFOVDEG (overrides aircraft if present), HFOVDEG (overrides aircraft if present), GEOREFENABLEn

Simulated aircraft application

BAUD, IRIDIUMENABLE, DEFAULTCAMERA, TERRASERVERSIM, SERVER, PICCOLO, NMEA, METADATABAUD, SIMAIRCRAFT, GROUNDELEVATION, WFOVDEG, HFOVDEG

The configuration file is called SatCamConfig.txt and it resides in the same directory as the application.

The file can include the following parameters:

DEBUG=n Enable debug messages at debug level parameter n. Typically, each debug level is implemented as a bit in the n parameter. For example, most standard image protocol messages are level 1, HQ and command bit messages are level 2, satellite modem connect/disconnect messages are level 4, and you could enable some combination by adding them together i.e. DEBUG=(1+2+4)

DEBUG same as DEBUG=255

2.6.3 Communications related messages

P=serial port # Select image serial port. This is the port used to transmit imagery (which may be connected to a satellite modem or to a UHF radio / avionics payload port).

BAUD=baud rate serial port baud rate [300 to 115200]

IRIDIUMENABLE= TRUE to enable the Iridium state machine [TRUE or FALSE]

PHONENUMBER= Default phone number to use (Ground).

EXTMDMDIALINITSTR= Externally supplied modem dial init AT command string. An Iridium init string is used by default, but you can override the string to support other modem-like communications links such as

Globalstar satcomm. This is the configuration message sent by the dialing (ground) side to set up the modem with the proper configuration before dialing.

EXTMDMANSINITSTR= Externally supplied modem answer init AT command string. Sent to configure the modem on the answer (air) side.

DEFAULTCAMERA=n Default camera number [1 to 5]. Used by the aircraft until a valid configuration is sent from the ground, and by the ground to set the default UI setting for this parameter.

DEFAULTRESOLUTION=n Default resolution setting. Use primarily on ground side.

see resolution setting table:

Resolution table

Resolution setting	*Image dimensions*
0	176x144
1	352x288
2	320x240
3	640x480 0.3MP
4	720x480
5	704x576 PAL
6	1024x768 0.8MP
7	1280x1024 1.3MP
8	1600x1200 1.9MP
9	1920x1080 HD
10	2048x1536 3.1MP
11	2272x1704 3.9MP
12	2592x1944 5.0MP
13	3008x2000 6.0MP
14	3072x2304 7.0MP
15	3264x2448 8.0MP
16	3648x2736 10.0MP
17	4000x3000 12MP
18	4872x3248 16MP
others	as desired

These resolution settings are primarily used by the imaging system to set the desired resolution via a script, and for convenience. They are not used in georeferencing.

DEFAULTHQCAMERA=	Camera used when Take HQ Photo button is pressed. Ground side.
DEFAULTHQRESOLUTION=	Resolution used when Take HQ Photo button is pressed.
DEFAULTHQCOMPRESSIONRATIO=	Compression ratio used when Take HQ Photo button is pressed.

2.6.4 Camera specific configuration

These lines are used to configure the system to use a supported 3rd party camera.

Lumenera USB2.0 cameras are supported. The system must be configured with the correct driver for the camera used. By default this is the Lumenera LW230C.

LUMENERACHANn=k	Set camera n to Lumenera camera channel k

For instance

LUMENERACHAN0=2	is the configuration line used if the video framegrabber is installed,
LUMENERACHAN0=0	is used if no framegrabber is installed.

Multiple lines can be used to define multiple cameras. Multiple Lumenera camera support is still under development.

Prosilica Gigabit Ethernet cameras are also supported.

PROSILICACHANn=k	Set camera n to Prosilica camera channel k

SIMCAMERA=[TRUE or FALSE], simulate a Prosilica camera. Requires a camera raw bayer image file to be in the program directory, called 'ProsilicaSim0.raw'.

2.6.5 Triggering related configuration

TRIGGERMODE=k Set trigger mode

Camera trigger mode

0=Continuous, with downlink and ground based triggering

1=Manual, unimplemented

2=Time based, currently acquires as fast as possible

3=Distance based (Raptoreye using Piccolo flight plan), functional

4=Distance based with GPIO image trigger (Raptoreye using Piccolo flight plan, trigger using hardware camera trigger pin), seems to have some issues, need access to Prosilica hardware to resolve.

4=Autopilot hardware trigger (Prosilica, Raptoreye metadata), functional

5=Autopilot hardware trigger (Prosilica, Piccolo camera packet metadata), not yet implemented as Piccolo camera packet does not yet exist

TRIGGERDISTANCE=200.0 Set the distance between images. Note that this can come from the flight plan if the following parameter is enabled.

FLIGHTPLANDISTANCE=TRUE Enables specification of a distance between images based on the Piccolo flight plan. The 'user' byte in the Piccolo flight plan (0-255) is used as the distance between images in meters, multiplied by the factor below. This can be set in recent versions of PCC (and a special build of 2.0.4).

FLIGHTPLANDISTANCEFACTOR=1.0 Specifies the distance factor for the flight plan user byte. The user byte is multiplied by this factor to obtain the target distance between images.

FLIGHTPLANDISTANCE=FALSE This will disable using the flight plan based distance field and will use the config file provided flight plan distance.

TRIGGERDEBUG=TRUE Enable triggering debug message.

Note: Triggering modes may not be available in your configuration.

2.6.6 Miscellaneous configuration

PICCOLOMULTITHREAD=[TRUE or FALSE] Use multithreaded serial processing for Piccolo metadata.

USEIJGJPEGLIB=[TRUE or FALSE] Use the Independent Jpeg group jpeg libraries (FALSE uses high performance multiprocessing libraries, which do not seem to have quite as high image qualtiy).

2.6.7 Metadata related configuration

Choose one of the following sources of aircraft metadata:

SERVER=machine:port Piccolo CommSDK Server and port to connect to for Piccolo telemetry (primarily used in simulation) [machine:port or 'disabled']

PICCOLO=serial port number Serial port to connect to for Piccolo telemetry

NMEA=serial port number Serial port to connect NMEA telemetry

METADATABAUD= metadata baud rate, applies to both Piccolo and NMEA serial data, default is 57600 if not specified.

SIMAIRCRAFT= If this parameter is present, simulated aircraft gps and heading will be provided instead of coming from the Piccolo (only however if TERRASERVERSIM is also enabled).. In CIRCLE/TRUE mode, a simulated circle flight is performed, in Sin mode a sine wave flight is simulated. [CIRCLE / SIN / TRUE]

2.6.8 Other simulation related messages

TERRASERVERSIM=[TRUE or FALSE] Enable terraserver simulation mode (retrieves simulated aircraft view images from Terraserver.

2.6.9 Imaging parameters

GROUNDELEVATION= Ground elevation in meters. This is a simple ground datum which is used by the georeferencing calculations, pending a digital elevation map. Default is 0.

WFOVDEGn= Width field of view in degrees of camera n (horizontal image dimension). Repeat for each camera. WFOVDEG= indicates camera 0.

HFOVDEGn= Height field of view in degrees of camera n (vertical image dimension). Repeat for each camera. HFOVDEG= indicates camera 0)

These values should be calibrated for the camera and zoom setting in use. This can be done by aiming the camera at a known target and measuring the geometry.

There is support for field of view for multiple cameras.

Use one line each for WFOVDEGn=k1n and HFOVDEGn=k2n where n=(0,1,2,3,4), and k1n and k2n are the FOV's.

i.e.

WFOVDEG0=45

HFOVDEG0=30

WFOVDEG1=... etc.

HFOVDEG1= ... etc.

WFOVDEG= and WFOVDEG0= are equivalent.

XRESn=xres Set the x resolution for camera n. This is only necessary to be able to georeference the digital camera in independent mode, where georeferencing files are created onboard and archived, otherwise if the image is available the image dimensions will be read from the image file, and this is unnecessary.

YRESn=yres Set the y resolution for camera n. As above.

INDEPENDENTDIGICAM Independent Digital Camera Control Enabled. This allows independent control of an attached digital camera for onboard logging, without downlinking the images. In independent mode, the images are either timed or manually controlled as necessary. This mode can be turned on and off from the ground.

ROTATENADIR=TRUE/FALSE This is a master enable / disable for nadir image rotation which is performed by the ground application. This is the default value for the 'Rotate nadir images' option in the user interface. The default value is FALSE if not specified. This overrides the existing GEOREFENABLE commandline option which enables/disables nadir rotation and production of kml and jgw files on a per camera basis (default is enabled).

GEOREFENABLEn=TRUE/FALSE. This allows disabling production of rotated nadir images (ground side only) and kml and jgw georeferenced image files (ground and aircraft side) for a particular camera channel if desired. This is done on the ground side at the moment. The default is that GEOREFENABLE is enabled for all camera channels.

2.6.10 Image archiving

ARCHIVEPATH=/imagearchive

ARCHIVEDEVICE=/dev/sda1

ARCHIVEENABLED=[TRUE/FALSE]

MINFREEMEGS= Set minimum free megabytes for archiving (Default 5)

These commands set the archive path and specify the archive device (which is used when reading free disk space).

Image archiving is controlled in the SatCamGnd UI through the 'Log images onboard' option.

Enabling this option will send a flag to the aircraft application the next time a photo command is sent.

Jpeg images are logged with the filename format 'Img%dHQ.jpg'.

Metadata is also logged onboard..

A disk space check is performed before logging the image; a minimum of 5 megabytes of disk space is required before an image will be logged.

The current image numbers are saved in nonvolatile storage (as files in the archive path). This allows the imaging system to be powered up in flight / shut off again without destroying previously logged images.

2.6.11 Metadata file format

```
%<Imagefilename> <cameranumber> <ctrlat> <ctrlon> <altitude> <heading> <roll>
<pitch> <xdegperpixel> <ydegperpixel> <upperleftlat> <upperleftlon>
<lowerrightlat> <lowerrightlon> <wfovdeg> <hfovdeg> <latspan> <lonspan>
<LocalTimestamp> <AvionicsTimestamp> <CameraTimestamp>
.\imgarchive\Geo1.jgw 1 0.000000000000 0.000000000000 0.000000000000
0.000000000000 0.000000000000 0.000000000000 0.000000000000 0.000000000000
0.000000000000 0.000000000000 0.000000000000 0.000000000000 57.500000000000
44.000000000000 0.000000000000 0.000000000000 0.000000000000 -306
0.000000000000

<Imagefilename>   Name of the image file (jgw extension)
<cameranumber>    Camera number used for photo
<ctrlat>          Latitude of the image as acquired from aircraft
<ctrlon>          Longitude of the image as acquired from aircraft
<altitude>        Altitude of the aircraft (meters)
<heading>         Heading, degrees
<roll>            Roll angle, degrees
<pitch>           Pitch angle, degrees
<xdegperpixel>    Simple georeferencing x degrees per pixel
<ydegperpixel>    Simple georeferencing y degrees per pixel
<upperleftlat>    Simple georeferencing latitude of upper left corner
<upperleftlon>    Simple georeferencing longitude of upper left corner
<lowerrightlat>   Simple georeferencing latitude of lower right corner
<lowerrightlon>   Simple georeferencing longitude of lower right corner
<wfovdeg>         Width/Horizontal field of view, degrees
<hfovdeg>         Height/Vertical field of view, degrees
<latspan>         Simple georeferencing, span of latitude, degrees
<longspan>        Simple georeferencing, span of longitude, degrees
<LocalTimestamp>  Local timestamp
<AvionicsTimestamp> Avionics timestamp
<CameraTimestamp> Camera timestamp, if supported
```

A very simple 'look down' georeferencing is performed on the images, which can optionally be rotated to north up orientation. The FlightMosaic application can perform a more advanced direct georeferencing orthorectification on images (including oblique images, camera distortions, and terrain correction).

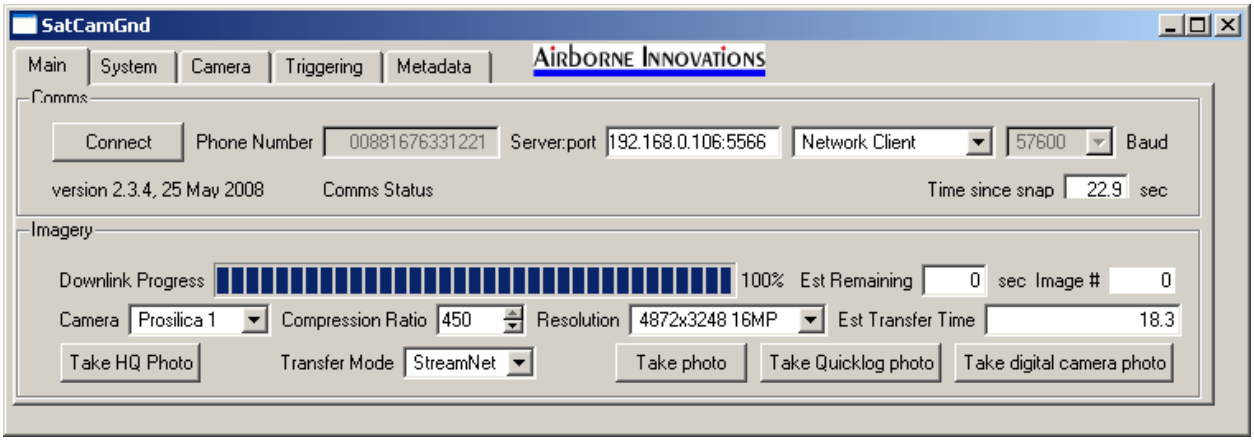
Basic Google Earth KML files are also created for the georeferenced files.

2.7 Ground application usage

2.7.1 Main dialog

Comms section

Connect	Control to initiate / hang up satellite connection
Phone number	Satellite telephone number
Communications mode	Select either Direct Serial Mode (for UHF transparent serial comms), or Iridium Dialup Mode for direct link to Iridium modem.



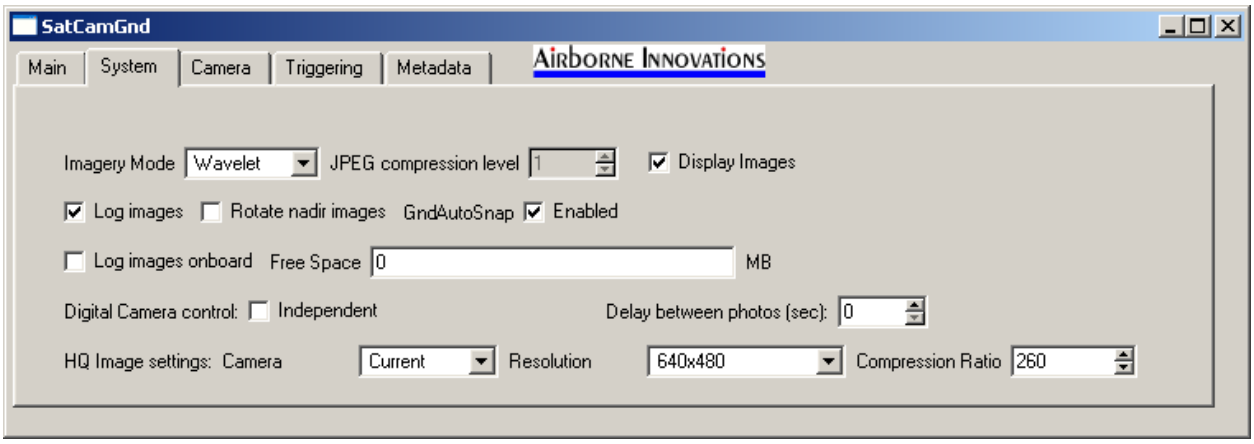
Baud:	Current baud rate setting. Typically 2400 or 9600 for Iridium, 38400 for UHF.
Comms Status	Satcomm dialup status
Time since snap	Time since last snapshot (useful to coordinate flight planning)

Imagery section:

Downlink progress:	Progress bar indicating percentage of image transfer remaining
Est remaining:	Estimated remaining image transfer time
Image #:	Counter displaying current image number
Camera	Control for camera channel (User configured cameras, USB digital, framegrabber channel 1 to 4, Lumenera / Prosilica)
Compression ratio:	Sets the wavelet compression ratio. This can range typically from 50:1 to 450:1. 100:1 is a reasonably high quality, 300:1 is usable quality
Est transfer time:	Estimated transfer time for the current compression ratio setting
Take HQ photo	Take a photo using high quality settings (transfer for an HQ image is always made in reliable mode, 'one time reliable transfer' if set to burst mode)
Transfer Mode	Transfer mode can be burst, reliable, or StreamNet. In burst mode, images are sent as fast as possible to achieve maximum frame rate. In reliable mode, a reliable transfer protocol is used. StreamNet is a new protocol used with IP based radios (Microhard IP921 / VIP radios).
Take photo:	Command a standard photo to be taken
Take Quicklog photo	Allows immediate acquiring and archive of imagery (no transmission)
Take digital camera photo	Take a digital camera photo

2.7.2 System tab

Imagery mode	Type of images transmitted. Wavelet images are high compression but slow to compress. Jpeg images compress quickly but are larger. Wavelet is recommended for lower bandwidths or larger images, JPEG for faster datalinks. There is a chart which shows the tradeoff between these two in the system overview document.
JPEG compression level	JPEG compression level (higher is more compression) for JPEG mode.



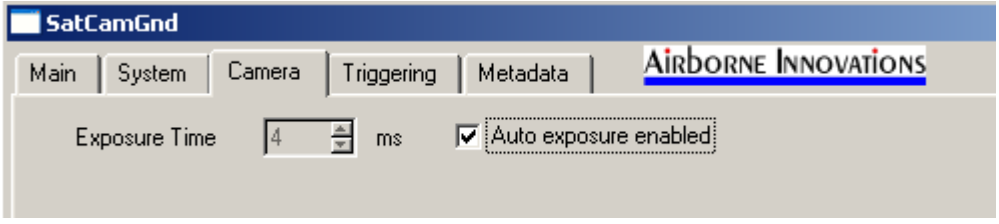
JPEG compression level	The JPEG compression setting used when in JPEG imagery mode.
Display images	Indicates whether the image is displayed when received on the ground side.
Log images checkbox: archived	Enables whether images are logged. For wavelet mode a jpeg version is also

Rotate nadir images checkbox indicates that a rotated 'north up' version of the image is saved if this is enabled (camera is assumed to point to nadir, this can be CPU intensive). This performs a basic north up georectification.

GndAutoSnap: Enable automatic continuous transmission of imagery. Does not apply to distance and other triggering modes.

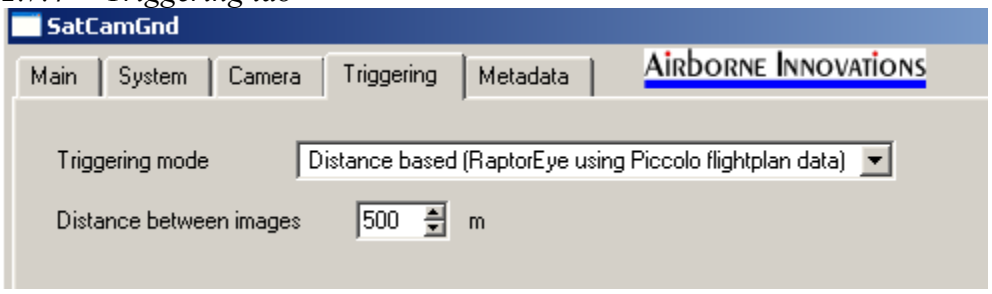
Log images onboard checkbox:	Enables whether images and metadata are logged onboard
Free space	Status of image archive storage space
Digital Camera control:	
Independent:	Allows independent acquiring of onboard multi-megapixel imagery
Delay between photos	Delay between photos (independent digital camera)
HQ Image Settings	HQ mode default settings
Camera	Which camera to use for HQ mode (current indicates no change)
Resolution	Resolution for HQ mode
Compression ratio	Wavelet Compression ratio for HQ mode

2.7.3 Camera tab



Currently has camera exposure settings / auto exposure enable

2.7.4 Triggering tab



The triggering options are as follows:

Camera trigger mode

Continuous, with downlink and ground based triggering

Manual, unimplemented

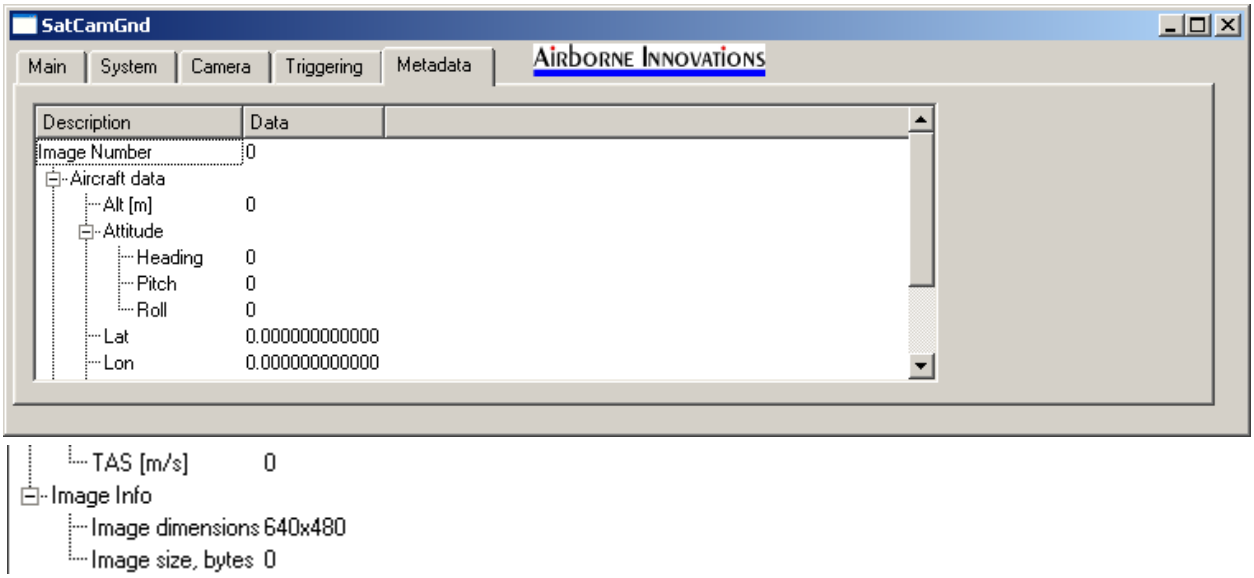
Time based, currently acquires as fast as possible

Distance based (Raptoreye using Piccolo flight plan), functional

Autopilot hardware trigger (Prosilica, Raptoreye metadata), functional

Autopilot hardware trigger (Prosilica, Piccolo camera packet metadata), not implemented

2.7.5 Metadata tab



Displays latest metadata

3 Using user configured digital cameras

The RaptorEye system can be configured to use a number of off the shelf consumer type digital cameras.

3.1 System configuration

In this configuration the system is set up as follows. Two copies of satcamairomp are run, one with the commandline parameter '-snapthread', and one without.

The snapthread copy acts as a second camera control thread. It receives and monitors image acquisition commands from the primary application.

In practice this is done from a script (but you can run the two copies from separate terminal windows for debugging.

Note that you should make sure you have superuser privileges before starting the satcamair application (e.g. enter the sudo su command)

'sat' script:

killall satcamairomp

/satcam/bin/satcamairomp -snapthread &

/satcam/bin/satcamairomp

3.2 Snap scripts

Popular digital camera software can be used to acquire images. When an image needs to be acquired, an appropriate 'snappic' script is run from the application directory. You can customize this and other associated scripts as required to configure it for your particular cameras(s). In fact this is an easy way to add support for a camera that the RaptorEye system does not natively support.

Typical scripts are provided. This script gets called with commandline arguments such as:

snappic n1 n2 n3

where n1 is the camera number (0 for digital camera, 1 for others)

n2 is the resolution code. A script can potentially control the resolution and acquire different resolution images.

n3 indicates 1 for quicklog mode and 0 for quicklog mode disabled. The quicklog function acquires an image at high resolution and archives it (no transmission).

example

snappic 0 5 0

Your script can potentially connect to different camera channels, change resolutions, etc. if your cameras support this.

Also note that the 'Take HQ photo' button will call the snappic script with the camera channel and resolution defined for the HQ mode camera. Typically this is used to provide rapid image transfer of small size images followed by a high resolution capture (and slower transmission).

3.3 Independent digital camera support

An independent digital camera can also be configured for onboard archiving only. The 'snappicinddig' script is called when it is time to trigger an image for this camera.

3.4 Consumer digital camera support

A quick note about consumer digital cameras-- The abilities of the system to deal with these cameras varies widely. Some cameras are supported very well and some are not. The application can successfully trigger image capture and image transfer for a number of cameras, but quite a number are not well supported. Our experience so far has been mixed, with cameras like the Canon S2 IS being pretty well supported, and others not as well (e.g. Canon SD1000 cannot trigger captures). Abilities and driver support vary widely so it is necessary to test the camera before committing to it. In general consumer cameras are not designed for realtime acquisition and transfer, but you may be able to make one work with some careful configuration and setup. Typically they also require intricate procedures such as powerup in a particular manner (e.g. turn the camera on, then plug in the cable).

Some cameras have excellent support and you can even control zoom settings, turn off the flash, set exposure time, etc.

Many digital camera manufacturers have been implementing PTP interfaces, and a generic PTP driver is also available.

We recommend a high performance industrial camera like the Prosilica range rather than a consumer / prosumer camera.