QUICK START GUIDE
HARRIER IP CAMERA INTERFACE BOARD

Introduction

This guide is designed to get you quickly up and running with the **Harrier IP Camera Interface Board** (AS-CIB-IP-SOC-001-A or AS-CIB-IP-SOC-002-A) together with the Harrier Ethernet Connection Board (AS-CIB-IP-IFETH-001-A or AS-CIB-IP-IFPOE-001-A). The Harrier IP camera interface solution can be purchased as a pre-assembled camera module with the Harrier 10x/36x/40x/55x AF-Zoom Camera, the Sony FCB-EV series cameras and the Tamron MP3010M-EV camera (e.g. AS-CIB-IP-001-3010-A, figure 1).

This document should be read in conjunction with the datasheets of the Harrier IP Camera Interface Board and the Harrier Ethernet Connection Board.

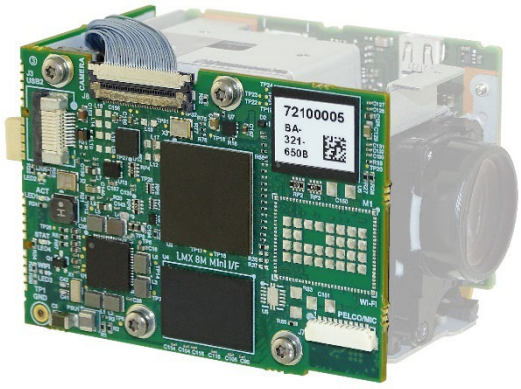

Figure 1. Harrier IP Camera Interface Board and Ethernet Connection Board mounted on a Tamron camera

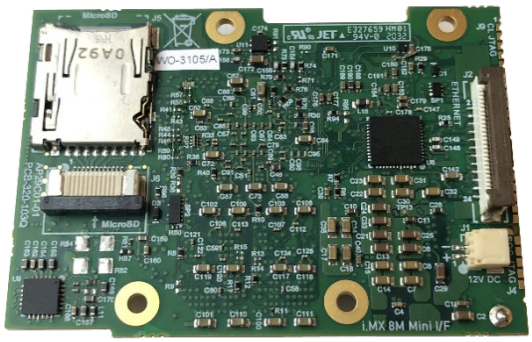

Figure 2. Reverse side of Harrier IP Camera Interface Board

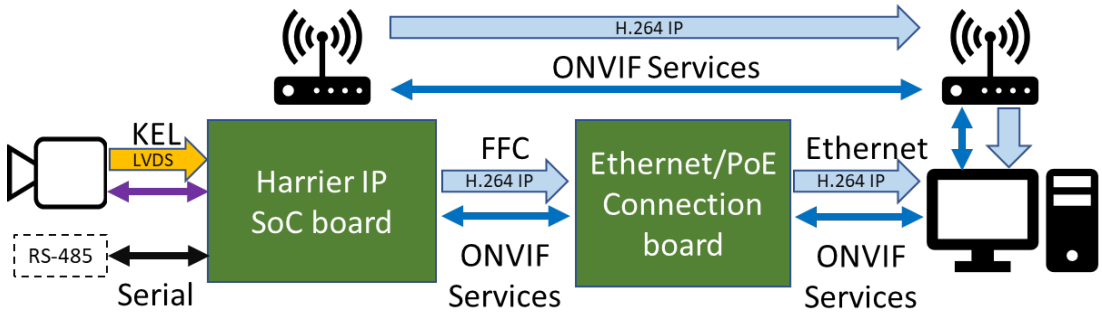

Figure 3. Harrier IP camera system block diagram (wireless/PoE features are optional).

Evaluation Kit Contents

The Evaluation Kit for Harrier IP (AS-CIB-IP-001-EVAL-A) contains all the parts needed to evaluate the Harrier IP Camera Interface Board. Note that the evaluation kit does not include a Harrier IP Camera Interface Board or camera, these need to be ordered separately.

Please check that you have all the parts listed below:

- Multi-region 12V power supply (please fit the adapter suitable for your region).
- 2 Ethernet interface adapter cables (Molex/JST connector to RJ45 socket, figure 4).
- Power adapter cable (barrel socket to 4-way JST connector, figure 5).
- Two Wi-Fi antennas with MHF4 connector (figure 6).
- 30-way micro-coax KEL cable (figure 7).
- 24-way FFC (0.5mm pitch with same side connection, figure 8).

Figure 4. Ethernet interface adapter cables

Figure 5. Power adapter cable

Figure 6. Wi-Fi antenna with MHF4 connector

Figure 7. KEL cable

Figure 8. FFC cable

Setting up the Boards

If you have purchased a pre-assembled camera you can skip this step.

1. Connect the Harrier IP Camera Interface Board (SoC board J2) to the Harrier PoE/Ethernet Connection Board (J1) using a 24-way 0.5mm pitch double ended (same side contacts) FFC cable. Ensure that the cable is connected the right way round.
   For the SoC board (J2) the metal contacts should face towards the microSD socket (see figure 2).
   For the connection board (J1), the metal contacts should face the PCB.
2. Connect the SoC board (J8) to the camera LVDS output using a KEL 30-way microcoax cable.
3. To avoid damage the boards must be securely mounted so that the cables are not strained.

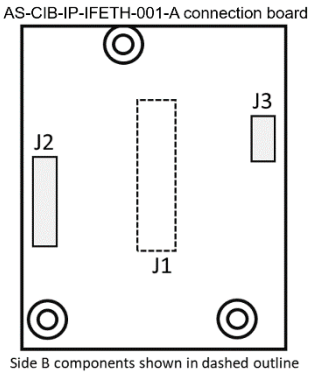

Figure 9. Harrier Ethernet Connection Board

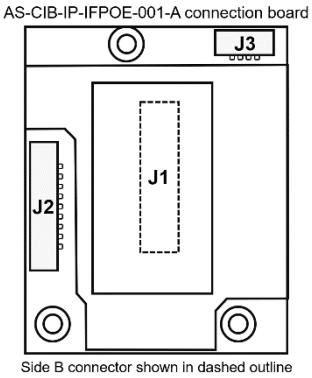

Figure 10. Harrier PoE Connection Board

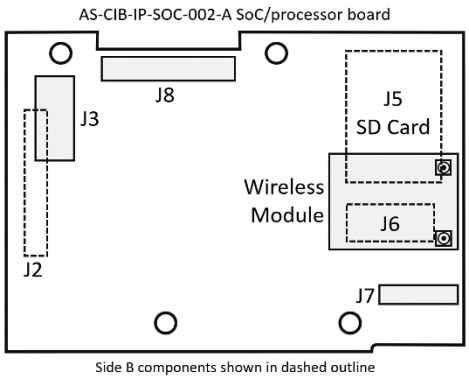

Figure 11. Harrier IP Camera Interface Board (SoC board)

Figure 12. Harrier IP Camera Interface Board mounted on Harrier 40x AF-Zoom Camera with Harrier PoE Connection Board and heatsink

DHCP Server Software

If the Harrier IP Camera Interface Board is set up to get an IP address from a DHCP server, and you want to set up a point-to-point connection between the Harrier IP Camera Interface Board and a PC, you will need to run a DHCP server on the PC. The DHCP server software must be configured to work at the IP address of the Ethernet port the Harrier IP Camera Interface Board is connected to.

An example of suitable DHCP server software application is Tftp64 which is available at:

http://tftpd32.jounin.net

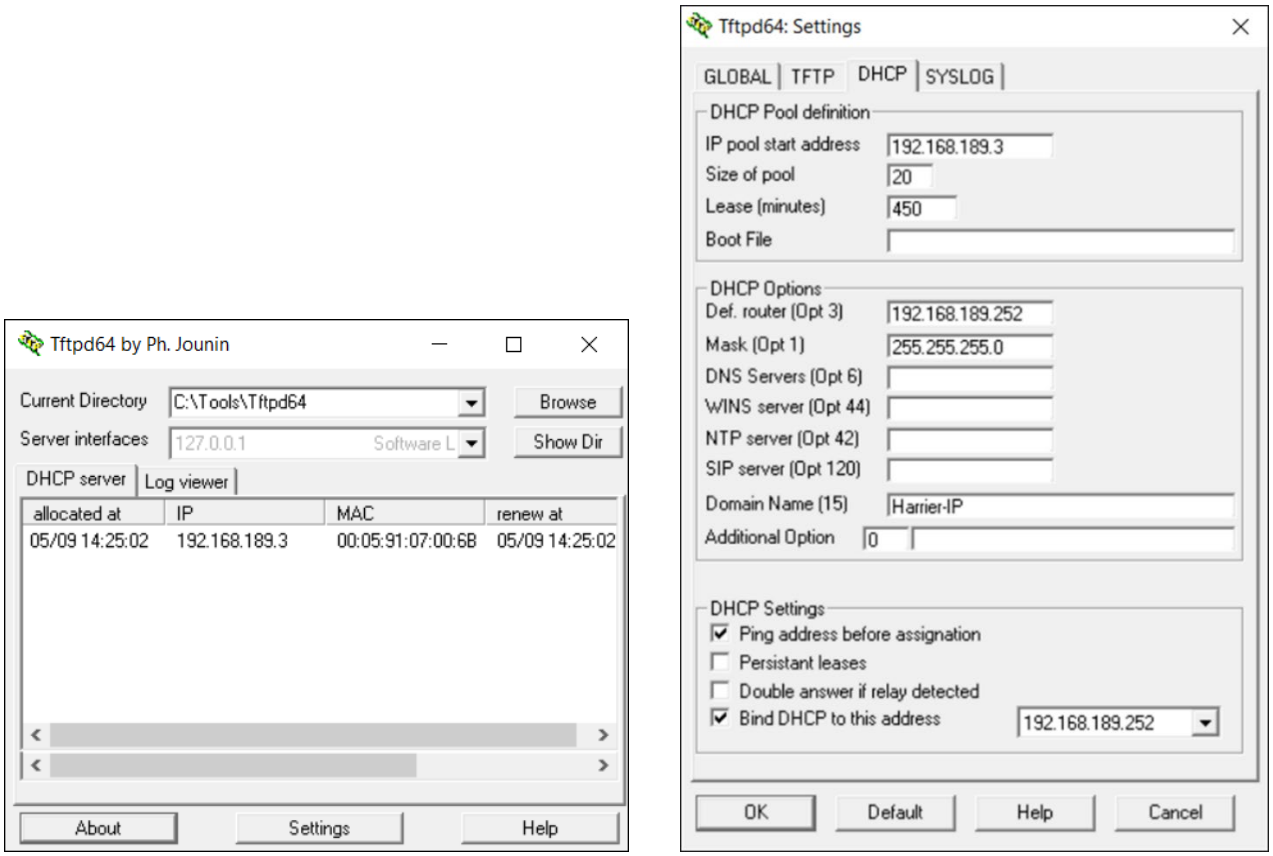

Figure 13. Screen shots from Tftpd64 DHCP software (including settings)

Quick Start - Harrier IP powered via regular power supply (IP-001/2)

1. Download the ONVIF Device Manager from https://sourceforge.net/projects/onvifdm/
2. Connect the correct power socket adapter to the multi-region power supply.
3. Connect the JST connector on the power adapter cable to J3 on the Harrier Ethernet Connection Board. Connect the barrel connector plug on the multi-region power supply to the power adapter cable barrel socket.
4. Connect the JST connector on the Ethernet interface adapter cable to J2 on the Harrier Ethernet Connection Board. Plug a CAT 5/6 cable, connected to a live network with DHCP server, into the Ethernet interface adapter cable's RJ45 socket.
   Note: the Harrier Ethernet Connection Board requires the interface adapter cable with the JST connector for the Ethernet connection. The Molex connector is slightly larger (1.2mm pitch) than the JST connector (1mm pitch).
5. When you are connected to a live network, connect the multi-region power supply to mains power. The board and camera will now power up. A blinking LED indicates network activity.
6. On a PC connected to the same network/subnet, use the ONVIF Device Manager application to locate the camera and find out its IP address (open application, click on refresh). Make a note of the IP address.
   Note: by default, the Harrier IP Camera Interface Board is configured to use a DHCP server so there must be an active DHCP server on the network, otherwise the Harrier IP will not have an IP address. On the very first power up the Harrier IP board will also have an additional fixed IP address of 192.168.189.100. Once you have selected a network configuration for the board (DHCP or fixed) this additional address will no longer be available.
7. View the streaming video from the Harrier IP Camera Interface Board using the ONVIF Device Manager or a suitable media player application (e.g. VLC media player or GStreamer).
   Use **rtsp://<IP address>:8554/quality_h264** to connect to the camera.

Quick Start - Power over Ethernet (PoE) used to power your Harrier IP (IP-003/4)

1. Download the ONVIF Device Manager from https://sourceforge.net/projects/onvifdm/
2. You will need a CAT5e/6 cable and a PoE enabled Ethernet port.
3. Connect the Molex connector on the Ethernet interface adapter cable to J2 on the Harrier PoE Connection Board. Note: the Harrier PoE Connection Board requires the Ethernet interface adapter cable with the Molex connector for the Ethernet connection. The Molex connector is slightly larger (1.2mm pitch) than the JST connector (1mm pitch).
4. Plug the CAT5e/6 cable into the Ethernet interface adapter cable's RJ45 socket and connect it to a live network with DHCP server. The board and camera will now power up and a blinking LED indicates network activity.
5. On a PC connected to the same network/subnet, use the ONVIF Device Manager application to locate the camera and find out its IP address (open application, click on refresh). Make a note of the IP address. Note: by default, the Harrier IP Camera Interface Board is configured to use a DHCP server so there must be an active DHCP server on the network, otherwise the Harrier IP will not have an IP address. On the very first power up the Harrier IP board will also have an additional fixed IP address of 192.168.189.100. Once you have selected a network configuration for the board (DHCP or fixed) this additional address will no longer be available.
6. View the streaming video from the Harrier IP Camera Interface Board using the ONVIF Device Manager or a suitable media player application (e.g. VLC media player or GStreamer). Use **rtsp://<IP address>:8554/quality_h264** to connect to the camera.

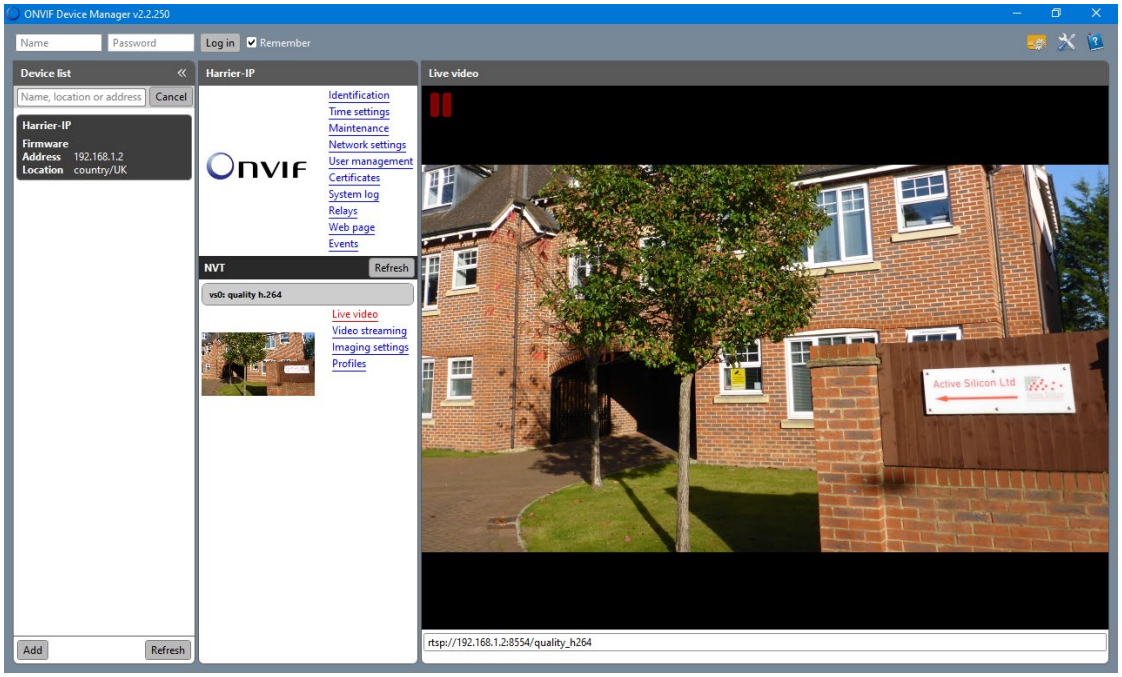

Figure 14. ONVIF Device Manager connected to Harrier IP camera

Discovering the IP Address of the Camera

Finding out the camera's IP address requires the ONVIF Device Manager application.

By default, the camera is configured to request an IP address from a DHCP server so unless the configuration has been changed, the IP address will be automatically assigned by the DHCP server. On the very first power-up the Harrier IP board will also have an additional fixed IP address of 192.168.189.100. Once you have selected a network configuration for the board (DHCP or fixed) this additional address will not be used.

To discover the IP address:

- Ensure the camera has powered-up correctly and is connected to the network.
- Ensure your network service/Ethernet router is running a DHCP server.
- Launch the ONVIF Device Manager.
- Click the Refresh button. The camera will appear on the Device List showing the IP address.

Alternatively, you can connect the camera to the network, then check the DHCP service and list the allocated IP addresses for all of the attached devices; the Harrier IP will appear as **imx8mmharrier**.

If the DHCP service is not easily accessible (or the IP address has been set and is currently unknown) an application that scans all the IP addresses in the whole subnet range can be used. The IP address of the Harrier IP Camera Interface Board has usually been set to be within the sub net range of the Ethernet port so it will appear in the list of devices connected to the network when the address range is scanned.

An example of an IP address scanning application is Advanced IP Scanner which is available at:

http://www.advanced-ip-scanner.com

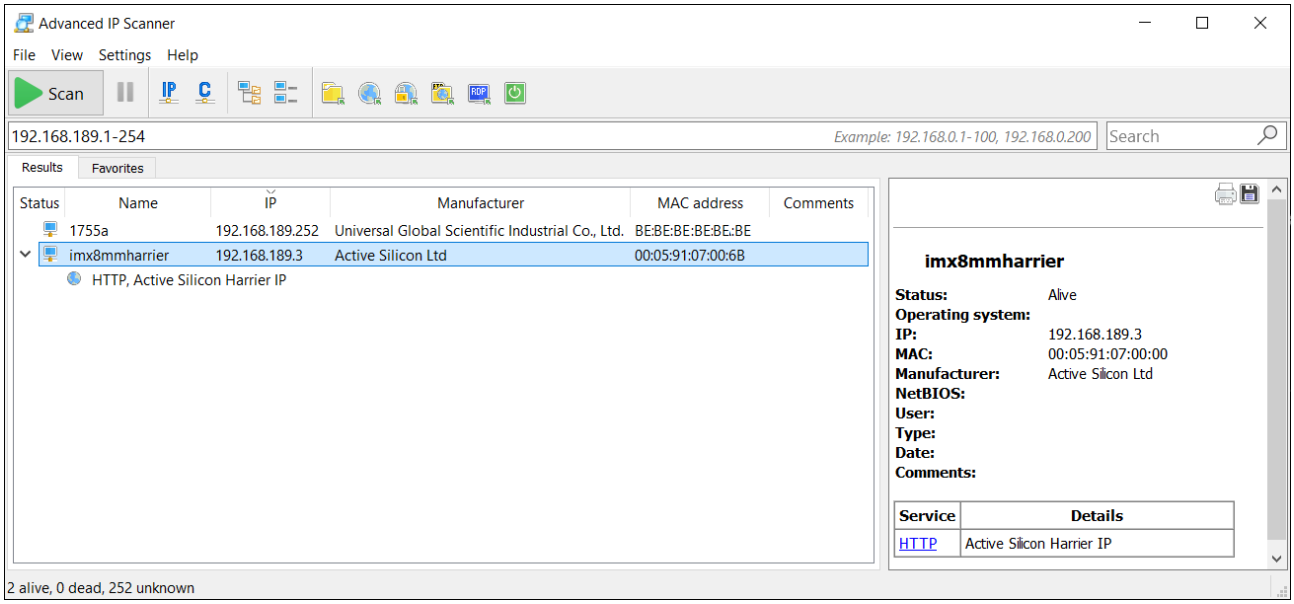

Figure 15. Screen shot of Advanced IP Scanner application showing Harrier IP connection.

Accessing the Harrier IP Website

The Harrier IP Camera Interface Board serves a website that can be used to access system information and control various settings. There are several pages on the site; these show the camera status and allow various settings to be changed (e.g. IP address, camera mode, etc.). The camera log file can be retrieved on the Maintenance web page.

To access the Harrier IP Website, enter: **http://<IP Address>** into your web browser.

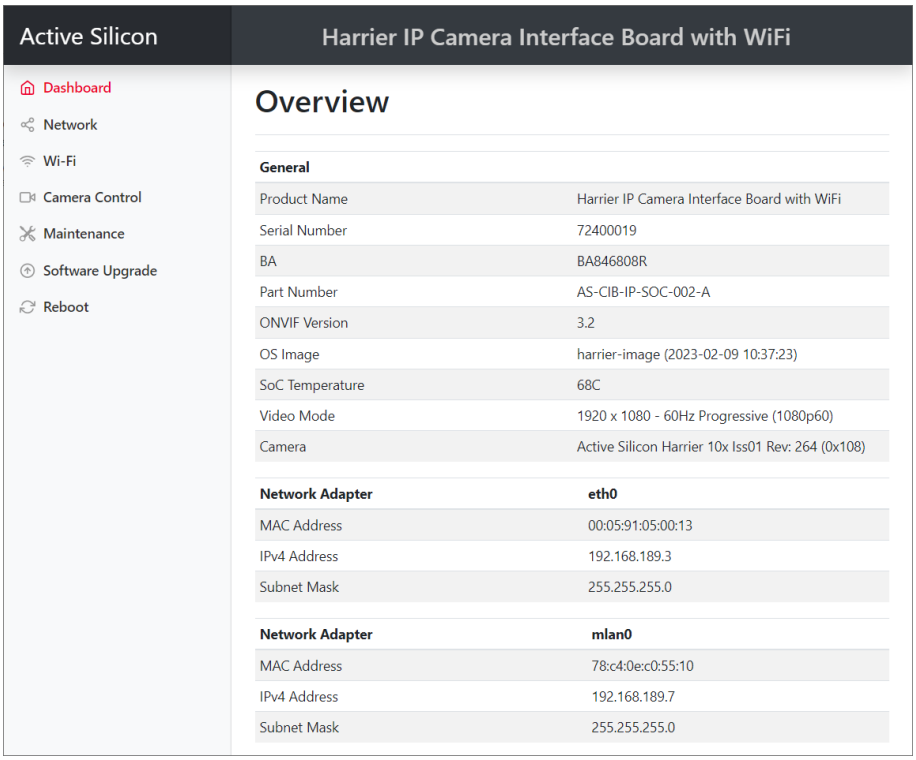

Figure 16. Harrier IP Overview/Dashboard web page

Assigning a Fixed IP Address

A fixed IP address can be set on the Harrier IP Website (Network Settings page) served by the Harrier IP Camera Interface Board.

- In your web browser, enter: **http://<IP Address>** to access the Harrier IP Website.
- In the menu click the 'Network' option to select the Network Settings page.
- Edit the network settings and then click on 'Submit' to change the settings.

Note: when you click on 'Submit' the IP address will change, and you will need to use the new address to access steaming video and the Harrier IP Website.

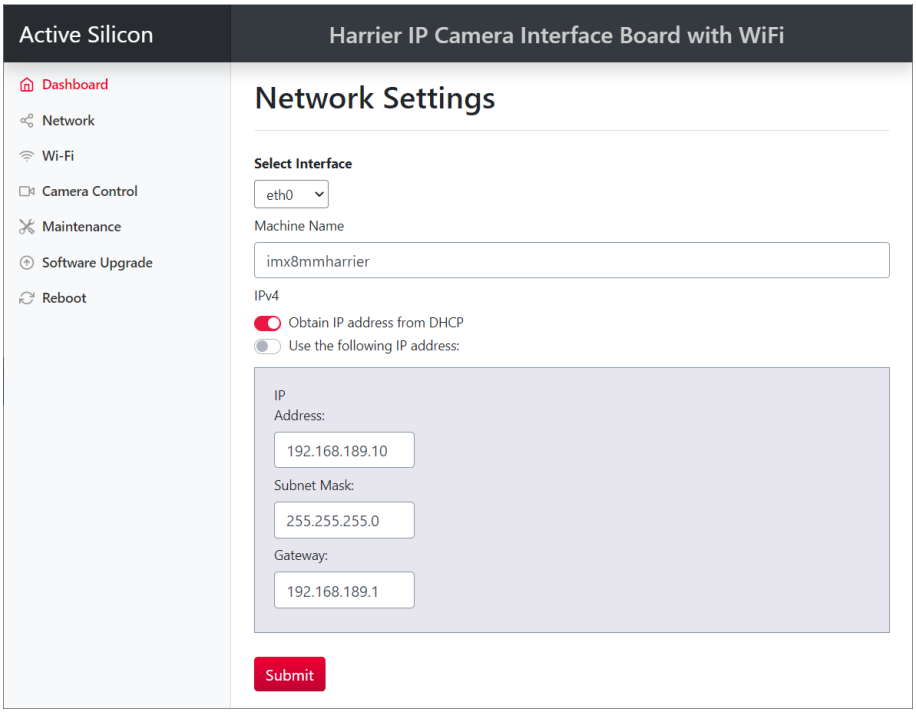

Figure 17. Harrier IP Network Settings web page

When setting fixed IP addresses please ensure that the address is correct and that you make a record of the new address before making the change as it can be very difficult to locate a device at an unknown/incorrect IP address.

Note: on the very first power up the Harrier IP board will also have an additional fixed IP address of 192.168.189.100. This address is used to configure/program the board/camera when being manufactured. Once you have selected a network configuration for the board (DHCP or fixed) this additional address will not be used unless you set it manually (as above).

Viewing Video Streams

To view streaming video from the Harrier IP Camera Interface Board you will need a media player such as VLC media player or GStreamer. Streams can also be viewed in the ONVIF Device Manager. There are three default stream profiles available:

- quality_h264
- balanced_h264
- bandwidth_h264

The profile to be displayed on the player is specified in the stream connection:

rtsp://<IP address>:8554/<profile>

Using VLC Media Player

- Install and open VLC media player. (https://www.videolan.org/vlc/index.en.html)
- From the Media menu, select Open Network Stream
- In the Open Media dialog, enter **rtsp://<IP address>:8554/quality_h264**
- Click the Play button

Using GStreamer

- Install GStreamer and open a command prompt or shell. (https://gstreamer.freedesktop.org/download/)
- Run the following command:

```
gst-launch-1.0 rtspsrc location=rtsp://<IP Address>:8554/quality_h264 latency=0
! decodebin ! autovideoconvert ! autovideosink sync=false
```

Note: to make GStreamer work on Windows, you may need to update the 'PATH' environment variable and set the GStreamer environment variable; for example:

```
set GSTREAMER_1_0_ROOT_X86_64=c:\gstreamer\1.0\x86_64\
set path=%path%;%GSTREAMER_1_0_ROOT_X86_64%\bin;
```

Managing Camera Streams

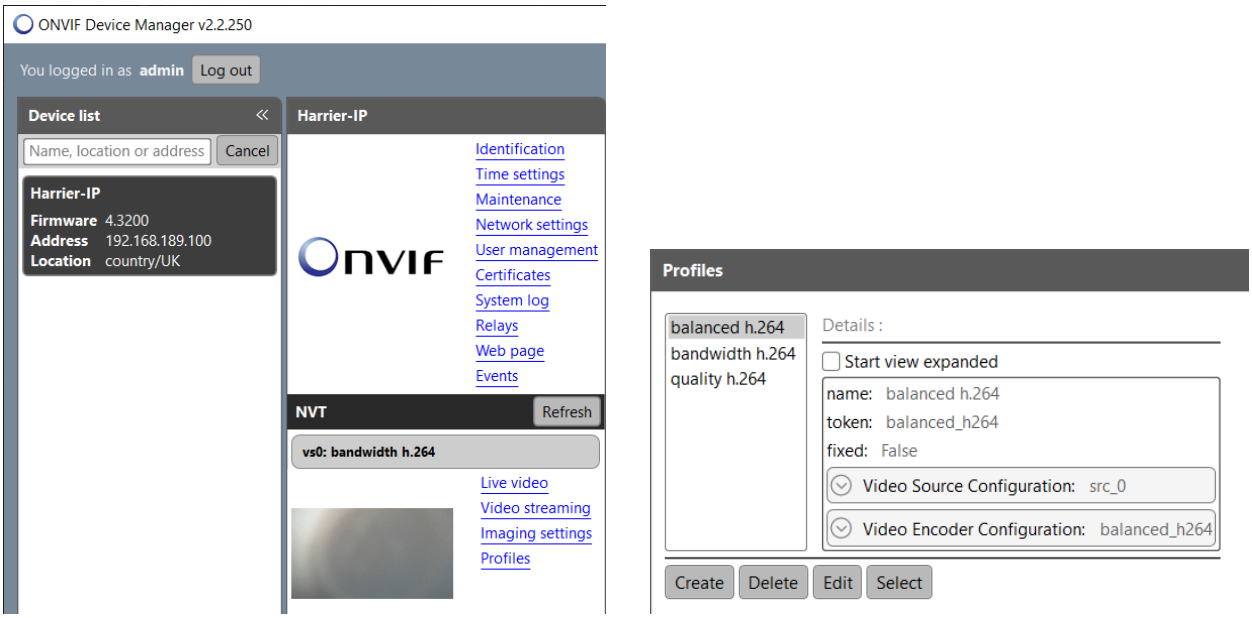

Figure 18. ONVIF Device Manager main menu and Profiles window

The three default video stream profiles are accessible in the ONVIF Device Manager (ODM) **Profiles** menu.

From here you can select the video stream profile that you wish to use/display in ODM.

Each profile stores a set of encoder settings for the video stream. By default, these three profiles are populated with settings appropriate to the video profile name:

- Quality h.264 - highest quality image, where high quality appearance is a priority.
- Bandwidth h.264 – lower quality image, where low bandwidth is a priority.
- Balanced h.264 – settings to give a balance of quality and bandwidth.

Selecting the video profile in ODM will set the encoder to the settings stored in the profile and select the correct stream to display. Once the video profile is selected the individual settings (bitrate, etc.) can be changed by the user using the **Video Streaming** menu in ODM (figure 19). They can also be changed by ONVIF API calls from another ONVIF based application or in house developed software. When the encoder settings are changed, the video stream configuration is updated and the change to the profile is automatically stored in the interface board; next time the video profile is selected it will apply the stored profile encoder settings to the video stream.

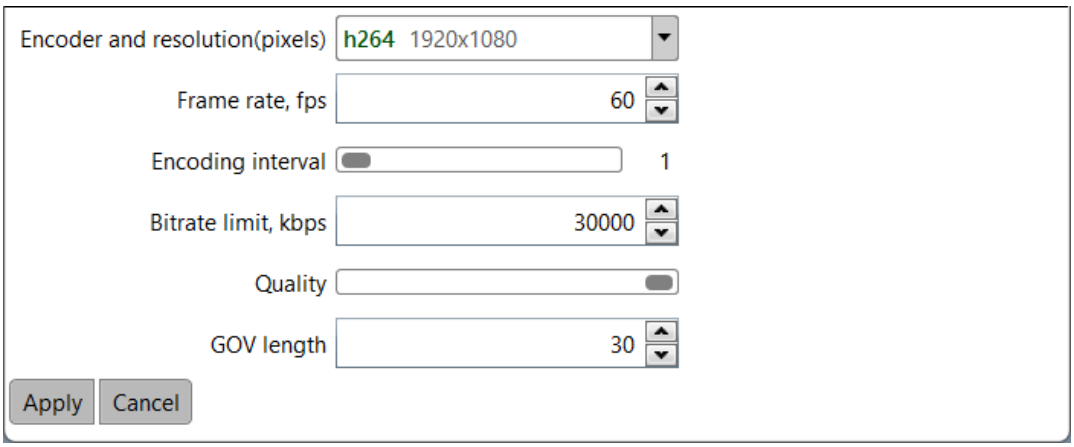

Figure 19. ONVIF Device Manager Video Streaming menu

New user video profiles can also be created.

To do this in ODM, select the **Profile menu** and click on **Create**.

Give your user video profile a suitable name. ODM will automatically generate a unique token for the stream name (token_*xxxx*) that will be used in the URI.

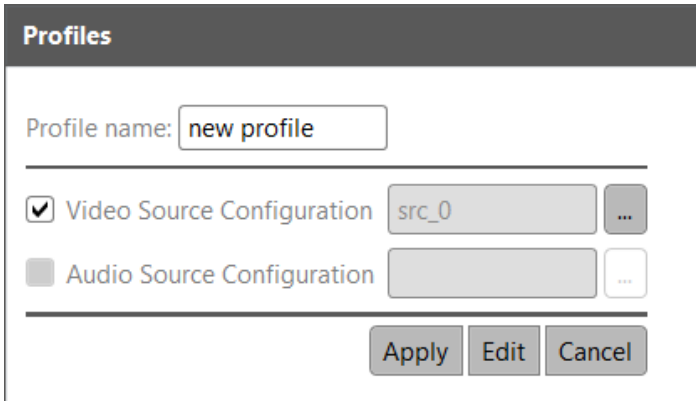

Figure 20. Creating a new user video profile

There is only one video source, and this is selected by default. The camera resolution and frame rate are set from the Harrier IP Website and cannot be changed from ODM; when the camera video mode changes it will change for all user profiles.

Select **Edit** (see figure 20).

Tick the Video Encoder Configuration box, and click on the '**...**' button (figure 21).

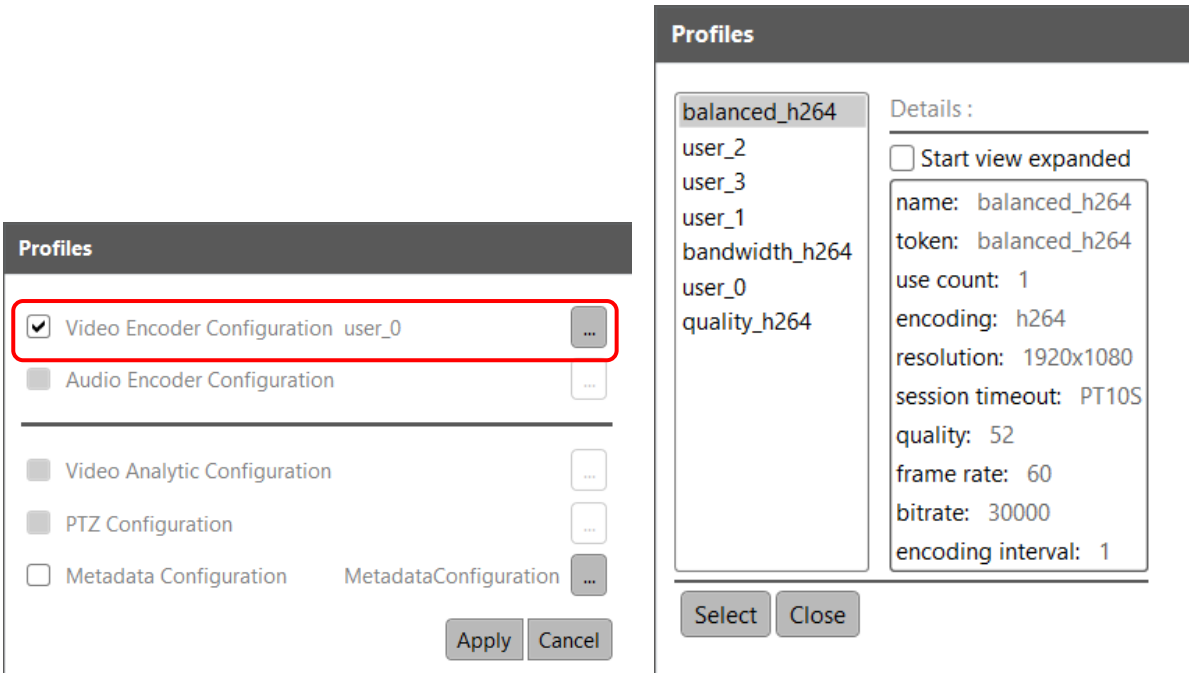

Figure 21. Selecting a base video profile for the user video profile

The Harrier IP Camera Interface Board offers seven base video profiles that are used to save the encoder settings. Select a base video profile that has not been used already (user_0 to 3).

Click on **Select**. The selection window will close and return to the previous view.

Click on **Apply**. The window will close and return to the **Profiles** menu view.

From here you can select your new profile and click on **Select**.

The **Live video** will switch to the video stream you have created (rtsp://192.168.189.99:8554/token_*xxxx*). You can edit the encoder settings for your new user video profile (and video stream) in the **Video Streaming** menu. Any changes made will be saved to the newly created profile.

This process can also be applied from a host application using the ONVIF API.

Controlling the Camera

The ONVIF standard defines and supports control for various camera settings and client applications should use the ONVIF Imaging service to control these camera settings (please consult the ONVIF documentation for more information, see section ‘Getting Started with the ONVIF API’ below).

However, block cameras typically have many other settings/features that can be controlled using VISCA commands sent over the camera serial interface (see figure 3). With the Harrier IP Camera Interface Board, applications can use the ONVIF DeviceIO service to send and receive VISCA commands to the camera. Note: applications should not use VISCA commands to change settings that are controlled by the ONVIF Imaging service (e.g. camera resolution and frame rate).

Controlling the Camera via the Harrier IP Website (Evaluation Only)

For evaluation purposes the Harrier IP Website Maintenance and Camera Control pages provide a simple way to control the camera:

- In your web browser, enter: **http://<IP Address>** to access the website.
- From the menu on the left-hand side, select the ‘Camera Control’ page (figure 22)
- On the page there are buttons for some simple camera commands (e.g. zoom, image flip, etc.) and a text entry box/submit button for sending VISCA commands to the camera.
- From the menu select ‘Maintenance’ to go to the Maintenance web page (figure 23).
- From here you can reset to default settings, change the video mode and re-boot the camera.

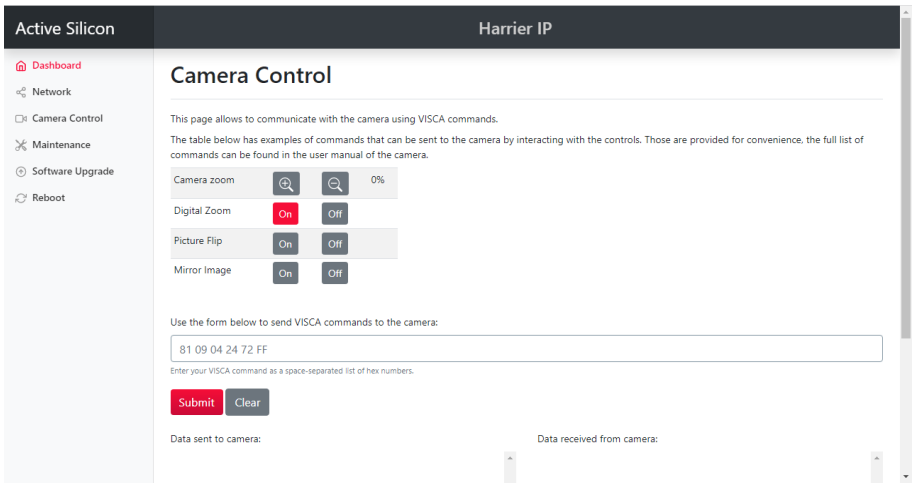

Figure 22. Harrier IP Camera Control web page

The text entry box (see figure 22) allows VISCA commands/inquiries to be sent to the camera, enabling full control of all camera features (white balance, defog mode, etc.).

Note: the camera resolution and frame rate settings should not be changed using VISCA commands; the Maintenance web page should be used for this function.

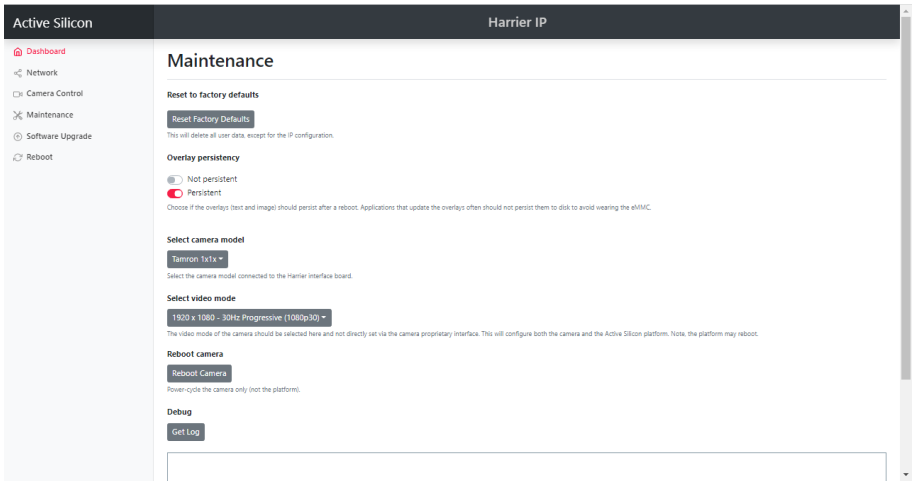

Figure 23. Harrier IP Maintenance web page

Using the Harrier IP Serial Ports

The Harrier IP has two serial ports that may be used by the client application via the ONVIF DeviceIO service.

Function *GetSerialPorts()* is used to query the list of available ports.

Function *SendReceiveSerialCommand()* is used to send and receive data to the port.

Refer to the ONVIF DeviceIO specification for details.

GetSerialPorts() will return two serial ports:

- SERIAL_PORT_000: this port is connected to the block camera (for VISCA communication).
- SERIAL_PORT_001: this port is connected to the RS-485 port on connector J7 (see figure 11).

J7 Connector: JST A10SUR10 series, example connecting cable A10SUR10SUR32W152A			
PIN	**SIGNAL**	**PIN**	**SIGNAL**
1	Microphone GND	6	Reserved
2	Microphone +	7	GND
3	Microphone -	8	RS-485 B
4	Microphone GND	9	RS-485 A
5	Reserved	10	Reserved

Table 1. Pinout of PELCO/MIC (J7) connector

Setting up a Wi-Fi connection

If your Harrier IP Camera Interface Board supports Wi-Fi it will have a wireless module fitted and it will have a serial number that starts with 724. The title of the Harrier IP Website will also indicate that the board has Wireless/Wi-Fi support.

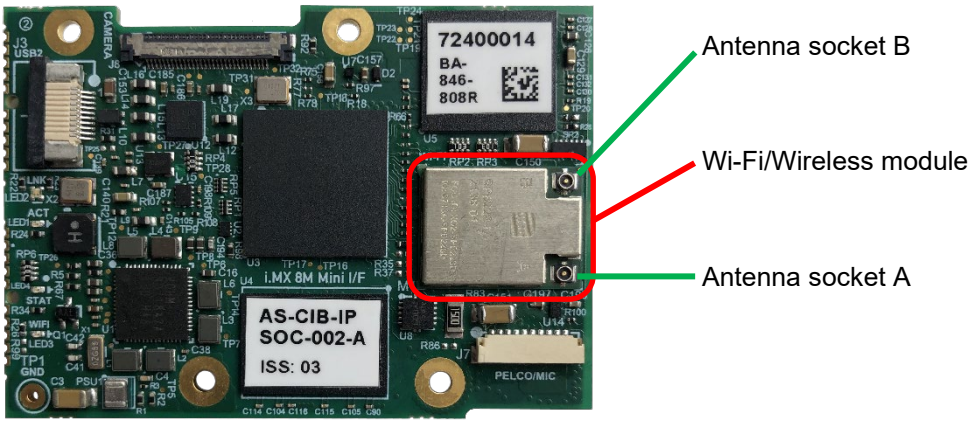

Figure 24. Harrier IP Camera Interface Board with Wi-Fi/wireless communications module fitted

In order to receive Wi-Fi signals there must be at least one antenna fitted to the wireless module. The antennae fit to the small micro-coaxial MHF4 connectors (A and B) on the module.

To set up a connection to a wireless network:

- Fit a suitable antenna to the MHF4 connector A or B (or to both).
- Using an Ethernet cable and the Ethernet adapter, connect the Harrier IP to a network (for details see previous sections).
- In your web browser, enter: **http://<IP Address>** to access the Harrier IP Website.
- From the menu select the 'Wi-Fi' option to go to the Wi-Fi Settings page (note this page does not appear with non-wireless versions of the board).
- Click on the 'Scan' button.
- When the scan completes, open the drop-down list that is next to the Scan button to select a network.
- Enter the password for the network and select connect.
- The Harrier IP will connect to the network and update the Wi-Fi status on the page.
- The network SSID and password will be saved and used next time the Harrier IP is powered up. Only one SSID and password is stored.
- Most wireless networks include a DHCP service so the IP address of the board is assigned by the wireless network when the Harrier IP connects to it.

By default, the Harrier IP wireless connection is set to obtain its IP address from a DHCP server so the wireless network you connect to must be running a DCHP server. To change this, you need to access the Network Settings web page, select the wireless interface, change the setting to 'Fixed IP address', set a fixed IP address value and then click on Submit. When setting fixed IP addresses please ensure that the address is correct and that you have a note of it before changing it as it can be very difficult to locate a device at an unknown/incorrect IP address.

Note: when you click on 'Submit' the IP address will change, and you will need to use the new address to access steaming video and the Harrier IP Website.

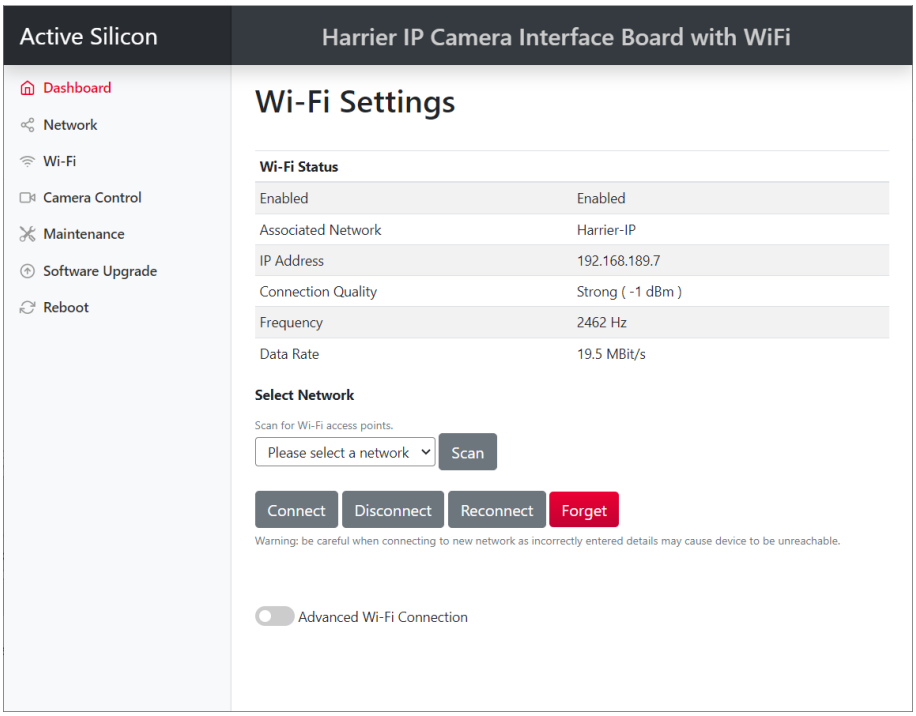

Figure 25. Harrier IP Wi-Fi Settings web page

Getting Started with the ONVIF API

The Harrier IP implements the ONVIF Profile S standard (www.onvif.org). The main services and their functions are listed below.

- Media service: allows control of the H.264 encoder settings and the on-screen display (OSD) features such as text and graphical overlays.
- Device IO service: provides direct communication to the camera and RS-485 serial interfaces. The camera serial interface enables the application to communicate with the camera using the VISCA protocol, thus providing full control of the camera. The RS-485 serial interface enables the application to communicate with external devices (e.g. motor controllers, sensors, etc.).
- Imaging service: enables the application to control some of the camera settings (e.g. brightness, etc.). Only a subset of the block camera settings can be controlled this way, but this service enables an ONVIF-compliant third-party software to control them.
- Device Management service: provides control of the Harrier IP system (e.g. time and date, etc.).

For examples of how to implement the text/graphical overlays and VISCA camera control please see the Harrier IP Example Software.

Useful links:

https://www.onvif.org/profiles/profile-s/

http://www.onvif.org/wp-content/uploads/2016/12/ONVIF_WG-APG-Application_Programmers_Guide-1.pdf

https://www.youtube.com/watch?v=mk6vAyIZZ0A&list=PLc2UaWzFQrPN7XNq2mAkVdsMkRCI0BMML&index=3

Downloads

ONVIF Device Manager: https://sourceforge.net/projects/onvifdm/

VLC media player: https://www.videolan.org/vlc/index.en-GB.html

GStreamer: https://gstreamer.freedesktop.org/download/

DHCP server application: http://tftpd32.jounin.net

IP address scanning application: http://www.advanced-ip-scanner.com

Firmware Updates

The Harrier IP firmware is easily updated over the Ethernet interface using the Harrier IP website: Software Upgrade page.

You can sign-up to receive notifications of new firmware versions from any Harrier IP product page on the Active Silicon website (black button “Receive Firmware Update Notifications”).

Technical Support

In case of any issues, please contact Active Silicon Technical Support by email on:

techsupport@activesilicon.com.

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Email: info@activesilicon.com
Website: www.activesilicon.com

18-Feb-2025, Harrier H.264 IP CIB ASL