



User Manual

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Revision History

Version	Date	Description
0.8	25-Sep-07	Initial Release
0.10	17-Oct-07	Updated for SW version App-NXP_0_10: Rx LEDs follow Tx
0.0.19	04-Feb-08	Registration, association, TPC, AFS
0.0.20	13-May-08	Update new TPC
1.0.21	18-Sep-08	Changed from Canary to Pashosh Changed to new application code and new user interface
1.0.22	18-Nov-08	Updated UI to comply with App 1.3.5
1.0.23		Updated for Sparrow4
1.0.24	1-April-09	Roy Korin: updated for Seagull and (preliminary) for Shaldag
1.0.25	June 08 2009	Roy Korin: updated for application version 1.4.25
1.0.26	June 28 2009	Added comment about pixel clock in 'Troubleshooting' and section 5.1
1.0.27	Sept 21 2009	Updated back to normal Shaldag-Seagull version. Updated trouble shoot for wrong input port issue

Certification & Compliance - FCC

- This product is for indoor use only in the band of 5.15-5.25GHz.
- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- Any changes or modifications not expressly approved by Amimon for compliance could void the user's authority to operate the equipment.
- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
 - Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and receiver.
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
 - Consult the dealer or an experienced radio/TV technician for help.
 - **Caution:** The module should be positioned so that personnel in the area for prolonged periods may safely remain at least 20 cm (8 in) in an uncontrolled environment from the module.

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1. Purpose

This document explains the required steps needed for setting up a link with AMIMON's WHDI™ Development Platform.

This is a basic user's guide that includes troubleshooting and a description of the basic features of the system that should allow the user to establish a video link and control the system

This document refers to systems running Pashosh with MAC version 1.5.35/1.3.35 and on, Shaldag with MAC version 3.0 and on, with application (Seagull) version 1.4.25 and on.

2. The System

The system consists of a Tx part and an Rx part. Each of the parts is comprised of a box, a 5V 2A DC power supply and 3 main board components:

- A wireless board, that contains the antennas, the RF components and the Baseband (BB) chip. The wireless board can be one of the following:
 - **Canary** (AMN1110/AMN1210) – First generation board, based on Amimon 1st generation BB and Maxim RF transceivers
 - **Pashosh** (AMN11310/AMN12310) – Second generation board, based on Amimon 1st generation BB and Amimon single-chip RFIC
 - **Shaldag** – Third generation board, based on Amimon 2st generation BB and Amimon single-chip RFIC
- An interface (also called ‘application’ or ‘I/O’) board which is the audio-video input/output board. The interface board is called **Seagull**, and is numbered AMN_PCB_117/118
- A User-Interface board that has LEDs and buttons. (AMN60)

Note: The functionality and operation described in this document is identical to all three possible wireless boards, unless specifically noted

2.1 Tx side

2.1.1 Wireless Tx board

The Canary/Pashosh/Shaldag wireless Tx board is the transmission part of AMIMON's wireless system. The board has 5 printed antennas, 4 of which are for transmission and 1 is for reception of the back-channel. In addition there is one uplink reception diversity antenna. The board also contains the RF components, the Baseband Tx chip and the MAC microprocessor. On the Shaldag board the MAC microprocessor is embedded inside the BB chip. It is connected to the Seagull interface board through a WHDI connector. The wireless board receives its power supply from the Seagull interface board through the WHDI connector.

2.1.2 Seagull Interface Tx Board

The Seagull Interface Tx board is used to connect from the various sources to the wireless link. It contains the following video and audio inputs:

- 2 HDMI inputs
- VGA input (optional)
- Stereo I²S audio (optional)
- Optical SPDIF audio input (optional)

Seagull board supports the following Amimon's wireless module (see fig 1.a):

- Canary (via J12)
- Pashosh (via J12)
- Shaldag (via J15)

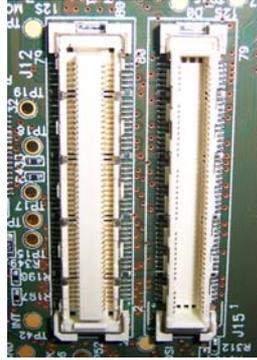


Figure 1 – wireless modules connectors

- The board also contains a remote control IR receiver port (optional) that will be supported with later SW versions.
- The power supply of the Seagull board is 5V 2A center positive DC power.

2.1.3 User Interface board (AMN060)

The AMN060 User Interface (UI) board is used to perform several operations, such as registration, display link status etc. Figure 2 shows the picture of the Interface board, that later on in this document will be illustrated as a schematic drawing for clarity. Please refer to chapter 5 for a description of the various LEDs and buttons use and indications.



Figure 2 - User Interface Board

2.2 Rx side

2.2.1 Wireless Rx Board

The Canary/Pashosh/Shaldag Wireless Rx board is the reception part of AMIMON's system. The board has 5 printed antennas, 4 of which are for reception and 1 alternates between reception and transmission of the back-channel (uplink). The board also contains the RF components, the Baseband Rx chip and the MAC microprocessor. On the Shaldag board the MAC microprocessor is embedded inside the BB chip. It is connected to the Seagull interface board through a WHDI connector. The wireless board gets its 5V power supply from the Seagull interface board through the WHDI connector.

Note: To ensure optimal performance please make sure that the antennas are not blocked by any object, both on Tx and Rx sides

2.2.2 Seagull Rx Interface Board

The Seagull Rx Interface board is used to interface to the various displays and destinations of the wireless link. It contains the following video and audio outputs:

- HDMI output
- Stereo I²S audio (optional)
- Optical SPDIF audio input (optional)

Seagull board is supporting the following Amimon's wireless modules (same as fig 1.a):

- Canary (via J12)
- Pashosh (via J12)
- Shaldag (via J15)

- The board also contains a remote control IR receiver port (optional) that will be supported with later SW versions.

- The power supply of the Sparrow board is 5V 2A center positive DC power.

2.2.3 User Interface board (AMN60)

See section 2.1.3 above

3. Setting-up a Link

3.1 Enabling communication to the wireless module

Seagull boards can work with Canary, Pashosh and Shaldag application boards. Canary and Pashosh use I2C protocol with the Seagull board, while Shaldag uses SPI protocol. The Seagull boards contain Dip Switch to select I2C/SPI communication. In case using Pashosh/Canary, dip switch 1 should be set to 'On' (as the figure below). In case using Shaldag dip switch should be off.

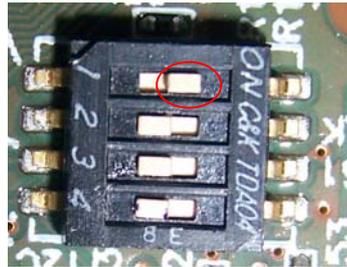


Figure 3 – SW6

3.2 Basic Link Set-Up

To create a link, follow the below procedure:

- Connect the Tx module to a video source using an HDMI cable. Use HDMI 0 port by default (this is Shaldag based system default)
- Connect the Rx module to a display (monitor/TV/projector) using an HDMI cable.
- Connect the power supplies to both Tx and Rx modules. Ensure that the power switches are off.
- Power on the Tx using the power switch and wait for the status LEDs (L2) to turn on. They should be red if no source is connected and turn green if a legal source is connected and the video resolution is identified. Refer to section 5.5 for more information.
- In case the source is off, turn it on and make sure it is set to output a legal resolution (refer to section 4.1). The status LEDs (L2) on the Tx should turn to green once the source was recognized and the transmission is set and (refer to section 5.5).
- Make sure your display is on and set to the right input source.
- Power on the Rx using the power switch. L1 yellow LEDs should turn on once association is completed and the link is connected (refer to section 5.5). Link establishment process may take 10-15 seconds.
- Once link is established, RX L2 LEDs should turn green, and there should be audio and video reception on the display.
- In case the display has only a DVI port and the Rx can be connected to a display via an HDMI to DVI cable. Refer to section 5.7 for explanation on setting DVI mode.

4. System Configuration

4.1 Supported resolutions

The Sparrow system currently supports video formats up to and including:

- 720p 60fps
- 1080i 60fps
- 1080p 24fps/30fps
- 1080p 60fps (Shaldag system)

The system is configured to automatically recognize the resolution, and adjust accordingly. Switching sources and resolutions once the link is set is legal, and the system should adjust automatically, although this may result in a few frames of blank video and may take a few seconds. The system is also capable of recognizing the color space (RGB/YCbCr) and adjusting accordingly.

4.2 HDMI

To ensure full support and optimal performance, the HDMI (or DVI) source and display connected to the WHDI Reference Design system should support EDID and HDCP, and should provide the necessary 5V DC voltage as specified by the HDMI requirements.

5. User Interface

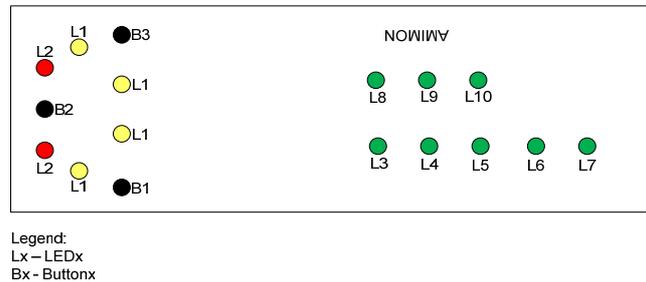


Figure 4 – User Interface General View

5.1 Video Input selection

Toggle between video input ports – HDMI 0, HDMI 1, VGA, Component

- **Button**
 - On Tx with Pashosh wireless board – short press on B1
 - On Tx with Shaldag – no selection can be done via the keypad. Default port is HDMI 0
- **LEDs:** according to section 'Video-in status Tx & Rx' below

Note: In some older Shaldag system, short press on B1 button will reverse the output pixel clock polarity, and only HDMI 1 is available. This is a temporary solution.

5.2 Video input status Tx & Rx

- No video input (Rx & Tx) – L2 red
- Unsupported video input (Rx & Tx) – L2 blinking red (future implementation)
- Video input exists and legal (Tx, and if link exist then Rx as well) – L2 green

5.3 Registration (both Tx and Rx)

Registration is the process where the Tx and Rx exchange a public key and generate a unique master key that is stored in non volatile memory.

Registration needs to be done only once for each pair of Rx and Tx. After successful registration the registered Tx and Rx can create link only with each other and cannot link with other devices.

Note: A system sent from Amimon will already be registered

- **Button:** To start the registration process, apply a long press (3 seconds) on B2 of both Tx and Rx.
- **LEDs:** Upon successful registration a link will be established and L1 LEDs should turn solid yellow. L2 will be solid red in case there is no video input or solid green in case of video input.

5.4 Association (Tx & Rx)

Association is the link set-up phase between two registered devices. The Tx and Rx create session keys using the master key that was created during registration.

- **Button:** *Association starts automatically upon power-up.* If for some reason manual association is required (mostly for debug purposes), apply a long press

on the B1 button on one of the boards to start association. Applying a long press on B1 when link is already in progress will disassociate. After disassociation the system will automatically try to re-associate.

- **LEDs:** L1 is solid yellow once link is established.

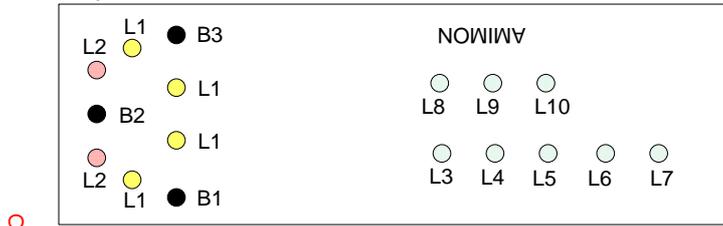


Figure 5 - User Interface for Association

5.5 RF frequencies table selection

It is possible to configure the system to work with 3 different frequency pre-defined tables, which are stored by default in the wireless board. The tables contain the certified frequencies per the following regions: MIC, ETSI, FCC

To select a frequency table, follow the procedure below:

Press on the required buttons according to the table below and only then power up the Seagull board. Wait until L2 LEDs are blinking.

1. Release the pressed buttons.
2. The Application will continue the boot process and will start working with the desired frequency table
3. The Application keeps the table ID on its local EEPROM, so next boot same frequency table will be used

Press one of the following buttons combinations before powering on the board

Buttons combinations			Freq group (according to region)
B1	B2	B3	
0	0	1	MIC
0	1	0	FCC
0	1	1	ETSI

5.6 Manual Transmission power (Tx only)

By default, the transmission power is set automatically. If for some reason the automatic setting needs to be overridden, you may use the interface to disable the TPC (Transmission Power Control) and set the transmission power manually.

- **Button:** a short press on B3 will disable TPC and set fixed output power setting. additional press will increment the power according to the following power Steps: 11, 14, 17, 20 & 8 dBm
- **LEDs:** LEDs L6, L5 & L3 indicate the power level of the Tx in binary mode. L6 marks LSB and L3 marks MSB. Upon power change the relevant LEDs will blink for a few seconds

5.7 Manual frequency selection

By default, the transmission RF frequency is decided automatically by the system's Automatic Frequency Selection (AFS) mechanism, out of the pre-defined frequency table. It is possible to disable AFS and select the frequency manually.

Note: Currently this feature is enabled only with Pashosh wireless boards.

- **Button:** a short press on B2 will disable AFS and set fixed transmission frequency. Each press will switch to the next frequency in the pre-defined frequency table.
- **LEDs:** LEDs L6, L5 & L3 indicate the selected frequency in binary mode. L6 marks LSB and L3 marks MSB. Upon frequency change the relevant LEDs will blink for a few seconds

5.8 Broadcast mode (both Tx and Rx)

This mode is used to set the system to broadcast mode. In this mode the Tx sends the video unencrypted so any Rx that is set to broadcast mode can receive the video without going through registration. Please note that even if HDCP is enabled in the system – it will not work in broadcast mode. Setting broadcast mode is registered in an EEPROM in the system and will remain even if powered down. In order to return to unicast mode, repeat the process.

- **Button:** Upon power up keep pressing all 3 buttons until L2 is blinking in red (do it both for Tx and Rx). Repeat (upon power-up) to return to unicast.
- **LEDs:** L1 will blink slowly when in broadcast mode.

5.9 Link exists (both Tx and Rx)

After Link setup the Tx should transmits video frames and the Rx should receives them. The following is the link indications:

- MAC does not response – L1 blink fast.
- MAC response but no LINK – L1 off.
- Link is active unicast – L1 solid.
- Link is active broadcast – L1 blink slowly.

5.10 Communication error (both Tx and Rx)

If there is a system error (such as bad I²C/SPI communication between the MAC and the application), there will be a system error indication.

- **LEDs:** L1 fast-blinking yellow

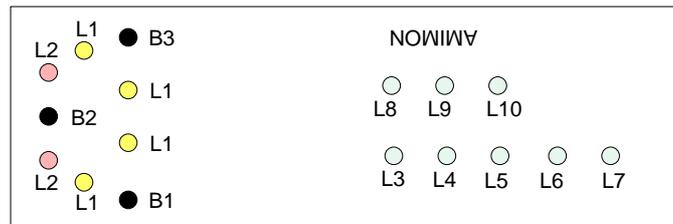


Figure 6 - LEDs for System Error Indication

5.11 DVI mode (Rx Only)

In case the display has only a DVI port and the Rx is connected to a display via an HDMI to DVI cable, you should set the Rx in DVI mode which removes the audio from the link. This mode can also be used to mute an HDMI link.

- **Button:** A short press on B3 sets the Rx in DVI mode (default mode is HDMI). An additional press returns the Rx to HDMI mode.

6. Basic Troubleshooting

Before proceeding to the common troubleshooting procedures below make sure that Tx, Rx, source and display are powered, connected and on. Then proceed:

Issue:

No video:	Check the status of the Link LEDs:
LEDs off	Make sure the power is connected and devices are on
Tx L2 red	Make sure the <u>source</u> is on, connected to the HDMI port and outputting a legal resolution. Try to switch the input to the other HDMI port. Connecting a valid video to the right HDMI port should switch the LEDs from green to red.
Rx L2 red	Make sure the Tx is transmitting (L2 on Tx is green), and check if the devices were pre-registered. Make sure that if L2 is green on the Tx, it turns red when pulling out the HDMI cable. If not – the input selected is probably component or VGA. Switch to HDMI by applying a short presses on B1 until HDMI port is selected.
Tx or Rx L1 (Yellow LEDs) blinking fast	Hardware issue: check connection between wireless and interface boards. Check the correct state of dip switch 1
Rx L2 green, but no image on screen	Make sure the display is connected, on and set on the right channel/source
Tx and/or Rx L1 blinking slow	<ul style="list-style-type: none"> • One or more of the link sides are in broadcast mode. If only one of them is in broadcast mode a link will not be established. Either set both to broadcast mode or both to unicast mode • If both are in broadcast mode intentionally, make sure your source is not an HDCP source. Broadcast mode does not support HDCP content.
Bad Picture	<ul style="list-style-type: none"> • Make sure the HDMI cables used are intact and that you get a good picture by connecting the source directly to the display by an HDMI cable (bypassing the WHDI link). • Make sure nothing is touching or blocking the antennas • Try restarting the link
'Dot noise' around color transitions	<ul style="list-style-type: none"> • In Shaldag only – Randomly the system may power on with reversed polarity of the pixel clock output. Apply a short press to B1 on the Seagull Tx keypad board
Bad Audio/No Audio	<ul style="list-style-type: none"> • Make sure the volume on the receiver is on • Make sure that the source is outputting legal audio formats (the system currently does not support HD audio) • Make sure you are not in DVI mode and you are not using DVI cables anywhere in the link • If there are mutes during the link, try restarting the link • Make sure there are no wireless phones in the area that use the 5.8 GHz band, as some of the phones on the market use sub-standard transmission schemes.
Other Issues / Unresolved Issues	If any other issue occurs or if the above issues persist, try powering off both Rx and Tx and repeating the link set-up process

