

AJA IPR-10G2-HDMI – Release Notes v2.2

Firmware for IPR-10G2-HDMI v2.2

Introduction

This is the fourth release of firmware specifically for IPR-10G2-HDMI. Version 2.2 introduces “System Modes” via the browser interface, whereby users can quickly and easily choose the outcome they desire based on their facility or workflow; i.e. choosing between a requirement for lowest latency vs. greatest level of protection, etc.

Each System Mode when invoked, applies a predetermined combination of parameters across “Video Clock Mode”, “Packet Protection Mode”, “Frame Sync Mode” and “Audio Sample Rate Converter.”

**f.k.a. “Hitless Mode”*

Features, Updates and Improvements in v2.2

- UHD support now available up to 50p.
Note: ST 2022-7 is supported up to 1080 60p (i.e. redundancy does not extend to UHD).
- UHD up to 30p supports YCbCr 4:2:2 10-bit, UHD up to 50p supports YCbCr 4:2:0 8-bit.
 - Reminder: HD up to 60p supports either YCbCr 4:2:2 10-bit or, RGB 4:4:4 10-bit.
- Reference In functionality activated
 - Provides ability for IPR-10G2 Receiver to receive a Black Burst/Tri Level reference signal and thus output baseband video that is locked not to PTP, but instead locked to local baseband equipment.
- PTP Optimizations and other low level bug fixes.
- Added four primary “System Modes” for quick, simple setup for specific outcomes:
 - System Mode 01: “PTP Low Latency”
 - With ideal network conditions, provides an effectively zero latency solution in a LAN environment.
 - System Mode 02: “PTP Protected”
 - Provides the highest level of protection at both the Frame and Packet-Level, including redundancy support with ST 2022-7.
 - System Mode 03: “Gateway”
 - Bridging between PTP and Reference Video domains with Frame-Level protection.
 - System Mode 04: “Gateway Protected”
 - Bridging between PTP and Reference Video domains with both Packet-Level and Frame-level protections in place, including ST 2022-7.
- Added two non-production System Modes for testing/troubleshooting/teaching or advanced configurations.

- System Mode 05: “Asynchronous”
 - When unable to lock to PTP, or experiencing problems with Reference In, switching to “Video In” can be useful for verifying Video is being Received from the specified source address.
- System Mode 06: “Advanced” (an Advanced configuration could be production-ready, depending on the network environment and other bespoke factors)
 - Provides free-range access to the “Video Clock Mode”, “Packet Protection Mode” “Frame Sync Mode”, “System Mode” and “Audio Sample Rate Converter”, but there will be no guard against a user applying contradictory settings that could provide unpredictable results. The “Advanced Mode” has no native defaults of its own. Rather, upon invocation it shall retain the settings of the previous “System Mode” it was set to, and the user will proceed with customization from those predetermined selections.
- “Video Clock Mode” has been more clearly defined.
 - “PTP”; clock is based on house GrandMaster PTP (facility/enterprise-class PTP Generator necessary for critical production needs).
 - “Ref In”; clock is based upon incoming black-burst or tri-level sync (only available on IPR-10G2 models).
 - “Video In”; clock is based upon received input (in the case of IPRs this is the arriving ST 2110 Video).
 - “Freerun”; clock is based on IPR’s internal crystal, used mainly for testing, teaching or demonstration purposes rather than production.
- “Packet Protection Mode” replaces “Hitless Switching Mode”. New choices are “Dual Stream” (per ST 2022-7), “Single Stream”, or “Bypass”:
 - “Dual Stream”; Protection against dropped packets, out-of-order packets, network jitter, and network redundancy per SMPTE ST 2022-7 (Hitless Switching) on dual 10GbE links.
Note: “Dual Stream” requires that each network leg is being supplied to one of the two physically separate SFP + cages on the IPR.
 - “Single Stream”; Protection against, out-of-order packets, and network jitter on a single 10GbE link (without dual network paths ST 2022-7 cannot be used).
Note: no dropped packet recovery with “Single Stream” selected.
 - “Bypass”; No Packet Protection, which reduces latency, but will prevent both packet reordering and redundancy via ST 2022-7. Will also decrease jitter tolerance, and may mean image quality/stability could become compromised.
Note: “Dual Stream”, and “Single Stream” modes both afford protection against; out-of-order packets and network jitter. But, only “Dual Stream” also supports recovery from dropped packets and network redundancy per SMPTE ST 2022-7 (Hitless Switching).
- “Frame Sync Mode” has been more clearly defined. Frame-Level Synchronization choices are “Enabled”, or “Bypass” (“Bypass” replaces “Direct Out” as the label for this functionality):
 - “Enabled”; Frame Syncing functionality will automatically smooth out the visual impact of network interruptions, including dropped frames, either by:
 - “Hold Last Frame” if the entire next frame is delayed, not available, or has unrecoverable packet errors or lost packets.
 - Dropping or adding a frame if mismatched frame rates.
 - “Bypass” (fka “Direct Out”); No frame syncing takes place, which reduces latency, but may mean image quality/stability could become compromised.

Note: In essence the “Frame Sync Mode” is designed to compensate for when the Input and Output Video Pixel Clocks are mismatched. Plus the Frame Sync can also realign synchronous video to the SMPTE Epoch.

Also, note: “Hold Last Frame” functionality does not require “Dual Stream”, and can also be supported on a single link.

- “Audio Sample Rate Converter” has been more clearly defined.
 - “Bypass”; No audio sample rate conversion takes place. For example, when both Receiver and Transmitter are using the same PTP source, no ASRC is necessary.
 - “Enabled”; Will automatically smooth out the impact of mismatched audio sample rates, which may otherwise surface up as audible clicks and pops.

Note: In essence the “Audio Sample Rate Converter” does an analogous job to the “Frame Sync Mode” in that it is also designed to compensate for when the Input and Output Audio Sample Rates are mismatched.
- PTP GrandMaster Capable has been more clearly defined.
 - This feature allows the AJA IP Receiver to act as a GrandMaster PTP source, mainly for testing, teaching or demonstration purposes rather than production. For real-world production, AJA strongly recommends using a facility/enterprise-class PTP Generator.
 - When “PTP GrandMaster Capable” is set to “PTP”, then it should be noted that by default the “Video Clock Mode” will be set to “Free Run”, thus IPR is using its internal crystal to create PTP timing.

Important Hardware Upgrade Notes

Earlier models of IPR-10G2-HDMI are feature complete as of version 2.1 firmware. Attempting to update to v2.2 firmware will result in the error message “this firmware is not for this device”. If you encounter this message and wish to make use of the v2.2 firmware update, please contact AJA Customer Support (see end of this document for contact details).

Features, Updates and Improvements in Previous Releases

Version 2.1

- Added NMOS registry status information to web status display.
- Added Ref Input Format to web status display.
- Automatically switch Input Stream Selection to NMOS/Ember+ on connection change.
- Changed NMOS to use DNS-SD and MDNS priorities.
- Fixed bug with DHCP Client where it would sometimes not obtain an IP address.
- Fixed bug with Media2 where it would show a link even when disconnected.
- Fixed NMOS IS-05 connection management issues with some clients.
- Fixed a field inversion issue with Interlaced video formats.

Version 2.0.1

- Fixed an issue with PTP GrandMaster Mode.

Version 2.0

- Initial Firmware release for IPR-10G2-HDMI and IPR-10G2-SDI.
- SMPTE ST 2110 IP Video and Audio to HDMI Converter with hitless switching (-7) support.
- Quiet, rugged, fanless, compact design.
- Essence support: SMPTE ST 2110-10, 2110-20, 2110-21, 2110-30.
- NMOS for Discovery, Registration, Control (according to standards IS-04 v1.2 & IS-05 v1.0).
- AJA REST API or Ember + v1.6.2 for Control.
- 1x 1 GigE RJ45 socket (with status light) for network (LAN) control and status.
- 1x USB 2.0 Mini-B Interface.
- 2x SFP+ Cage for 10 GigE Ethernet media, control, and timing input (SFP+ modules not included).
- Full size HDMI 1.4b video output: Deep Color 30-bit video per pixel (24-bit also supported).
- HDMI video output capabilities up to 1920x1080 60p, YCbCr 4:2:2, or RGB 4:4:4.
- Full 10-bit pixel processing pipeline.
- Embedded HDMI audio support up to 8-channel output.
- Analog audio support Up to 2-channel output.
- Built in web server for full remote control and configuration (Control Port or Media Ports).
- Quick network setup with AJA eMini-Setup software v2.0 onwards (via USB):
<https://www.aja.com/family/software#eminisetup>
- For additional information, please refer to the IPR-10G2-HDMI section of the AJA website:
<https://www.aja.com/products/mini-converters/ipr-10g2-hdmi>
<https://www.aja.com/products/mini-converters/ip-converters>

Initial Setup, Control and Updating Firmware

Please see the combined manual for all ST 2110 Transmitters and Receivers “10 GigE IP Mini-Converters” for further details.

There are two methods available for initial setup and updating firmware for IPR-10G2-HDMI:

- Web Browser on host computer connected to the same network as the IPR-10G2-HDMI.
- AJA eMini-Setup application running on host computer directly connected to IPR-10G2-HDMI via USB.

Web Browser – Configuration, Control and Updates

Please see the combined manual for all ST 2110 Transmitters and Receivers “10 GigE IP Mini-Converters” for further details.

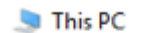
Note: Safari is the preferred web browser for control on the Mac, and additionally Chrome and Firefox on Windows. Other web browsers may work, but AJA cannot guarantee consistent operation for all web browsers or web browser versions.

IPR-10G2-HDMI requires a network connection for initial configuration, control and firmware updates. 10 GigE IP Mini-Converters are shipped from the factory with DHCP enabled, and support automatic network discovery via SSDP and MDNS.

1. Connect IPR-10G2-HDMI Control Port to the intended network with Ethernet cable.
2. The intended network's DHCP Server will assign an IP address and the IP Mini-Converter will join that network.
3. Locate and connect to the AJA IP Mini-Converter.

Windows PC host:

- a. Open Windows Explorer.
- b. Navigate to Network.
- c. Click on Network to enumerate network devices.
- d. Search for either "IPR-10G2" or the device's Serial Number.
- e. Double click on the intended IP Mini-Converter.
- f. The host machine web browser will launch and display the web GUI for the device.

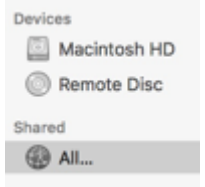


This PC

Network

Mac host:

- a. Go to System Preferences > Sharing and turn on File Sharing
- b. Open Finder Window
- c. Navigate to Shared > All...
- d. Click on All... to enumerate network devices
- e. Search for either "IPR-10G2" or the device's Serial Number.
- f. Double click on the intended IP Mini-Converter.
- g. The host machine web browser will launch and display the web GUI for the device.
- h. If the above does not work, then you will need to download and install an MDNS browser to assist with discovering network devices on a Mac host.



4. Leaving the IP Mini-Converter browser tab open, open a new browser tab and check the AJA website for new firmware:

<https://www.aja.com/products/mini-converters/IPR-10G2-HDMI#support>

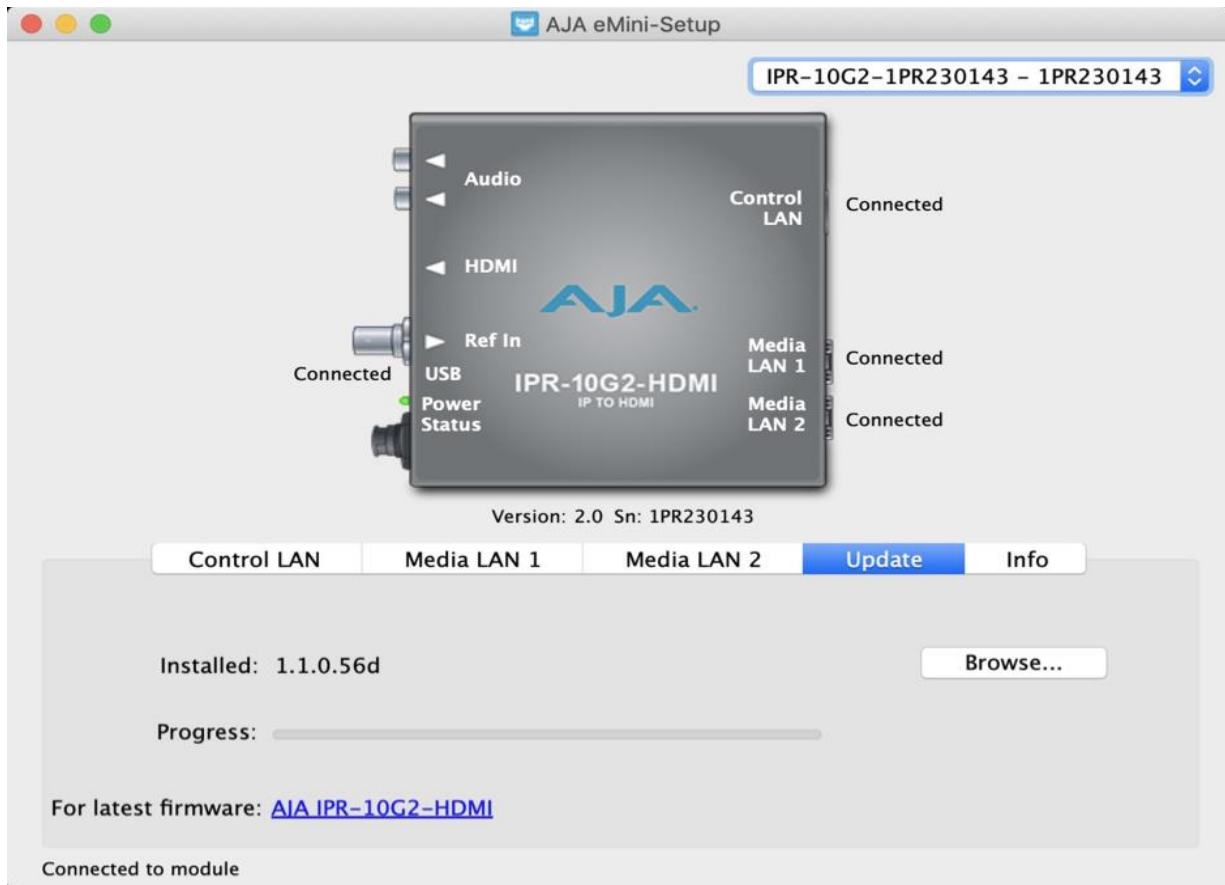
5. If new software is found, download it and uncompress the file archive (.zip) to a network location accessible to the IP Mini-Converter.
6. Return to the IP Mini-Converter browser tab and proceed to the Firmware Page.
7. Adjacent to "Upload New Firmware" use the "Choose File" button to locate previously unzipped firmware package (.ajas extension).
8. Follow the prompts to load the new firmware into your unit.
9. After the update, the AJA device must be rebooted by clicking on the Reboot button in the prompt window.

AJA eMini-Setup – Configuration, Control and Updates

Please see the eMini-Setup Manual for more detail.

Note: eMini-Setup 2.0 is the first version to support IPR-10G2-HDMI and IPR-10G2-SDI. Earlier versions will not work with these specific IP mini-Converter models.

1. Acquire eMini-Setup from the AJA website for either macOS or Windows:
<https://www.aja.com/family/software#eminisetup>
2. Install eMini-Setup:
 - a. Unzip the Installer
 - b. Run the .dmg file on macOS or the .msi file on Windows
3. Connect Power to your AJA Ethernet equipped Converter.
4. Connect the USB Config cable to the Computer running eMini-Setup.
5. Open eMini-Setup and Configure the device's network settings.
Note: DHCP will be enabled by default, and if the device is connected to a DHCP server the IP address field will populate
6. Type in (or Copy/Paste) the IP address into a Browser Window
 - a. This will get you into the web based GUI for your AJA device.
7. Use the Web GUI to fully configure, control and use your AJA Device.



8. After the update, the AJA device must be rebooted by clicking on the Reboot button in the prompt window.

Technical Support

AJA Technical Support is free and available to help you answer questions or resolve issues with any of your AJA products.

To contact AJA Technical Support:

Email: support@aja.com

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