

# HELIOS LED Processing Platform

## PX1 Receiver

Release Notes v22.04.1

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## Legal

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## Contact

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## Introduction

The HELIOS LED Processing Platform also includes the PX1 Tile Receiver Card as part of a complete system.

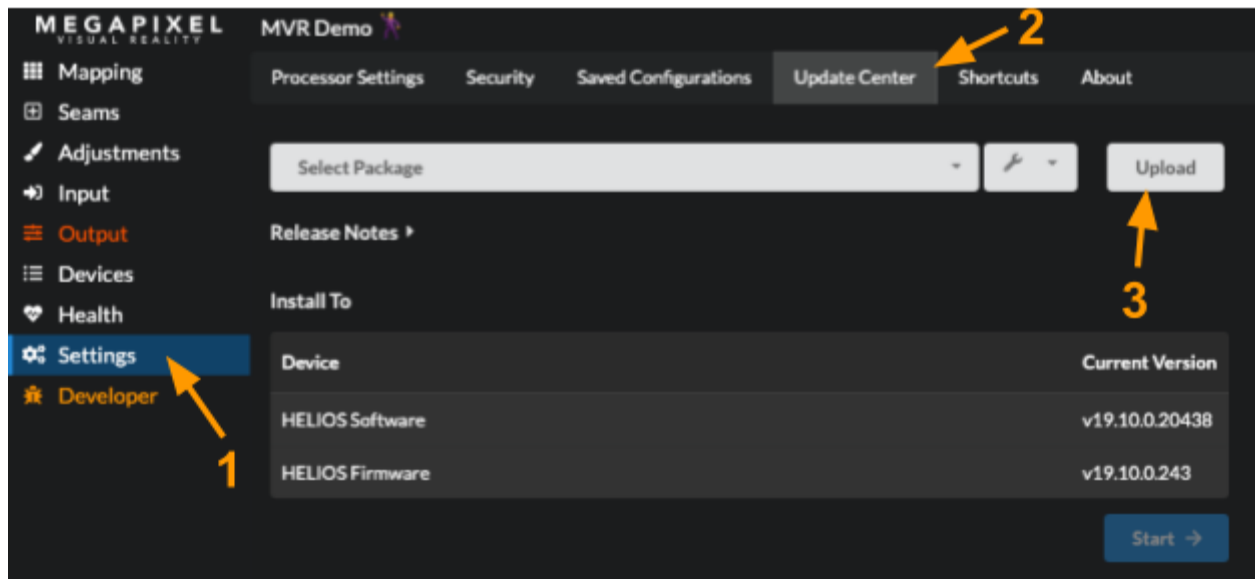
Some features/improvements may require updating the PX1 receiver card firmware also.

The current user manual and releases for the HELIOS LED Processing Platform can be found at: <http://www.megapixelvr.com/support/>

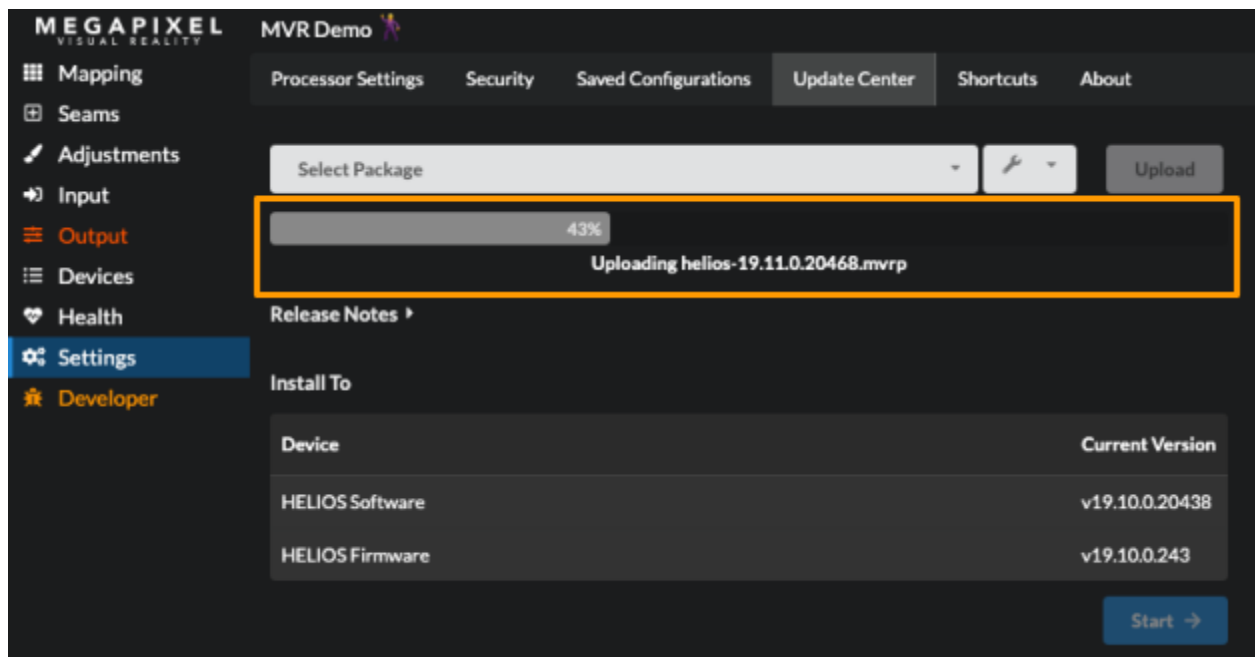
It is always recommended to update the HELIOS Processor software prior to upgrading the PX1 Receiver Card firmware. Upgrading the HELIOS Processor will upgrade both the software and firmware versions as needed on the HELIOS Processor.

## HELIOS Upgrade Instructions

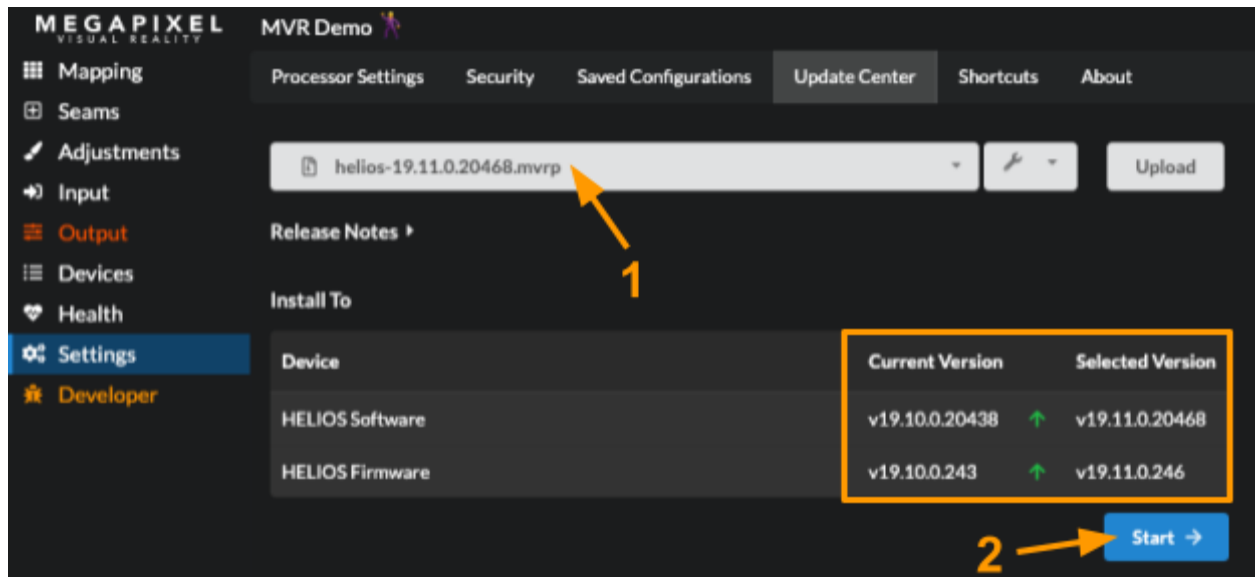
In the HELIOS web UI navigate to: *Settings->Update Center* and select the "Upload" button.



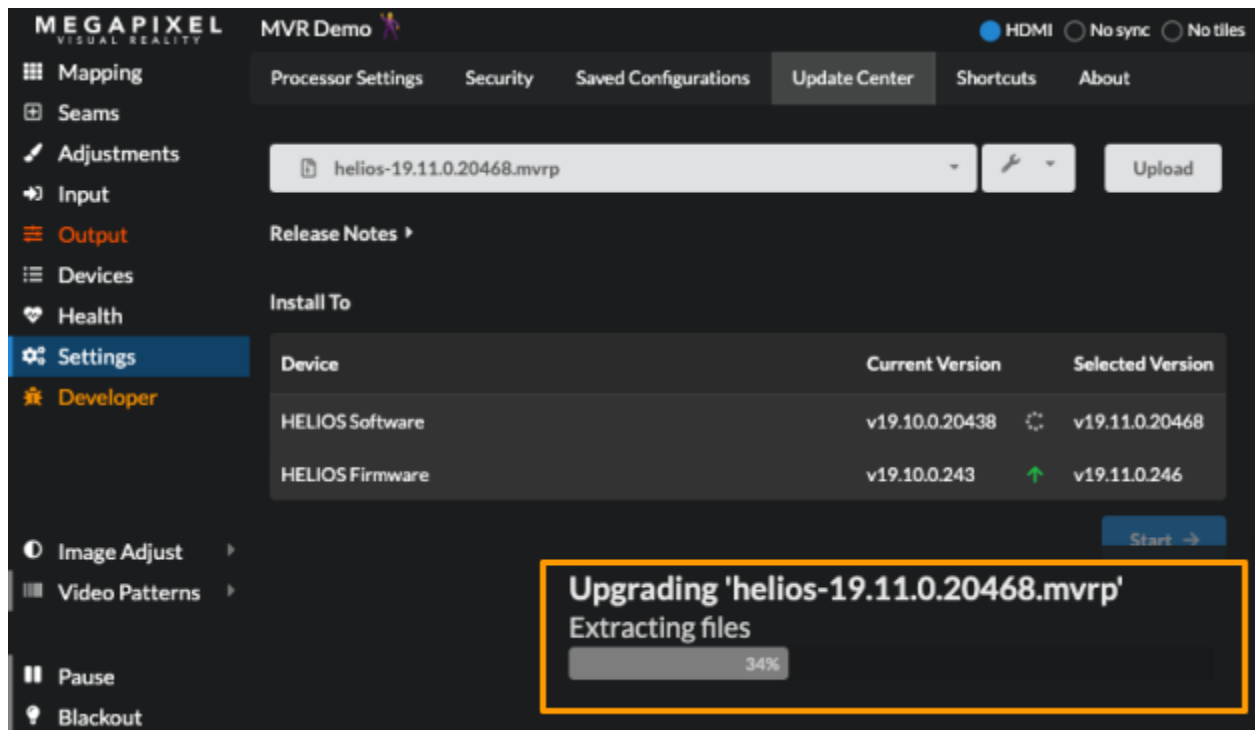
Browse to the current software .MVRP file your computer and upload it. You should see the following progress bar as the file is being uploaded.



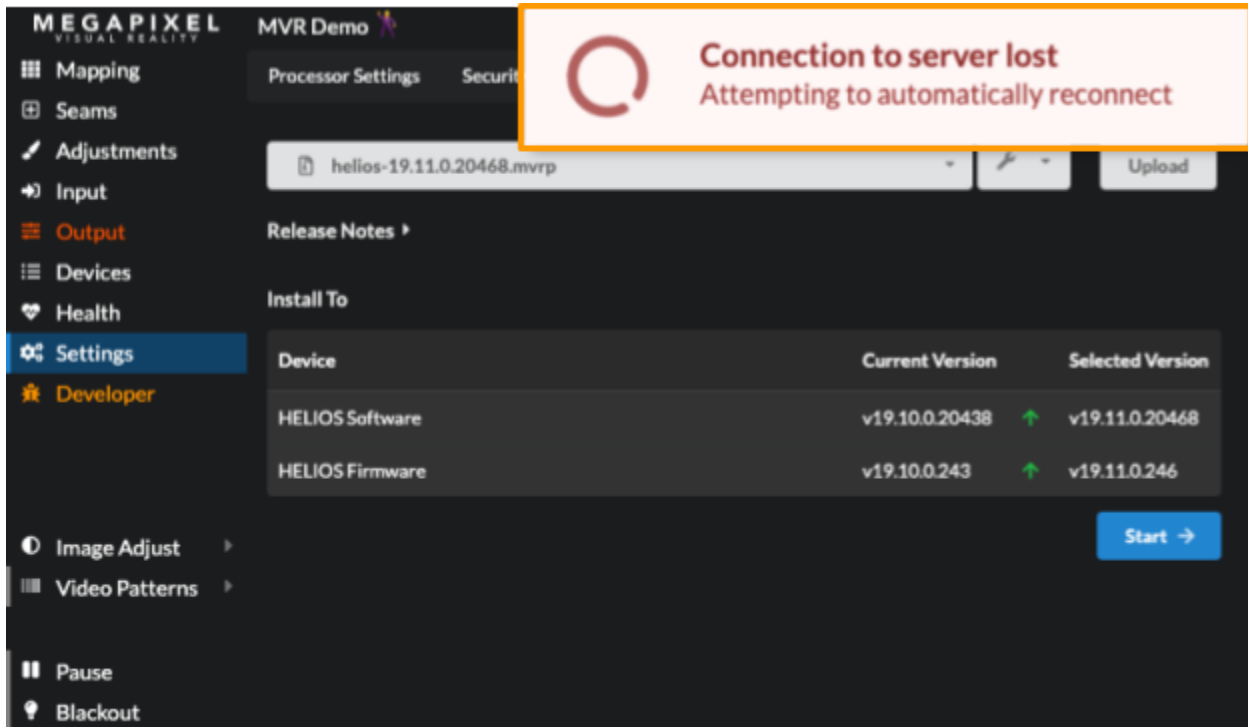
After the package has uploaded, you can then execute installation by selecting the appropriate MVRP package in the drop down list (1) and then clicking on "Start" (2).



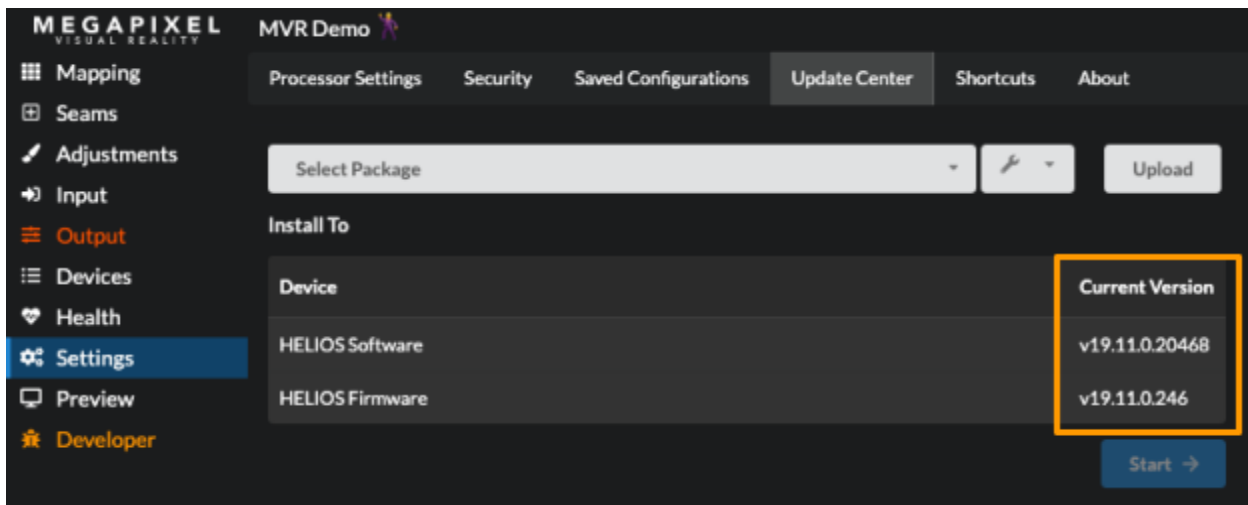
You will then see the upgrade process continuing as shown below.



During the upgrade, you will see the "Connection to server lost" message as HELIOS is performing the upgrade and restarting.



Once the upgrade is complete, you can see the current software and firmware versions displayed below.

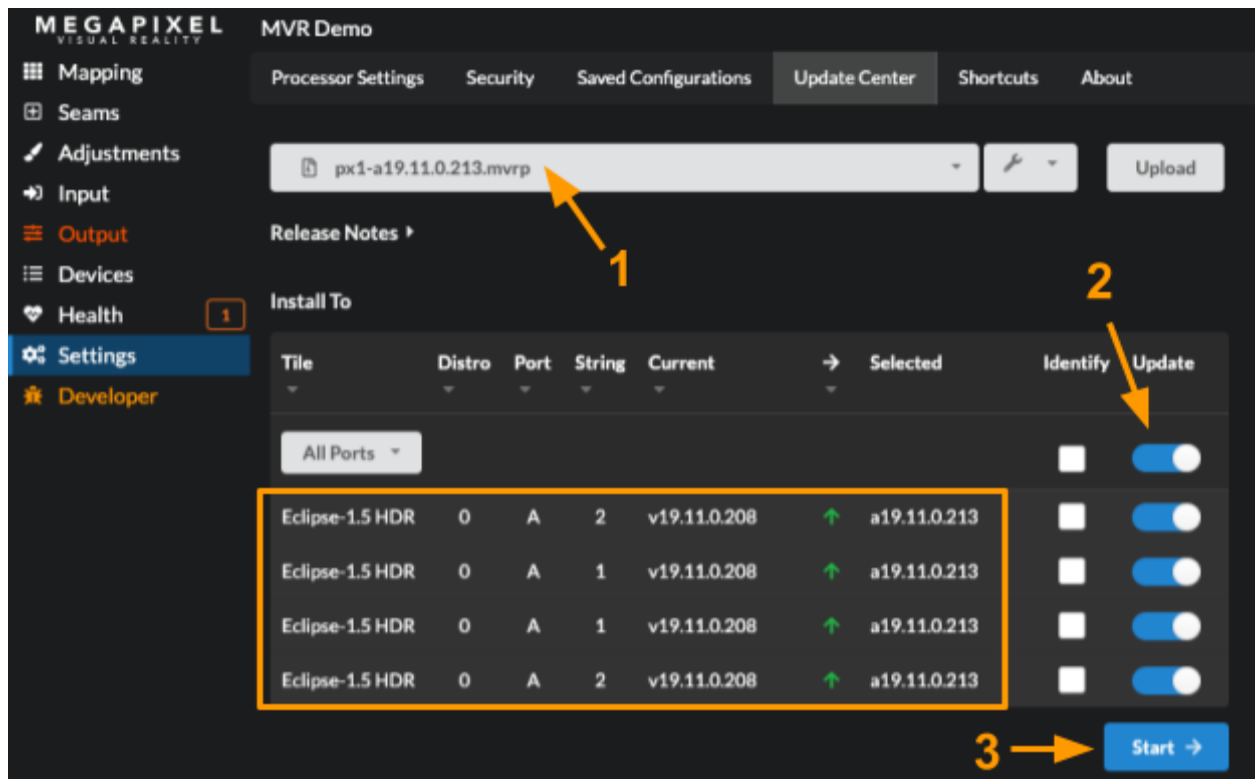


## PX1 Upgrade Instructions

Once the firmware for the HELIOS Processor has been updated, then the firmware for the PX1 Tile Receiver Cards may also be upgraded using a similar process. Upload the PX1 Receiver Card firmware (px1-xx.xx.xx.xxx.mvrp) using the same process above and then select it in the drop down list.

You will then be presented options for which tiles to update to the latest firmware.

You can enable/disable which tiles are included in the firmware update and then press the **“Start”** button in order to initiate the firmware upgrade process.



## Network Switch Upgrade Instructions

HELIOS now includes the capability to upgrade the Netgear network switch firmware as easily as you can update the PX1 firmware. Upload the Netgear switch firmware package (helios-switches--M4200-10MG-PoE+xx.x.x.xx.mvrp) using the same process above and then select it in the drop down list.



You will then be presented options for which switches to update to the latest firmware. You can enable/disable which switches are included in the firmware update and then press the **“Start”** button in order to initiate the firmware upgrade process.

## Version Information

After updating, the following should be displayed as the current versions:

| Device                  | Version        |
|-------------------------|----------------|
| HELIOS Software         | v22.04.1.21572 |
| HELIOS Firmware         | v22.04.0.359   |
| PX1 Receiver Card       | v22.04.0.427   |
| M4200 (GSM4210P) Switch | v12.0.2.40     |
| M4250 (MSM4214X) Switch | v13.0.2.34     |

## Officially Supported Tiles

- Lamp RN2.6S-PLUS
- Lamp R3.9S
- Megapixel Eclipse 1.5 HDR
- Megapixel KELVIN B / W / HDR 2.6
- Nanolumens HDS1.25
- Nanolumens HDS1.5
- Revolution Display ADVHD1.5
- Revolution Display ADV4 / ADV5 / ADV8
- Revolution Display RS1 / RS2 / RS3
- ROE Amber 0.9 / 1.5 / 1.8
- ROE Black Pearl 2.8 v1.0
- ROE Black Pearl 2.8 v2
- ROE Black Pearl 2.8 v2.1
- ROE Black Quartz 3.9 / 4.6
- ROE Carbon CB5W (Full/Half)
- ROE Diamond 2.6

- ROE Jasper 2.6 / 3.9
- ROE Ruby 2.3
- ROE Sapphire 1.5
- Unilumin Unano 1.8
- Unilumin Unano 1.3
- Unilumin Upanel0.9S / UHQ0.9
- Unilumin Upanel0.9S-2.5G
- Unilumin Upanel1.2S / UHQ1.2
- Unilumin Upanel1.5S / UHQ1.5
- Unilumin Upanel1.9S / UHQ1.9
- Unilumin Upanel2.5S / UHQ2.5
- Unilumin Upanel1.5S-EL
- Unilumin UTWII1.2

It is strongly recommended to fully upgrade both HELIOS and all LED tiles to this release. Numerous improvements have been made in HELIOS and PX1 greatly improving both performance and reliability. Best performance and interoperability expects both HELIOS and PX1 cards are operating with the version numbers listed above for consistent behavior.

**VERY IMPORTANT NOTE:** If upgrading from v21.05.0 or older it requires that the HELIOS software be updated to this release PRIOR to upgrading the PX1 tile firmware.

- Changes to the package structure have been made that require HELIOS to be updated first.

**IMPORTANT NOTES:** PX1 cards beginning with the following serial numbers have component changes that require newer firmware for proper operation. Once upgraded, these PX1 cards will not be allowed to downgrade below their minimum base version.

- PX1 cards with serial numbers 0203-210401-XXXX and later will not be allowed to be downgraded lower than v21.08.0.
- PX1 cards with serial numbers 020A-22XXXX-XXXX and later will not be allowed to be downgraded lower than v21.08.0.

**NOTE:** Redundancy operation requires tile firmware v20.02.0.250 or later.

- Older tile firmware versions can fail to respond to processors in a redundant configuration.

- WORKAROUND: Disconnect the tile from the backup processor (or power off the backup processor) then perform the tile upgrade.

## New Functionality

- Grouping (#410)
  - Adds ability to create independent screen groups.
  - Tile Groups RGB + intensity can be controlled via sACN or via our REST API (#473 / #1013).
- Mapping - Editable local & global tile position when canvas repeat is enabled (#964).
- Canvas
  - Item selection will now jump to the next LDM/tile based on how many items are selected. (Hold down ctrl/alt to revert back to the old single step behavior) (#270).
  - Support jumping selection across gaps, provided items on the other side are lined up and are of the same size (#940 / #1105).
- Input
  - Added detailed timing popup (advanced mode) (#966).
  - Alert when links of a stitched input are out of sync (#1102).
  - HDMI EDID now advertises 120Hz (#993).
- Output
  - Post gains can now go to 200% (**warning**: sACN ranges have also been updated!).
  - Added ACEScg output gamut.
  - Increased HDR PQ accuracy for low levels (#987).
- GhostFrame
  - GhostFrame can now be disabled/enabled on a per-tile basis through the mapping page or through the API (#1006).
  - With GhostFrame disabled on individual tiles, allow selection of which video feed they display in a multi-source system GhostFrame system (#1133).
  - Increased maximum number of sub-frame slices up to 32, dependent on individual tile capabilities.
  - ROE BP2.8 v2.1 (batch 3) - Increased the number of sub-frame slices to 14 at 60Hz.
  - Unused GhostFrame sub-frame slices now gray out (#1045).

- Settings
  - Network - Option to enable/disable mDNS + SSDP.
  - Saved configurations - Added a Factory Default preset; quickly discover which settings have been changed on a HELIOS.
  - Stacking - now shows all available stacks of processors on the network (#1011).
- Video Patterns - Custom color test patterns are now available, including using custom colors with all black and white patterns (#1070).
- HELIOS
  - Allow 10G DAC for MVR-branded cables (#884).
  - HDCP upgrade option now available. Requires new HDMI VFMC board with appropriate HELIOS license. Note that to comply with HDCP licensing; video will only be shown on authentic tiles when HDCP is active (#908).
  - Added support for MVR MultiMode fiber modules (#1046).
- sACN - Ranges have changed.
  - RGB gains are now 0 - 200 which maps to 0 - 200%
  - Blackout/Freeze/Test pattern enable now requires a level  $\geq 128$  to enable.
- Tiles
  - Consolidate tile short names for variations of the same tile (#1126).

## Bug fixes

- HELIOS
  - Canvas
    - Improved canvas object rendering. Expect cleaner lines and less jaggy circles (#719 / #919).
    - iPad - Improved touch handling for dragging tiles on map (#909).
    - Mapping - Port drop-down should close after making selection (#1027).
  - Input
    - Persist aspect ratio setting (#1039).
    - Restore crop settings on reboot (#1042).
    - Fixed NVidia input errors running on Windows at UHD/50 (#868).
    - Fixed tearing with mismatched (non-multiple) sync and frame rates (#997).
    - Scaling - fixed rounding error in scaler causing bright border on object (#1016).

- Freeze
  - Avoid color space updates due to input changes while frozen (#1026).
  - Tile glitch when plugging input back in while frozen (#1134).
- Output
  - "Custom gamut not applied" message is now more reactive and should only show when values differ (#1060).
  - Corrected LUT not updating properly on some color curve/wheels adjustments (#1071).
  - Lift setting no longer effects black test pattern (#1044).
- Preview - Preserve image aspect ratio (#949).
- GhostFrame - Multiple sources with Low Latency enabled had occasional sub-frames out of sync (#1131).
- Devices - Phantom switch association edge case causing switch to appear to be associated with multiple HELIOS outputs at once (#1161).
- Health
  - HELIOS Jr. - PHY error reports corrected (#871).
  - Greatly reduce the amount of "Page/Frame errors" generated on user initiated actions (such as enabling/disabling test patterns or changing inputs).
  - Added some new video alerts for more precise identification of input issues.
  - Fix frame error alerts that were not resolving after a tile reboot (#1129).
- Seams
  - Rotated seams should now match the rotated tile (this was incorrectly flipped for 90 & 270 degrees) (#1066).
  - Reduced large step size to 0.01 (#1069).
- Upgrades
  - Boost priority on tile upgrade to force tile re-association. Meaning you can finally upgrade tiles from either the main or backup without having to manually flip them first.
  - Support firmware upgrading for new M4250 network switches (#1038).
- Web Server
  - Improved handling of low level Websocket errors.

- Tiles
  - Send tile string topology information on association (#1031).
  - Re-apply fan control setting on tile reboot/re-association (#1090).
  - Sliding Color Temperature slider quickly resulted in inconsistent settings (#1024).
  - Batched tile support retrieval. Greatly improves tile support downloads at the cost of reduced coffee break time.
  - Update test patterns that use larger fonts, rearranged some screens to fit better, and added more patterns.
  - Fixed uneven gradient at low brightness levels (#1095).
  - Random tile authorization failure alert (#1072).
  - Tile Low Latency reporting Ethernet errors for tiles near end of chain (#1112).
  - ROE BP2.8 v2.1 (batch 3) - Corrected data corruption issue when running Tile Low Latency (#1065).
  - ROE BP2.8 v2.1 - Corrected issue with frame error notices occurring while in low power mode (#1064).
  - Improve Rec.709 accuracy on ROE Sapphire and MVR Eclipse tiles (#1059).
  - ROE Sapphire driver block artifacts after tile power cycle fixed (#1097).

## Experimental

- SMPTE2110 support available in Beta now (#641).
  - HELIOS has the capability to ingest (4) 10G inputs of SMPTE 2110 using the standard Megapixel 10G SFP modules (same modules as used on outputs). If you are interested in beta testing ST2110 inputs to HELIOS please contact MVR Support ([support@megapixelvr.com](mailto:support@megapixelvr.com)) for more information.
  - Numerous improvements have been made to the ST2110 implementation in this release.

## Known Issues

- Downgrading HELIOS to a release earlier than v21.08.0 can result in a “No Firmware” error. If this occurs, simply power cycling HELIOS after the downgrade will resolve the issue.

# PREVIOUS RELEASES

## Version 21.08.1

After updating, the following should be displayed as the current versions:

| Device                  | Version        |
|-------------------------|----------------|
| HELIOS Software         | v21.08.1.21311 |
| HELIOS Firmware         | v21.08.1.347   |
| PX1 Receiver Card       | v21.08.1.392   |
| M4200 (GSM4210P) Switch | v12.0.2.40     |

## Officially Supported Tiles

- Lamp RN2.6S-PLUS
- Lamp R3.9S
- Megapixel Eclipse 1.5 HDR
- Megapixel KELVIN B / W / HDR 2.6
- Revolution Display ADVHD1.5
- Revolution Display ADV4 / ADV5 / ADV8
- Revolution Display RS1 / RS2 / RS3
- ROE Amber 0.9 / 1.5 / 1.8
- ROE Black Pearl 2.8 v1.0
- ROE Black Pearl 2.8 v2
- ROE Black Pearl 2.8 v2.1
- ROE Black Quartz 3.9 / 4.6
- ROE Carbon CB5W (Full/Half)
- ROE Diamond 2.6
- ROE Jasper 2.6 / 3.9
- ROE Ruby 2.3
- ROE Sapphire 1.5
- Unilumin Upanel0.9S / UHQ0.9
- Unilumin Upanel1.2S / UHQ1.2
- Unilumin Upanel1.5S / UHQ1.5

- Unilumin Upanel1.9S / UHQ1.9
- Unilumin Upanel2.5S / UHQ2.5
- Unilumin Upanel1.5S-EL

It is strongly recommended to fully upgrade both HELIOS and all LED tiles to this release. Numerous improvements have been made in HELIOS and PX1 greatly improving both performance and reliability. Best performance and interoperability expects both HELIOS and PX1 cards are operating with the version numbers listed above for consistent behavior.

**VERY IMPORTANT NOTE:** This release absolutely requires that the HELIOS software be updated to this release PRIOR to upgrading the PX1 tile firmware.

- Changes to the package structure have been made that require HELIOS to be updated first.

**IMPORTANT NOTE:** PX1 cards with serial numbers 0203-210401-XXXX and later have a component update that requires newer firmware for proper operation. Once updated to v21.08.0 these PX1 cards will not be allowed to be downgraded lower than this release.

**NOTE:** Redundancy operation requires tile firmware v20.02.0.250 or later.

- Older tile firmware versions can fail to respond to processors in a redundant configuration.
- **WORKAROUND:** Disconnect the tile from the backup processor (or power off the backup processor) then perform the tile upgrade.



## New Functionality

- Health - Serial report - Show aggregated LDM Batch ID (#916).
- LCD - Show external sync information (#1004).
- Gamepad - L1 to adjust pattern + display brightness (#969).
  - L1+L adjusts display brightness
  - L1+SEL toggles test pattern on/off
  - L1+D-pad buttons to select test pattern
- Input - Canvas repeat mode (requires advanced mode enabled) (#1020).
  - Under Input->Output Window->"Canvas Repeat".
  - When zooming out on Mapping page you will see multiple identical canvases to allow duplicating multiple screens using same raster.
- Public API - Exposed test patterns enable + type
- Sync section renamed to NanoSync (#939).
- Additional stitching options for SDI inputs of (1x2, 1x3, 2x1, 3x1) (#985).
- Added Theater Mode settings for Black Pearl 2 v2.1

## Bug fixes

- HELIOS
  - Adjustments - Holding shift is no longer necessary when using keyboard adjustment shortcuts.
  - Mapping - Snap tiles to canvas repeated input window.
  - Test patterns showing up on panels that are off of the active input area (#968).
  - Changing SDI from ImagePro between 50hz to 48hz causing crash (#991).
- Tiles (Note: issues fixed below may have also been present in tiles beyond specific models listed).
  - Fix Sapphire authentication failure warning (#999).
  - Fix Sapphire tile artifacts after power cycle or extended blackout (#1000).
  - Fix visual artifacts when using GhostFrame and Low Latency mode with Black Marble 4 tiles.
  - Fix BlackPearl 2 v2.1 pulsating at low frame rates. Also applies to other tiles (#975).
  - Fix visual artifacts in UPanel1.25 using 50Hz (#995).
  - Fixed corruption on 8th GhostFrame slice on Black Pearl 2 tiles running at 59.94Hz (#998).

- Fix tile metadata corruption on Diamond 2.6v1 and Ruby 2.3 (#1001).
- Fix Eclipse watchdog occasional reset with bad Ethernet link (#1007).
- RS1 tiles not displaying full image (#1025).
- Fix JSON read error (#1015).

## Experimental

- SMPTE2110 support available in Beta now (#641).
  - HELIOS has the capability to ingest (4) 10G inputs of SMPTE 2110 using the standard Megapixel 10G SFP modules (same modules as used on outputs). If you are interested in beta testing ST2110 inputs to HELIOS please contact MVR Support ([support@megapixelvr.com](mailto:support@megapixelvr.com)) for more information.

## Known Issues

- Downgrading HELIOS to a release earlier than v21.08.0 can result in a “No Firmware” error. If this occurs, simply power cycling HELIOS after the downgrade will resolve the issue.

## Version 21.08.0

After updating, the following should be displayed as the current versions:

| Device                  | Version        |
|-------------------------|----------------|
| HELIOS Software         | v21.08.0.21260 |
| HELIOS Firmware         | v21.08.0.343   |
| PX1 Receiver Card       | v21.08.0.371   |
| M4200 (GSM4210P) Switch | v12.0.2.40     |

## Officially Supported Tiles

- Lamp RN2.6S-PLUS
- Lamp R3.9S
- Megapixel Eclipse 1.5 HDR
- Megapixel KELVIN B / W / HDR 2.6
- Revolution Display ADVHD1.5
- Revolution Display ADV4 / ADV5 / ADV8
- Revolution Display RS1 / RS2 / RS3
- ROE Amber 0.9 / 1.5 / 1.8
- ROE Black Pearl 2.8 v1.0
- ROE Black Pearl 2.8 v2
- ROE Black Pearl 2.8 v2.1
- ROE Black Quartz 3.9 / 4.6
- ROE Carbon CB5W (Full/Half)
- ROE Diamond 2.6
- ROE Jasper 2.6 / 3.9
- ROE Ruby 2.3
- ROE Sapphire 1.5
- Unilumin Upanel0.9S / UHQ0.9
- Unilumin Upanel1.2S / UHQ1.2
- Unilumin Upanel1.5S / UHQ1.5
- Unilumin Upanel1.9S / UHQ1.9
- Unilumin Upanel2.5S / UHQ2.5

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**IMPORTANT NOTE:** PX1 cards with serial numbers 0203-210401-XXXX and later have a component update that requires newer firmware for proper operation. Once updated to v21.08.0 these PX1 cards will not be allowed to be downgraded lower than this release.

**NOTE:** Redundancy operation requires tile firmware v20.02.0.250 or later.

- Older tile firmware versions can fail to respond to processors in a redundant configuration.
- **WORKAROUND:** Disconnect the tile from the backup processor (or power off the backup processor) then perform the tile upgrade.

## New Functionality

- Image Settings
  - Expanded min CCT to 1667K.
  - Support specifying min display brightness in nits.
- LCD
  - Preview of stitched inputs (#167).
  - Show QR code on network overview page (#862).
- Mapping
  - Toggle to disable tile snapping (#876).
  - Pan canvas when moving selected object to edges.
- Camera mode - Provides limited slice control when GhostFrame is unavailable.
- Feedback - Option to save locally for later sending.
- GhostFrame
  - Show total HELIOS pixel utilization to better illustrate the impact of additional video streams.
  - Undo/Redo support.
- Input
  - Plot EOTF curve (EOTF adjustments pane) refs (#658).
  - Restrict sizing based on input limits. This was already happening behind the scenes, and the UI will now make this more apparent (#210 / #924).
  - Show hTotal + vTotal timings per input (#866).
  - Show input's sync offset relative to the current sync (#838).
  - Enable DP HDR (#521).
  - Migrated to Vivado tool set 2021.1.
  - Update DP EDID with new tool set.
- Output
  - Color grading controls (Lift, Gamma, Gain, Offset).
  - YRGB curve adjustments.
  - Calibration report (#892).
- Preview - Show preview of stitched inputs (2x2, 4x1, etc)
- Redundancy
  - Communicate + show when in a mixed redundancy state.
  - Offline redundancy mode - Tiles will not associate with an offline processor. For workflows where a specific processor within a larger stack needs to be taken offline.

- Saved Configuration:
  - Clone, rename, delete, download, and update.
- Licensing - Support licensing via an activation key (requires internet connectivity).
- Update Center - Support upgrading of network switches (#520).
- Network Switches - Adds ability to view SFP fiber power levels for the switch (requires firmware update to network switch).

## Bug fixes

- Mapping - Improved meta/ctrl handling to disable snapping on drag start (#876).
- Input
  - HLG OOTF requires tile firmware a21.07.0.357 or later. Older tile firmware will alert and appear very red-ish while using HLG.
    - NOTE: Downgrading HELIOS to an older version while using HLG may require rebooting of tiles to restore color. (#522).
  - Turn HDMI LED off when source removed (#935).
  - Round frame rate to known standard rate if really close (#874).
  - Fix ImagePro-II firmware crash on DP removal (#852).
  - Address DP FIFO overruns on less than 4 lanes (#787).
- Device lists - Prefer long device names (#923).
- RevNet
  - Improved internal grouping of tile strings which could lead to temporary id exhaustion when large id fragmentation was occurring (i.e. rebooting a large system)
  - Use VLAN assignment to determine switch port when switch not yet discovered
  - Workaround tile upgrade bug which would cause transfers to timeout (#888).
  - Increase database table column constraint for firmware with a larger list of supported devices (#911).
  - Send firmware build number when initiating a tile upgrade (#936).
- Settings
  - Redundancy - Re-label offline on input failure (#928).
- Sync
  - Round no input signal frequency for Dual DP (#874).
  - Signal frequency rounding error and sync mismatch errors (#874).
  - Sync mismatch from same sync source at same frequency (#838).

- Fix vsyncPos not updating when switching inputs (#838).
  - Use HDMI measured sync instead of reported sync (#865).
- Security - Show user's connected user agent (this was broken by 21.05.0).
- Switch
  - Raise alerts for incompatible SFPs (#547).
  - Optimized discovery of pre-connected switches.
  - Copper SFP module reported as Up when it wasn't.
- Test Patterns
  - Test Pattern should honor selected input's sizing restrictions (#924).
  - Improve speed of Test Pattern on/off (#917).
- Support - Increased timeout when retrieving support from firmware.
- Update Center - Paginate devices to improve page performance (#922).
- Pause - Fix pause randomly not working on test patterns with Nanosync (#943).
- Network - Fix spurious Ethernet Error alerts (#937).
- Downgrades - Check for and prevent stuck GIC resulting in 'no firmware' errors during downgrades (#904)

## Experimental

- Input - Canvas repeat mode, infinitely repeats the output window across the canvas area (#879).
- Health Reports - Include tile support log download buttons (#827).
- SMPTE2110 support available in Beta now (#641).
  - HELIOS has the capability to ingest (4) 10G inputs of SMPTE 2110 using the standard Megapixel 10G SFP modules (same modules as used on outputs). If you are interested in beta testing ST2110 inputs to HELIOS please contact MVR Support ([support@megapixelvr.com](mailto:support@megapixelvr.com)) for more information.

## Known Issues

- Downgrading HELIOS can result in a "No Firmware" error. If this occurs, simply power cycling HELIOS after the downgrade will resolve the issue.

## Version 21.05.0

After updating, the following should be displayed as the current versions:

| Device            | Version        |
|-------------------|----------------|
| HELIOS Software   | v21.05.0.21119 |
| HELIOS Firmware   | v21.05.0.321   |
| PX1 Receiver Card | v21.05.0.347   |

## Officially Supported Tiles

- Megapixel Eclipse 1.5 HDR
- Megapixel KELVIN B / W / HDR 2.6
- Revolution Display ADVHD1.5
- Revolution Display ADV4 / ADV5 / ADV8
- Revolution Display RS1 / RS2 / RS3
- ROE Amber 0.9 / 1.5 / 1.8
- ROE Black Pearl 2.8 v1.0
- ROE Black Pearl 2.8 v2
- ROE Black Pearl 2.8 v2.1
- ROE Black Quartz 3.9 / 4.6
- ROE Diamond 2.6
- ROE Jasper 2.6 / 3.9
- ROE Ruby 2.3
- ROE Sapphire 1.5
- Unilumin Upanel2.5S / UHQ2.5

It is strongly recommended to fully upgrade both HELIOS and all LED tiles to this release.

Numerous improvements have been made in HELIOS and PX1 greatly improving both performance and reliability. Best performance and interoperability expects both HELIOS and PX1 cards are operating with the version numbers listed above for consistent behavior.



**IMPORTANT NOTE:** Redundancy operation requires tile firmware v20.02.0.250 or later.

- Older tile firmware versions can fail to respond to processors in a redundant configuration.
- **WORKAROUND:** Disconnect the tile from the backup processor (or power off the backup processor) then perform the tile upgrade.

## New Functionality

- GhostFrame feature added (#706).
  - See <https://ghostframe.com> for details.
- Added NanoSync feature.
  - See user guide for details.
- Migrated web app to newer technology frameworks (#548).
  - Improved canvas.
  - Dark/Light mode (processor settings).
- App
  - Image adjust
    - Indicate tile's current brightness in nits.
    - Indicate when brightness has been limited (by max tile or content).
    - Expand CCT range to 3K-10K (#694).
  - Added feedback submission (top right) to ease giving us feedback! Have an idea, something we should fix, or something else we should know? Feel free to reach out.
  - Gamepad - Hold R1 for fine adjustments (#765).
- Input
  - Show SDI flavor (e.g., 3G Level A) (#746).
  - EOTF - Split SDR option to "SDR" and "SDR (Preserve Details)" (#675).
  - Added option to allow/ignore external sync (#453).
  - Show mismatch alert if active sync is a different frequency to the currently selected input (#550).
  - Automatically adjust the internal frequency (used for test patterns/no signal) to be the last valid selected input frequency reference (#742).
  - Expose internal frequency setting under the Sync pane (#742).
  - Enabled maximum incoming refresh rate up to 250Hz (#771).
  - Added Dual HDMI/Dual DP input options to HELIOS Jr. (#712/#783).
  - Added handling/notification for invalid sync inputs (#550).

- Added support for HDMI at 144Hz (#808).
- Mapping
  - Show serial number for the selected tile (#621).
  - Select Port(s) - Show colored dots to match up with the tiles on the canvas (#570).
  - Added Black tile test pattern option.
  - Maintenance
    - Added capability to retrieve tile support logs. Requires PX1 firmware v21.05.0.346 or later (#613).
    - Added Tile ejection capability for tiles supporting motorized ejection (#695).
- Seams
  - Support for tile to tile seams added. These are stored within HELIOS and saved configurations. LDM seams continue to be stored within tiles. (#354).
- Output
  - HELIOS & tile Ultra Low Latency mode toggles (Output/Latency) (#459).
    - See user guide for full details on how to use Ultra Low Latency modes.
  - Option to add additional tile frame delay (Output/Latency) (#294).
  - Expand black clipping range 0 - 0.5.
  - Render CIE chart and include an option to see the 1976 variant.
- Devices
  - Show HDMI/DP input card details (Part #, Serial #, etc) (#538).
- Settings
  - Redundancy - Indicate processor readiness. A processor is considered "not ready" when it's input is invalid or its firmware is missing.
- Stacking - Show IP address of discovered processors along with a clickable link (#766).
- Saved configurations - Can be applied via API endpoints (request our API doc for details) (#527).
- Authentication
  - Extended authentication to also support JSON Web Tokens (Bearer). Digest authentication continues to be supported, but bearer authentication allows a more visually pleasing authentication flow.
  - Added user roles; admin users continue to have full functionality, while a "user" role can have a more limited subset.

- Added "secure" connections via https:// as a proof of concept. This uses a self-signed certificate so your browser will show a security warning.
- Tiles
  - Align all VSynCs in a chain to be within 1uS to exactly align PWM (#679).
  - Separated tile blackout and low power modes internally (#711).

## Bug fixes

- Mapping
  - Improved mapping of mixed sized tiles.
  - Filter available tile test patterns based on advanced/developer settings (#530).
- Input - Auto EOTF would mistakenly flip over to the forced setting on an EOTF update.
- Settings
  - Correctly restore factory defaults; previously HELIOS would delete all the settings, but then would occasionally try to repopulate them as it was restarting.
  - Default output gamut to auto.
- Saved configurations - Limit to 1000 presets.
- Shortcuts - Include gamepad/controller button mappings (#764).
- OS - Enable ntpd to update the internal time automatically (when possible).
- Devices
  - Show tile connection relative to redundancy role (#757).
  - Increased threshold for fiber transmit power level to avoid false alert (#825).
- App
  - Avoid deadlock when quickly re-adding a tile.
  - Avoid spurious EOTF updates when nothing has changed.
- Test Patterns
  - Renamed "Image" to "Aspect Ratio Test" (#673).
  - Horizontal and vertical gradients swapped (#683).
- Inputs
  - Improved Genlock Sync at 29.97 (#559).
  - Lightware DP Router support added. Fixed issue when DP link but no video packets (#698).
  - Analog Way Aqualon DP support added. Fixed DP connectivity issue (#820).
  - Removed input mismatch alert when only single input is active (#791).
  - Added ability to force DP negotiation to use HBR2 links (#787).
  - Fixed dual DP input mismatch alert when DRM differs (#786).
  - Fixed persistent external sync mismatch alert after setting source refresh back to matching refresh rate (#788).
  - Fixed image corruption of bottom image border at certain frame rates (#730).
- System - Firmware missing error on downgrade (#809).

- Fixed an issue where this might occur on downgrade. A power cycle will resolve it. Downgrading from future releases to this release will not have this issue. Downgrading to something older than this release may exhibit the issue, but a simple power cycle will resolve it.
- Tiles
  - Updated tile short name list in UI to match proper tile naming (#681).
  - Redundancy Mode 'Manual' setting fixed issues where tiles would fall to backup instead of waiting for main processor to come back (#653).
  - Backup processor not always aware when tile goes offline temporarily (#824).
  - Tile brightnesses occasionally different after HELIOS reboot (#753).

### Known issues

- HDR over DisplayPort is still in progress (#521).
- Gamepad API will soon require a secure context (#729).
  - In order to use the Game Controllers for seam correction it may require connecting to HELIOS using <https://> and proceeding past the certificate warning in order to connect.
- Redundancy and Ultra Low Latency fully running together may result in Ethernet errors in some cases (#857).
  - For better performance, when attempting to run Ultra Low Latency and Redundancy together use Fail-Over Redundancy mode.

## Version 20.09.0

After updating, the following should be displayed as the current versions:

| Device            | Version        |
|-------------------|----------------|
| HELIOS Software   | v20.09.0.20886 |
| HELIOS Firmware   | v20.09.0.291   |
| PX1 Receiver Card | v20.09.0.303   |

## Officially Supported Tiles

- Megapixel Eclipse 1.5 HDR
- Megapixel KELVIN B / W / HDR 2.6
- Revolution Display ADVHD1.5
- Revolution Display ADV4 / ADV5 / ADV8
- Revolution Display RS1 / RS2 / RS3
- ROE Amber 0.9 / 1.5 / 1.8
- ROE Black Pearl 2.8 v2
- ROE Black Quartz 3.9 / 4.6
- ROE Diamond 2.6
- ROE Jasper 2.6 / 3.9
- ROE Ruby 2.3
- ROE Sapphire 1.5

It is strongly recommended to fully upgrade both HELIOS and all LED tiles to this release. Numerous improvements have been made in HELIOS and PX1 greatly improving both performance and reliability. Best performance and interoperability expects both HELIOS and PX1 cards are operating with the version numbers listed above for consistent behavior.

**IMPORTANT NOTE:** Redundancy operation requires tile firmware v20.02.0.250 or later.

- Unfortunately older tile firmware versions can fail to respond to processors in a redundant configuration.
- **WORKAROUND:** Disconnect the tile from the backup processor (or power off the backup processor) then perform the tile upgrade.

## New Functionality

- Redundancy
  - Reworked redundancy to improve workflow and avoid terminology confusion (#583) & (#594).
  - Processors can now be assigned a desired redundancy role (main/backup).
  - Redundancy role is used as part of "Go Main" & "Go Backup" to instruct tiles to connect to the appropriate processor. This is then consistent when controlling from either the main or backup processor.
  - Processors are considered "active" when tiles are connected, "mixed" when tiles are connected to both the main + backup processors, or "standby" when no tiles are connected.
  - A different processor test pattern can be assigned to backup processors to make it much clearer which processor a tile is currently connected to (#604).
- Stacking
  - Syncs input adjustments & output color gamut settings across processors in the stack.
    - **WARNING:** Selecting widest gamut can result in different coefficients for different processors in a Stack.
  - Sync actions such as "Go Main" & "Go Backup" operate across the stack (#583).
- LCD
  - Show redundancy state & stacking group (top right).
  - Added a line under input to show the EOTF.
  - Added input selection to the main menu.
  - Added a pattern menu to be able to select processor test pattern & toggle motion.
- Devices - Support naming of network switches (#223).
- Saved Configurations
  - EOTF Adjustments, Input range override added to saved configurations (#655).
  - Display gamut, Light science, Output adjustments added.
  - Removed LDM seam corrections (for now) from Saved Configurations as these values are stored in the tiles.
    - **NOTE:** We plan to add this back to Saved Configurations when we have tile-level seam correction (#354).
- Processor Settings

- Tile fan control option to request tile fans run automatic or silent. Requires tile firmware 20.09.299 or newer (#633).

## Bug fixes

- LCD - No longer shows the rotary knob position on the main menu.
- Redundancy
  - Adjusted processor announcement periods & improved hand-over to reduce visible disruption when tiles connect to a different processor (#579).
  - Avoid processor backup missing on "Go Backup" (#618).
- Stacking
  - Fixed surprising state changes when initially stacking processors (#584).
  - General communication robustness; addressing startup races, and improving initial discovery + connection (#664).
- Switches
  - Fixed "Unable to communicate with switch" occurring on some switches (#615).
  - Workaround switch sensors not being immediately available (#577).
  - Reported switch uptime errors fixed (#574).
  - No longer crash while initializing newly connected switches (this was pretty rare and really hard to find) (#552).
- Attempt to restart firmware when encountering "Firmware missing" startup error (#196)
- Assert EOTF/range override on the selected input (toggling test pattern was temporarily disabling, which was very confusing).
- Alert when selected stitched input is missing one or more links (#646).
- Avoid getting stuck during a tile firmware update when one, or more, tiles go offline during the update.
- Increase LED Driver power down on blackout to five minutes, delay un-blanking tiles from low power state to avoid visual glitch (#624).
- Sliders - Preventing tabbing into a slider which could reset the slider's value (#671).
- Firmware logging will report more data for alerts and report Sensor ID.
- Continue sending vsync packets even if no tiles are connected.
- Fixed occasional unknown tile type/auth fail issue (#600).
- Scan SFP changes if interrupt is lost (#644).
- Sensors
  - Increased low SFP power range to avoid temporary sensor fault alerts (#603).
  - Renamed SFP alerts to "Over/Under fiber power" (#535).



- SFP current readings were off by factor of 10x (#581).
- Added SFP Temperature sensors (#635).
- Rename fiber SFP sensors (#565).
- Adjust fiber SFP optical power alert thresholds (#535).
- Raised chassis over temperature alert to 50C.
- Inputs
  - Update DP EDID for YCC 12-bit input.
  - Increased accuracy of reported refresh rate on HDMI (#558).
  - Fixed an issue with invalid DP data causing invalid refresh rate resulting in pixel capacity exceeded event (#661).
  - Block inputs with invalid sync source (related to #661).
  - Fixed DP input not accepting video, automatically re-initializes input (#620).
  - Added alert for DP input failure (#634).
  - Corrected EDID Manufacturer ID (#516).
  - Fixed jitter in DP sync.
  - Use measured frame rate on DP to display accurate refresh rate (#650).
  - Fixed video artifacts on DP 2x1 when tiles are mapped with a large offset from (0,0) (#629).
  - Fixed occasional DP link issue where Input was lagging by a frame and striping image (#619).
- Fixed I2C issue that could cause internal comm bus to lock (#83).
- Test Patterns
  - Fixed "Image" aspect ratio pattern (#529).
  - "Image" Test Pattern doesn't switch back to normal test patterns correctly (#571).
- Tiles
  - Added Silent Fan setting (#633).
  - Removed scan lines and artifacts going in/out of Blackout (#329).
  - Eliminate white lines when performing tile reboot (#591).
  - Fixed tile freezing in Seamless Redundancy failover mode (#553).
  - Improved Failover Redundancy time (#605).
  - Fixed Tile re-association when looking main processor (#609).
  - Fixed single frame glitch in Seamless mode when rebooting switches (#610).
  - Fixed delay in going to black on loss of signal (#557).
  - Fixed authentication errors in redundant system (#562/#630).

- Changed Ethernet indicator behavior and include them in 'Show Rear Indicators' setting (#564).
- Fixed Ethernet issue causing tile to get into persistent glitchy state (#575).
- Fixed clearing tile counters in redundant system (#576).
- Fixed tile re-association issue when flipping between Main/Backup states (#579).
- Fixed tile power up in redundant system initially coming up in wrong mapping state (#584).
- Fixed MDIO issue causing tile-tile connectivity loss (#585).
- Fixed invalid Ethernet PHY temperature readings due to MDIO issue (#596).
- Fixed random tile redundancy flip due to command processing overhead in some messages (#631).
- Fixed Ethernet MDIO issues (#665)
- Disable IPv6 announce packets (#588).
- Fixed Tile Identify arrow appearance (#590).
- Improved correlation between HELIOS error counters and OMNIS reporting for PHY errors (#614).
- Fixed tile reset when flipping rapidly between test patterns and live video (#628).
- Fixed tile reset when flipping rapidly between main/backup systems (#663).

## Known issues

- HDR over DisplayPort is still in progress (#521)

## Version 20.05.0

After updating, the following should be displayed as the current versions:

| Device            | Version        |
|-------------------|----------------|
| HELIOS Software   | v20.05.0.20743 |
| HELIOS Firmware   | v20.05.0.270   |
| PX1 Receiver Card | v20.05.0.276   |

## Officially Supported Tiles

- Revolution Display ADVHD1.5
- Revolution Display ADV4 / ADV5 / ADV8
- Revolution Display RS1 / RS2 / RS3
- ROE Amber 1.5
- ROE Black Quartz 4.6
- ROE Diamond 2.6
- ROE Ruby 2.3
- ROE Sapphire 1.5

## New Functionality

- System Redundancy
  - System redundancy capabilities now available using a main/backup HELIOS both driving from each end of a string of tiles.
  - Both traditional failover backup mode and new seamless failover mode available.
  - Please refer to the User Guide for full details on configuration and operation.
  - **IMPORTANT NOTE:** Redundancy operation requires tile firmware v20.02.0.250 or later.
    - Unfortunately older tile firmware versions can fail to respond to processors in a redundant configuration.
    - **WORKAROUND:** Disconnect the tile from the backup processor (or power off the backup processor) then perform the tile upgrade.
  -

- **IMPORTANT NOTE:** HELIOS will need to reconfigure its attached network switches to support redundancy. (#487)
  - Switch reconfiguration will happen automatically when a network switch is connected to an upgraded HELIOS.
  - Current switch configuration version can be seen by looking at the switch's Contact field on the devices page, "v3" is the latest version.
  - **WARNING:** Once a switch has been reconfigured, it is not compatible with previous versions of HELIOS. Please contact us if you need to downgrade.
  - Please upgrade the HELIOS and its switches in an isolated environment before trying out the redundancy.
- HDR - High Dynamic Range with Dynamic Metadata support
  - **IMPORTANT NOTE:** Requires tile firmware v20.01.0.245 or later.
  - Initial support for SDR, HDR (traditional), HLG, and ST 2084 (PQ) curves
  - Initial support for dynamic range metadata.
  - Improved detection of (most) input colorimetry (DP is a known issue).
  - Please refer to the User Guide for full details on configuration and operation.
- Web Interface
  - Re-worked top right status icons.
  - Update sync status icon to indicate sync source (e.g., "Sync to HDMI") (#452)
  - Added a "Global settings" lock (#300).
  - Mobile - Added a test pattern selection to the mobile view (#478).
- Front panel LCD
  - Show the current operating mode (Standard/Jr) (#499).
  - Turning knob moves between pages.
  - Pressing knob now opens a menu:
    - Brightness %, Blackout, Freeze, and Test Pattern toggles.
    - Restore Factory Defaults.
    - Configure DHCP/Static IP address.
- Mapping
  - Identify option will now include "(rear only)" option when the "Rear indicator only" processor setting is set (#467).
  - Editable tile XY position can now be found under the "Positioning tools" (#460).
- Input
  - Added luminance-only support for HDMI 4:2:0. (#456)
-

- Output
  - Black clipping is no longer considered an “Advanced” function.
  - Default brightness limit to lowest to false, moved toggle to Output adjustment.
  - Added Gray Step Test Pattern (#365)
- Settings
  - Option to reset to factory settings while keeping the assigned IP (#351).
  - Update Center - Sort tiles by identify (#321).
- Shortcuts - Updated CSS. You can always use '?' to see keyboard shortcuts (#389).
- Switches
  - Temperature & fan speed monitoring added.
- Tiles
  - Alert when there's an authentication failure (#458)
  - Added diagonal line test patterns, and additional stats patterns to tiles (#423).
- Public API
  - Exposed device counters & sensors, available inputs, redundancy state, and the directly connected switches.
- Stacking
  - Should now discover other HELIOS when automatically assigned a link-local address (#495).
  - Improved/Reduced HELIOS-HELIOS connection time.

## Bug fixes

- Devices - Support for > 1GbE tile port speeds (#484).
- Output - Less truncated edit fields when using an iPad (#470).
- Settings - Support uploading of licenses via Safari.
- SDI Level B fixed (#439).
- Fixed PSU reporting thresholds for VCCINT & VCC\_PSINTFP (#465).
- Fixed DP errors on DP disconnect (#481).
- Avoid flickering when the input doesn't match the external sync's frequency (#482).
- Stop reporting that the external sync is valid after the external sync has been removed (#486).
- Changed wording when LDM is not in factory position (#503).
- Corrected DP EDID Vendor ID (#516).
- Heat Map - Hover temperature info above selection (#29).

- Mapping - Simplified selecting tiles when using port dropdown (#355).
- Output - show auto detected gamut (#525).
- Settings - pseudo-random static IP based on unit's MAC address.
- Fixed Interrupt handling issue causing memory corruption (#534).
- Fixed memory allocation issues and improved memory checking.
- Improved RPU crash handling.
- Reduced HELIOS Fan speeds.
- Adjusted ranges for SFP power limits for valid ranges.
- Update crash handlers in PX1 card.

### Known issues

- Support HELIOS to same HELIOS redundancy is on our road map (#514)
- HDR over DisplayPort is still in progress (#521)

## Version v20.01.0

After updating, the following should be displayed as the current versions:

| Device            | Version        |
|-------------------|----------------|
| HELIOS Software   | v20.01.0.20551 |
| HELIOS Firmware   | v20.01.0.252   |
| PX1 Receiver Card | v20.01.0.245   |

## Officially Supported Tiles

- Revolution Display ADVHD1.5
- Revolution Display ADV4 / ADV5 / ADV8
- Revolution Display RS1 / RS2 / RS3
- ROE Amber 1.5
- ROE Black Quartz 4.6
- ROE Diamond 2.6
- ROE Ruby 2.3
- ROE Sapphire 1.5

## New Functionality

- New HELIOS Jr. model released.
- Adjustments - Intensity adjustment to quickly adjust the brightness of a group of LDMs added. (#449)
- Canvas - Escape to deselect any selected objects. (#433)
- Input - Alert when an unrecognized/invalid input is detected. (#436)
- Mapping
  - Show aggregated port details when multiple tiles are selected.
  - Theater mode settings to adjust tile(s) max luminance to a different calibration target. (#450)
  - Show additional test patterns in HELIOS that are supported by tile firmware. (#415)

- Output
  - No longer categorized as "advanced functionality".
  - "Automatic" gamut automatically adjusts the display's gamut to match the source advertisement (which is going to be Rec. 709, see known issues).
  - Added "Limit max to lowest tile max" setting to control how max display brightness is calculated. (#411)
- Light Science feature added for tiles which support enhanced low level controls. (#432)
- PX1
  - Improved control over gamma curves added.
  - Advertise available test patterns to HELIOS. (#415)
  - Added small grid test pattern.
  - Ethernet PHY LED's are now disabled when turning off "Show Indicators" for the tiles.
- Health
  - Reports - Include device's serial number in all reports.
- Settings
  - Identify behavior option added- "Front identify & Rear indicator", or "Rear indicator only". (#264)
  - Licensing (#6)
    - Support for per-unit feature based licensing added.
    - All existing HELIOS units will automatically be issued a "Standard" license to allow selection between Standard & Jr modes.
  - Operating mode (#326)
    - Control whether HELIOS is configured in "Standard" mode (8 x 10GbE SFP+) or a new "Junior" mode (8 x 1GbE copper SFP).
    - Requires HELIOS using at least a OS 19.10.0 release. This can be verified under Devices->Processor->expand HELIOS and note the version listed for "OS". (For those needing this functionality with an OS version lower than 19.10.0, please contact Support for details on upgrading your OS.)



## Bug Fixes

- Devices - Removed support for incompatible SFPs. (#6)
- LCD
  - Show dual DP/HDMI in preview thumbnails for HELIOS configured using dual DP or dual HDMI input card configurations.
  - Update current input details if the input is changed while test pattern is active.
- Input
  - Avoid truncating reported frequency (e.g., 59.94).
  - Fix a DP state issue on disconnect. (#387)
- Output
  - Corrected bit depth calculation for 10-bit with non-60Hz frequencies. (#445)
  - Removed "Disabled" gamut.
- Settings
  - Networking - Keep static IP assignment when a DHCP server is available. (#462)
- Updates - Show HELIOS port information when updating tiles.
- Addressed an EEPROM write issue.
- Fixed bad sensor readings after a reboot. (#403)
- Sensor report improvements.
- Suppress some repeat error messages.
- PX1: Clearing Counters isn't clearing PHY errors. (#407)

## Known Issues

- Input - Advertised input colorimetry is often incorrectly assumed to be Rec. 709 (#64)
- Output - Still need to handle non-scalable and wide inputs (#210)
- Previews - Only single inputs are supported. i.e., 2x2 SDI, 4x1 SDI will be black (#395)

## Version v19.11.0

| Device            | Version        |
|-------------------|----------------|
| HELIOS Software   | v19.11.0.20468 |
| HELIOS Firmware   | v19.11.0.246   |
| PX1 Receiver Card | v19.11.0.216   |

## New Functionality

- Input - Automatically expand details for the selected input (#358)
- LCD - Make it more obvious when in blackout/test pattern (#209)
- Processor Settings - Renamed Experimental to Advanced mode (#334)
- Preview - Support preview for single inputs, but still working on stitched inputs (#159)

## Bug Fixes

- Application - Continue showing current input while test pattern is active (#357)
- Devices - Timeout detected sensor faults (#388)
- PX1 - Added delay after blackout before putting tiles into low power mode (#329)
- Fixed Alert Names (#163)

## Known Issues

- Previews - Only single inputs are supported. i.e., 2x2 SDI, 4x1 SDI will be black (#395)