

# Fast streaming to disk with Beacon

Scientific camera imaging software from Teledyne Photometrics

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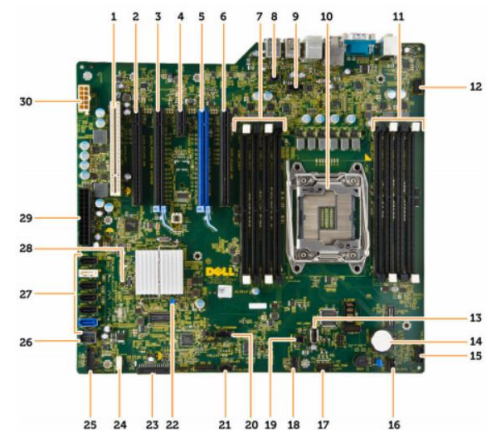
## 1. Prerequisites

1. A Teledyne Photometrics recommended computer such as Dell 5820, Dell 5860, HP Z4G4 or better with minimum of 32 GB 4 channel RAM, and Intel Xeon W-2245 or better CPU. Dual processor models are not recommended, a higher CPU base clock instead of large core count is preferred (e.g. an 8-core 5 GHz CPU would be preferred to a 32-core 3 GHz CPU). The computer must have at least two available PCIe Gen3 (or newer) slots, each supporting at least 8 PCIe lanes. [For recommended PC specifications, please click here.](#)
2. A NVMe Raid Controller card, **HighPoint SSD7101A** or better. The aim is to establish a sufficient volume of SSD storage in RAID-0 configuration in order to read/write data faster.
3. NVMe SSDs for storage, to fit into the Raid Controller card. This guide was tested with 4x **Samsung 970 Pro** 512 GB NVMe SSD drives for total of 2 TB array capacity (equivalent to 6m 40s of Speed Mode acquisition with the Kinetix sCMOS camera).
  - a. Alternatively, 4x Samsung 970 Pro 1TB NVME SSD drives– for total of 4 TB disk capacity (13m 20s of 8bit acquisition) – would provide similar performance.
  - b. Newer and larger drivers are generally suitable; however, careful consideration needs to be made when selecting an NVMe drive – the **sustained** sequential write speed is the most important factor. Please refer to 3<sup>rd</sup> party benchmarks such as TomsHardware to compare sustained sequential write speeds of various drives.
4. A **Teledyne Photometrics** camera. This guide was tested with Kinetix PCIe camera that provides roughly 5 GB/s of data in 8-bit Speed mode.
5. [ImageJ application software](#) for viewing image stacks.



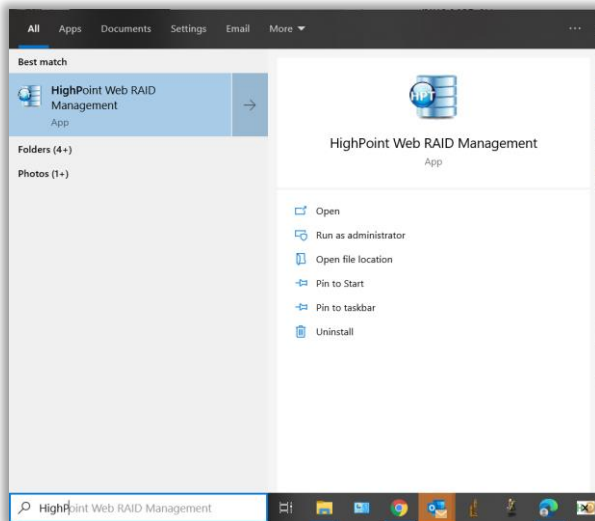
## 2. Configuring the hardware

1. Follow the [HighPoint Quick Installation guide](#) and install all 4 NVMe SSD drives into the adapter card
2. Depending on the target computer, install the HighPoint card into an available PCIe 3.0 (or better) slot. The slot must have at least 8 PCIe lanes available and should be directly connected to the CPU, not to the PCH. Please consult your motherboard manual for details. A Dell 5820 computer was tested in the following configuration:
  - GPU installed in one slot (black, marked 6 on image)
  - Kinetix PCIe adapter installed in slot (blue, marked 5 on image)
  - HighPoint SSD controller installed in slot (black, marked 3 on image)

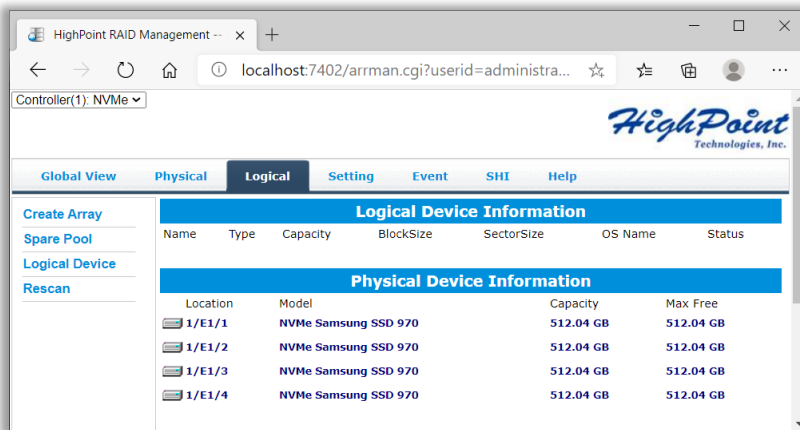


### 3. Configuring the RAID array

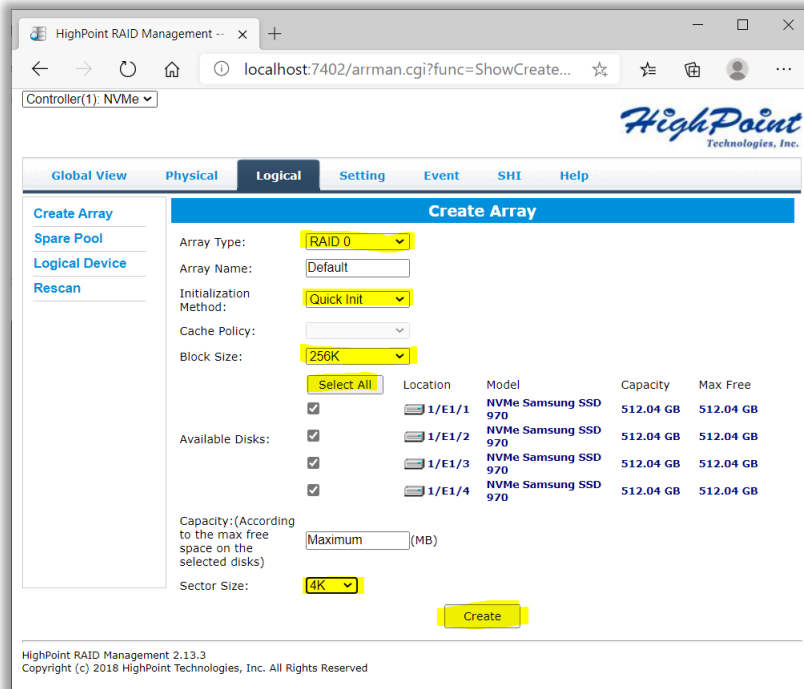
1. Download and install the [HighPoint RAID management software](#). A computer restart may be required, please follow the installation instructions.
2. By typing “HighPoint” in the Windows start menu, locate and launch the “HighPoint Web RAID management software”.



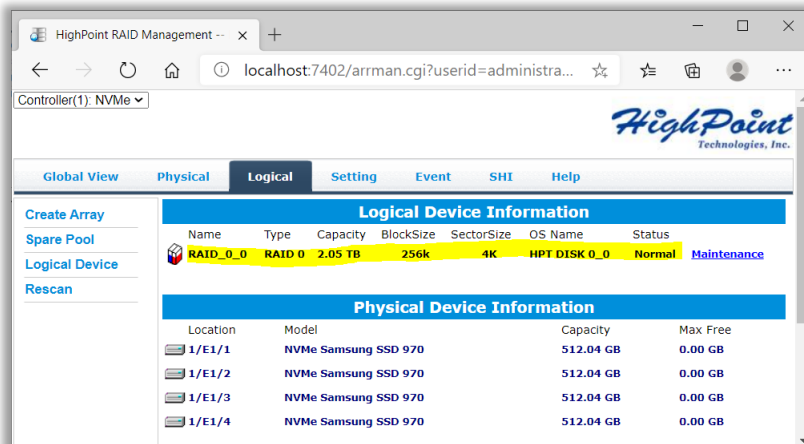
3. Navigate to the “Logical” panel and click “Create Array” (if you do not see the disks as in the screenshot below, please check the HighPoint installation instructions again).



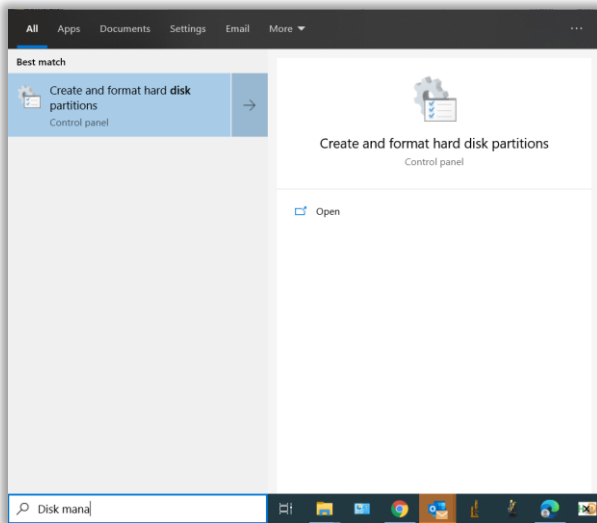
- In the following window, please make sure the configuration corresponds to the screenshot below.
  - Array Type: "RAID 0"
  - Initialization Method: "Quick Init"
  - Block Size: "256K" or "512K"
  - Click the "Select All" button to select all available disks
  - Sector Size: "4K" (if you do not see the "Sector Size" selection, please skip this step)
 If all sections are correct, select "Create"



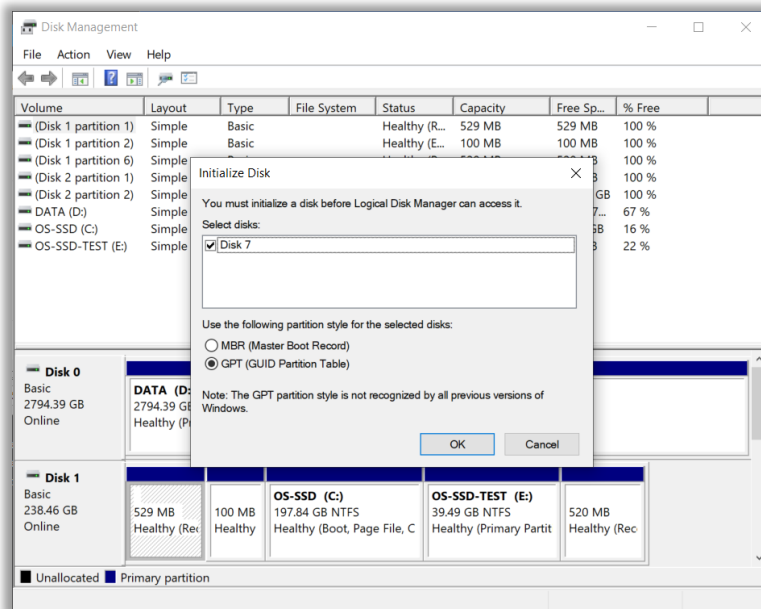
- If successfully configured, the RAID array should be displayed in the main screen. **However**, the RAID array will not be immediately visible to the operating system. It needs to be initialized and formatted first.



- Start typing "Disk Management" in the Windows search bar and launch the "Create and Format hard disk partitions" control panel.

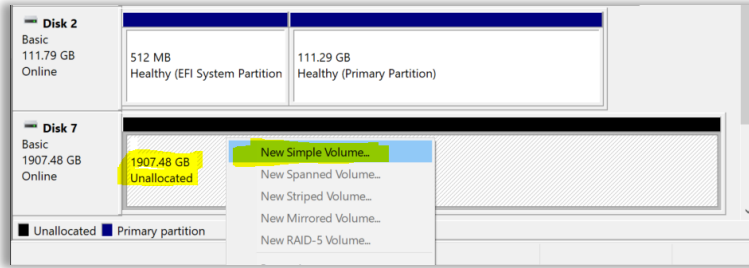


- Upon launching the control panel, the operating system may already detect the new drive and offer to **Initialize the Disk**. In such case, select the GPT partition style and confirm the dialog. If the Initialize Disk dialog does not appear, try to locate a "1907.48GB" or similarly sized, uninitialized disk in the list, right-click on the disk label (the left side of the disk strip) and choose "Initialize".

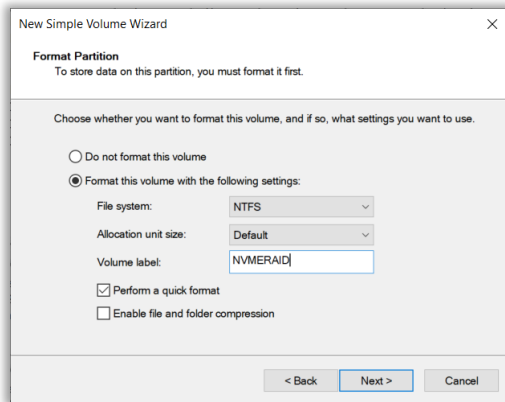


- Once the disk is initialized, it needs to be formatted and assigned a letter.

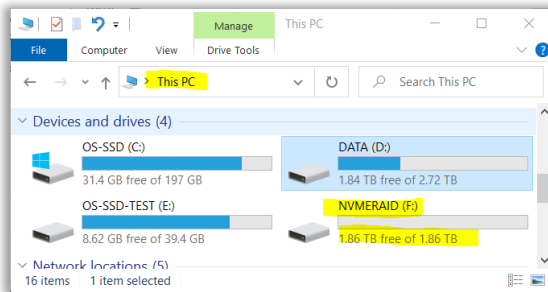
9. Right-click on the “Unallocated” partition and choose “New simple volume”.



10. A simple wizard will guide the user through the volume creation. Keep everything default, keep the File system as NTFS, feel free to update the Volume label for easier drive identification and finish the wizard.

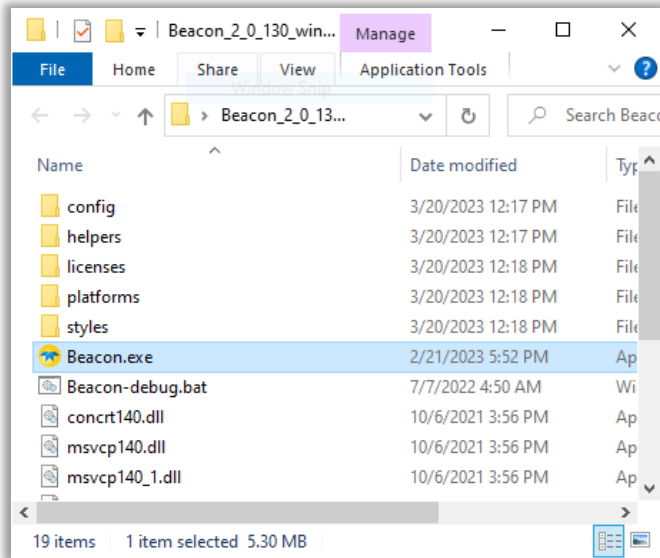


11. A new disk driver should be now available in the “This PC” folder:

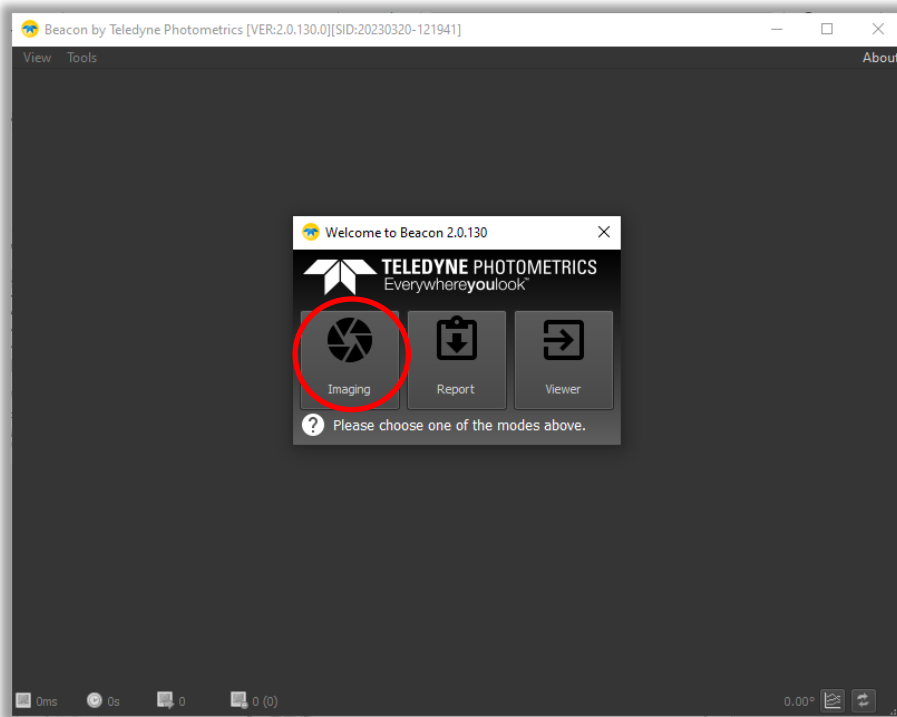


## 4. Disk streaming with Beacon

- 1) Launch the Beacon application by executing the Beacon.exe file.

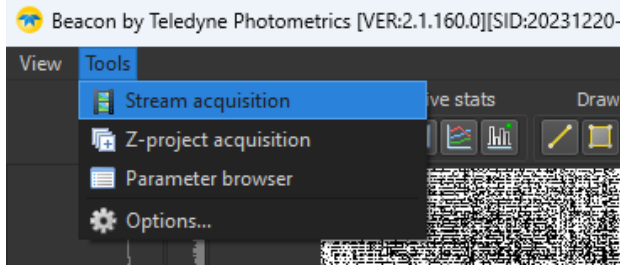


- 2) Upon launching the application, select the "Imaging" mode.

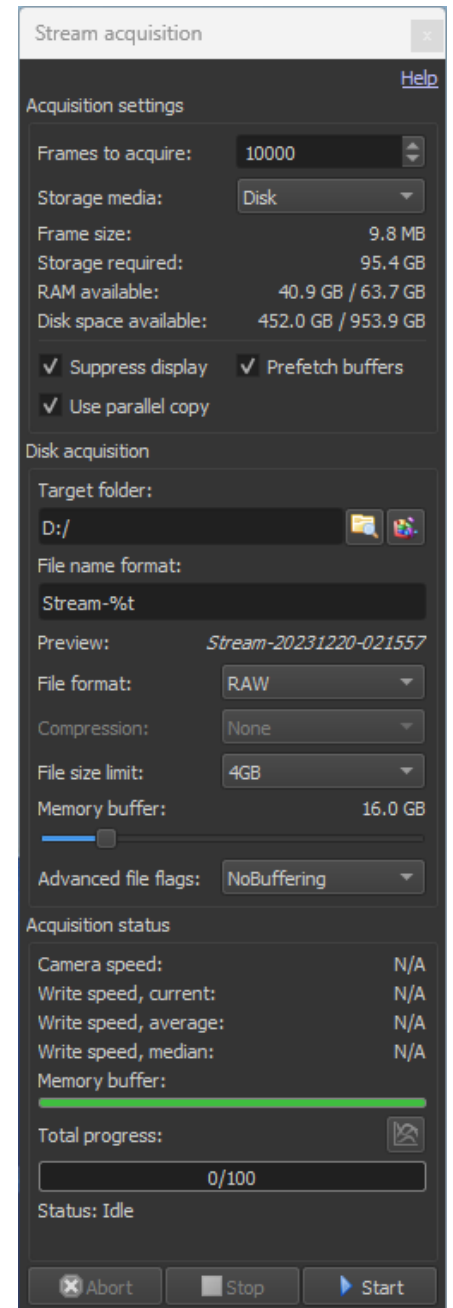


- 3) In the Main Application Window, configure the Camera to the desired mode, select the 8-bit mode by choosing the "Speed" port. For fastest frame rate, keep the exposure at 0.
- 4) Verify the camera functionality and configuration by starting and stopping live or acquiring frames as desired.

- Use the Tools menu to open the Stream Acquisition control panel.



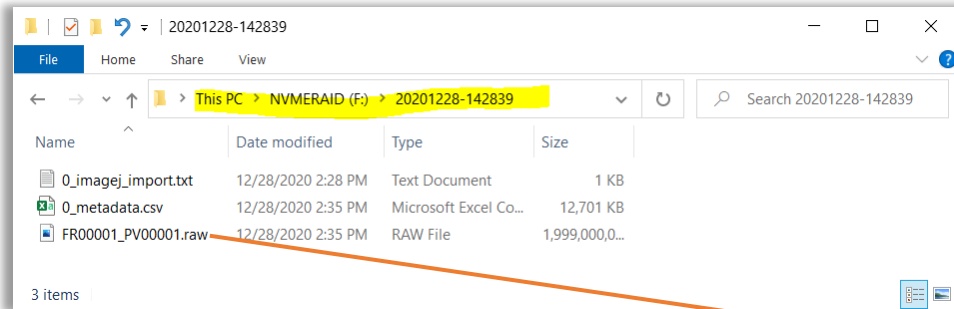
- Set the "Frames to acquire" to the desired number of frames. If the disk is empty, it should be possible to fill the disk completely with 199900 frames with the 2 TB disk array. Before the disk is selected in the next step, some numbers may be highlighted in red, this will disappear once the correct disk is selected.
- Set the "Storage media" to "Disk". Once selected, the Disk acquisition panel will become available.
- "Suppress display", "Prefetch Buffers" and "Use parallel copy" options are recommended.
- Select the "Target folder" in the newly created drive. A subfolder is automatically created with each acquisition.
- Make sure the "File format" is set to "RAW". Depending on the computer specifications, the TIFF format may be too slow for fast acquisitions and may be suitable for slower modes / higher exposures only.
- Everything else should be kept default, "File size limit" at "4 GB", "Memory buffer" at least "16 GB" and "Advanced file flags" at "NoBuffering".
- When ready, click "Start" to initiate the acquisition. If the "Start" button is not available, make sure the correct drive is selected and the number of frames can actually fit in the drive. If something is not correct, the Stream Acquisition dialog will highlight the error in red.
- Once the acquisition completes, the image stack(s) should be ready in the target directory.





## 5. Working with the acquired stack

1. Once the acquisition completes, the image stack with supporting files will be stored in a subfolder in the target folder.
2. Read the auto-generated "0\_imagej\_import.txt" to import the file in ImageJ. Simply drag & drop the .raw file into the ImageJ and follow the "0\_imagej\_import.txt" instructions.



3. When Importing large, single files in ImageJ, it is highly recommended to use the "Virtual Stack" option

