PC Setup for Vicon Systems

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Vicon Motion Systems is an OMG plc company.
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About this manual

PC Setup for Vicon Systems explains how to set up your Vicon system, including Bonita and Basler Video cameras. It gives details about how to set up both the required hardware and software.

It also includes information about using Bonita and Basler video cameras with Vicon Nexus and setting the relevant camera attributes.

If you are setting up your system or adding video cameras for the first time and need detailed information on installing and configuring the recommended hardware and software, read this guide from the beginning.

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Setting up the hardware and operating system

Before you set up your Vicon system or use video cameras for the first time, complete the following procedures, as required:

▌ Check the system components

▌ Install the SSDs

▌ Enable AHCI (Windows 7 only)

▌ Change the BIOS settings

▌ Update Windows

Warning

Before opening up your computer, ensure it is switched off, unplugged and disconnected from peripheral devices, and that you are wearing an anti-static wrist band.

Check the system components

Before you begin setting up your Vicon system, ensure it includes the required components.

Important

The following specifications were correct at the time of publication, but may now have been superseded. For up-to-date information, please visit the Vicon website, or contact Vicon Support.

▌ Cameras: including Bonita Video and Basler cameras as required:
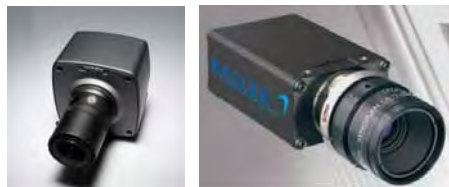
Important

Bonita Video cameras are compatible with Vicon Vantage cameras, Vicon MX T-Series cameras and Bonita Optical cameras. You can also use them with DV cameras. You may use a maximum of four Bonita Video cameras in a single Vicon system.

▌ PC: As recommended on the Vicon website, with NVIDIA graphics card.

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Network card (NIC): Intel i350 T4 Quadport Ethernet Server Adapter RJ-45 PCI-E, or Intel Ethernet Server Adapter i210 T1 single port adapter.

Tip

If you want to use a 4x video camera system with your optical cameras, note that you need one port for each video camera and at least one port for the optical data.

SSDs: Corsair Neutron Series™ GTX CSSD 240GB 2.5". Each SSD can take two video streams.

SSD controller card (if required – only needed for older machines that have fewer than four SATA ports): StarTech 2-Port SATA 6 Gbps PCI Express SATA Controller Card:

Connectivity device: Vicon Lock+, Giganet, Ultranet, Trendnet, PoE+ switch.

Note that for optimal performance and to include synchronization and timecode support, Bonita Video cameras should be connected to a switch that connects to a Vicon Lock+, or to a Giganet. Whichever switch is used, each video camera should be separately connected to the switch and the cabling should connect the switch to a network card in the PC. Connect optical cameras via separate cabling and network card. For examples of various system setups, see

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▌ **Cables**: power and Ethernet cables as required, including 4 x SATA cables and (for older machines using an SSD controller card only) Molex to 2x Molex power splitter cable:

Install the SSDs

It is usually easier to connect the SATA cables to the SATA drive before installing it in the PC, as shown in the following instructions.

Note

The following instructions have been largely superseded as the process of installing the SSDs is simpler in more recent PCs. However, you may need to refer to them if you are installing into an older machine.

To insert the SSDs into the drive trays:

1. Remove a drive tray from the rack supplied with the SSDs by pressing the retaining clip and pulling outwards.

Tip

The drive trays for some racks have plastic retaining clips, as shown in the following illustrations; others have metal clips, as shown above.

2. Slide the first SSD into a tray, making sure it is the right way up:

3. Using the supplied screws, attach the drive to the tray.

4. Replace the tray in the rack and click the clip shut:

5. Repeat for all the SSDs:

The rack is now ready to be installed in the PC.

To install the SSDs:

1. Open the side of the PC so that you can install the rack into a spare bay.

2. To eject a bay spacer from the front of the computer to make room for the SSDs, push the retaining clip that holds the bays in the direction of the arrow on the casing (highlighted in the following illustration):
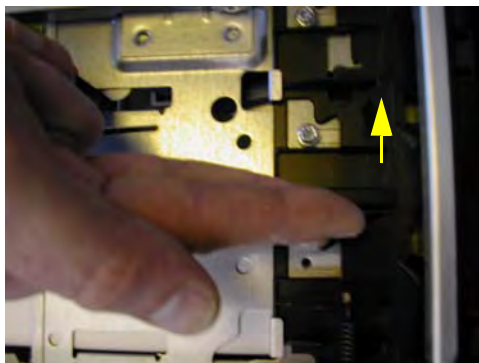
3. Continue pressing on the clip while pushing the bay spacer outwards from the inside of the PC until it is released:

4. Remove the screws from the back of the plastic casing by pinching in the clip and pulling outwards:

5. Connect the SATA cables to the rear of the rack and attach the screws to the sides, using the bottom hole in each case. Attach two screws (one at the

front and one at the back) on the side furthest from the power sockets and one at the front on the same side as the power sockets:
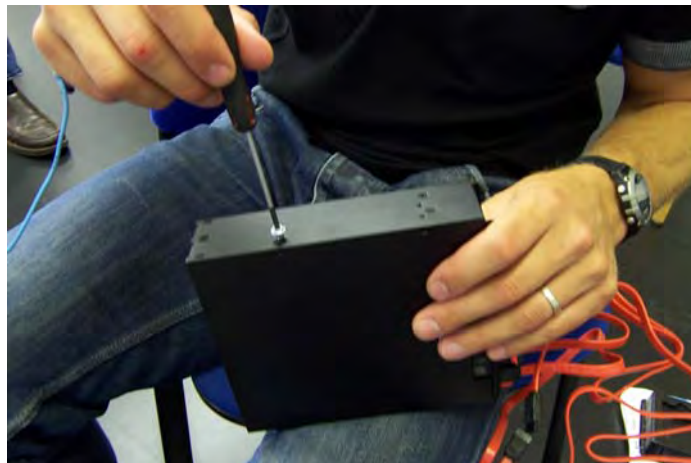
6. Feed the SATA cables through into the computer, ready to be connected up after you have installed the rack in the vacant bay, positioning the power socket(s) on the rack for easy access:

Power sockets
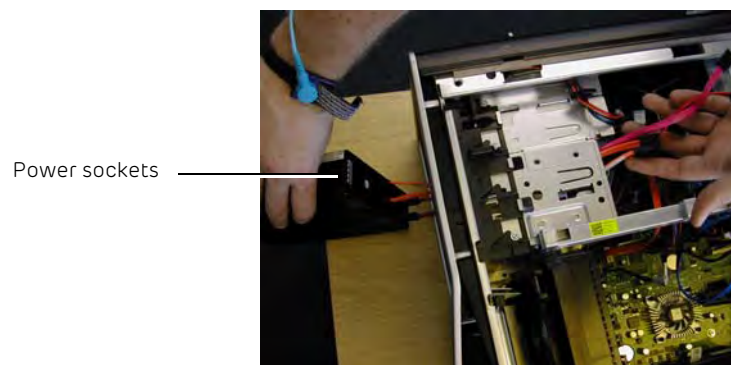
7. To install the rack, push the retaining clip in the direction of the arrow (see Step 2), push the rack firmly into place and then release the clip.

8. Attach the remaining screws.

9. If you are using a Molex splitter cable, connect the Molex power cables to the power socket on the SATA drive:

10. Plug the ends of the SATA connectors into the motherboard:
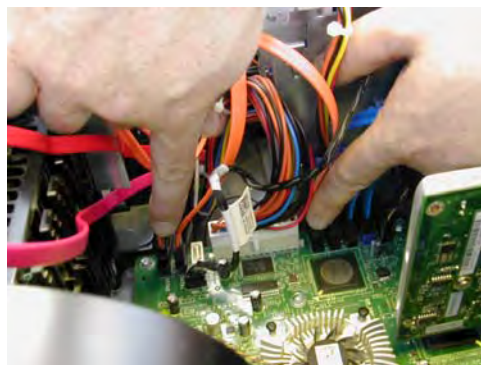
Important

When using multiple SSDs for video capture, ensure they are connected to different SATA controllers on the motherboard. (Note that each SATA controller may have multiple SATA ports.)

For example, in the following photo, the capture SSDs are attached to the motherboard using the yellow SATA cables. One is connected to SATA controller 2, port 3, and the other is connected to SATA controller 3 port 1.

11. If you are using a SATA controller card, plug the remaining two SATA connectors into the SATA controller card:

12. Replace the plastic fascia and the side of the PC.

Enable AHCI (Windows 7 only)

If you are using Windows 7, ensure that AHCI is enabled before proceeding.

To check AHCI is enabled:

1. Open the **Device Manager** (click the Windows **Start** button and then in the search field enter `Device Manager` and in the list of found items, click **Device Manager**).

2. Expand **IDE ATA/ATAPI Controllers**.

3. If you cannot see a driver named **Standard AHCI 1.0 Serial ATA Controller** or similar, you must put the SATA controller into AHCI mode, as described below. If AHCI is already enabled, go to Change the BIOS settings on page 17.

   ### Caution

   If you do not complete the following steps to enable AHCI before you change the RAID options, Windows may not work.

   Before you change the registry as described in the following steps, create a System Restore Point (see the Windows online help for details).

To put the SATA controller into AHCI mode:

1. Click the Windows **Start** button, then in the search box type `regedit`.

2. Right click **regedit.exe** and then click **Run as administrator**. Enter your user credentials as required and click **Yes** to open regedit.

3. Navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\msahci.

4. In the right pane, right-click **Start** and then click **Modify**.

5. In the Edit window, change the value to `0` and click **OK**.

6. To close regedit, on the **File** menu, click **Exit**. Restart the PC and make the changes described in the next section, Change the BIOS settings on page 17.

Change the BIOS settings

If RAID has been set up as a system default, you will need to change this to enable the PC to boot correctly. You will also need to ensure that the required ports are selected and that hyperthreading is enabled.

To check RAID/AHCI options:

1. On booting, press F12 (Boot options).

2. Select **System Setup** and press Enter:

3. In the BIOS **Settings** tree on the left, expand **Drives** and then click **SATA Operation**.

4. In the **SATA Operation** pane on the right, ensure that **AHCI** is selected (if you don't have an AHCI option, select **RAID Autodetect/AHCI** instead):
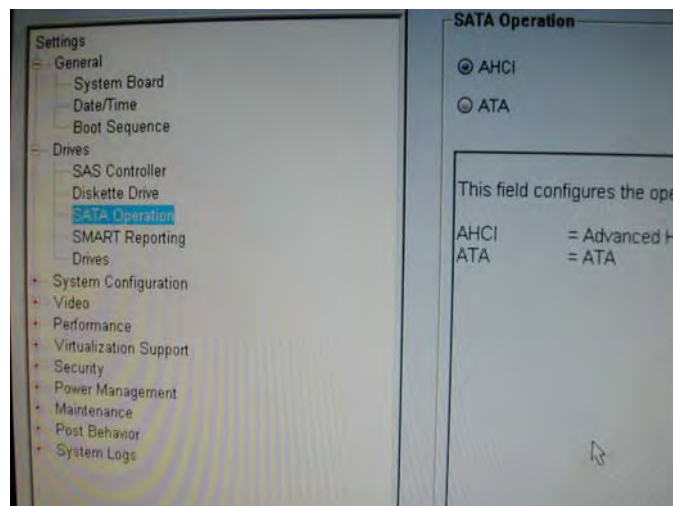
Enable the SATA drive

After you have installed the SSDs and enabled AHCI (Windows 7 only), you must enable the SATA drive before you begin to set up the SSDs in Windows.

To enable the SATA drive:

1. To enable the required ports, in the BIOS **Settings** tree on the left, in the **Drives** section, click **Drives** to display the list.

2. Select the required SATA drive and click **Apply** to enable it:
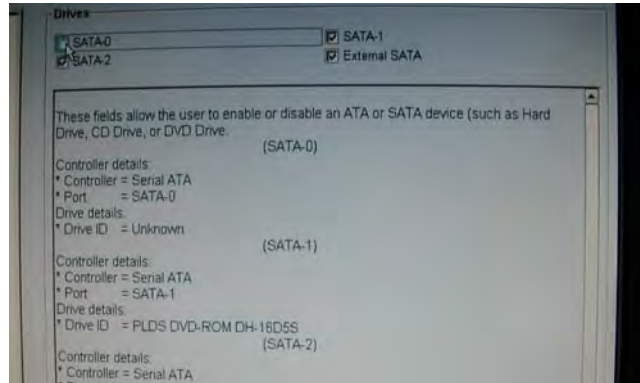
Tip

If you are not sure whether a disabled drive is the one you want, enable it (that is, select it) so that you can check. If necessary, you can disable it again afterwards.

Enable hyperthreading

In addition to enabling AHCI (Windows 7 only) and enabling the SATA drive, you must also ensure that hyperthreading is enabled.

To check the hyperthreading options:

1. In the **Settings** tree, expand the **Performance** node and select **Hyper-Threading Technology**.

2. In the **Hyper-Threading Technology** pane on the right, ensure that the check box for **Hyper-Threading Technology** is selected:
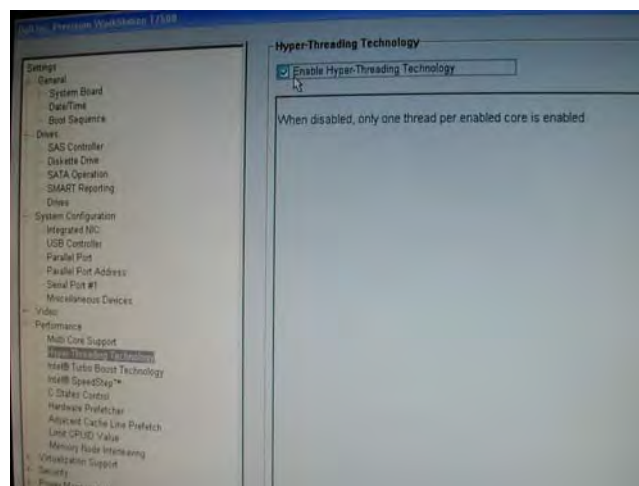
3. If you have made any changes, click **Apply**.

Change the boot sequence

To ensure the PC operates correctly with the cameras, you will need to change the items that are selected on boot up.

To change the boot sequence:

1. Access the **BIOS Settings** tree, as described in Change the BIOS settings on page 17, in steps 1 and 2.

2. In the **Settings** tree on left, expand **General** and then click **Boot Sequence**.

3. In the **Boot Sequence** pane on the right, clear the check boxes to disable everything apart from the hard disk:
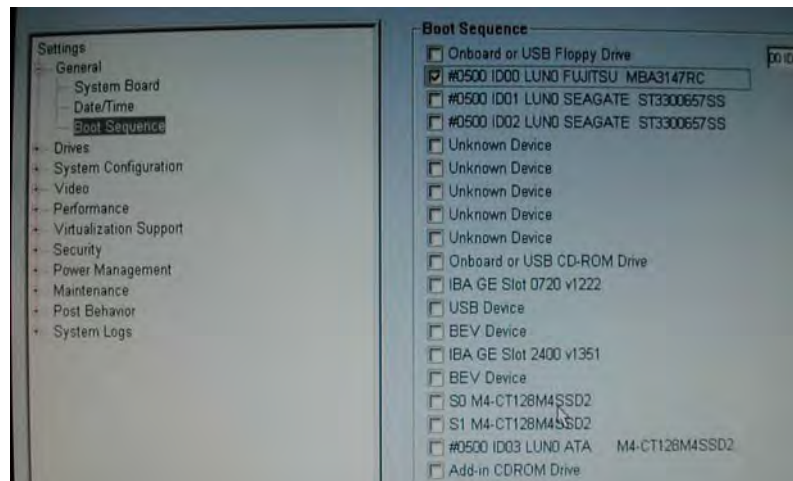
Tip

If you prefer, you can leave the CD ROM drive enabled (if it is not enabled, on booting you will have to press F12 and select the CD drive to boot from).

4. Click **Apply**.

Update Windows

Before proceeding, make sure you have the latest Windows updates.

To update Windows:

1. Run Windows Update to make sure you've got the latest software.

   > **Tip**
   > To make sure your captures are not interrupted by automatically run downloads, click **Change Settings** and select either **Check for updates but let me choose whether to download and install them** or **Never check for updates** (but in this case, remember to check for updates periodically). Vicon also recommends configuring your Windows power saving settings to prevent the hard disk from turning off when not in use. For more information, see Configure power saving settings on page 23.

2. When you get screen showing available updates, select everything *except* the following, which you will download later from the manufacturers' websites:

   ▌ **Intel Ethernet Server Adapter drivers** for the NIC

   ▌ **NVIDIA Quadro (2000, 4000, FX 1800, FX 1700 or FX 1600, etc) drivers** for the graphics card

3. Click **OK**, accept licensing terms and click **Finish**.

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Configure power saving settings

When capturing, power saving settings can cause problems during long periods between captures, by preventing the drives from re-activating quickly enough. To prevent the Windows power saving feature from interfering with capturing, before you begin captures, you can switch off power saving.

To change power saving settings:

1. In the **Control Panel**, click **Hardware and Sound**.

2. In the **Power Options** section, click **Change power-saving settings**.

3. Click **Change plan settings** and then click **Change advanced power settings**.
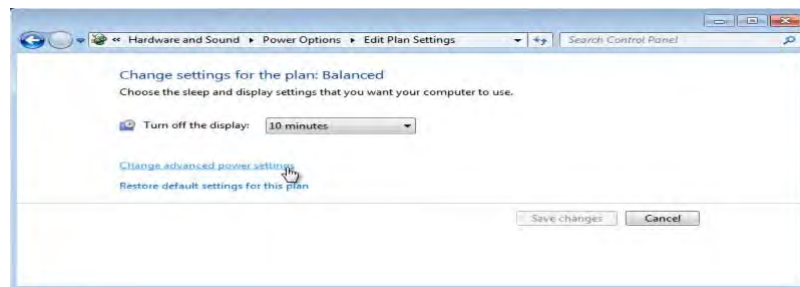
4. In the **Power Options** dialog box, expand **Hard disk** and then **Turn off hard disk after**.

5. Change **Setting (Minutes)** to **Never**:

6. Click **OK**.

   This prevents hard disk from ever spinning down, so the PC is always ready to capture.

7. To avoid interruptions by the display settings, set **Turn off the display** to **Never** too:
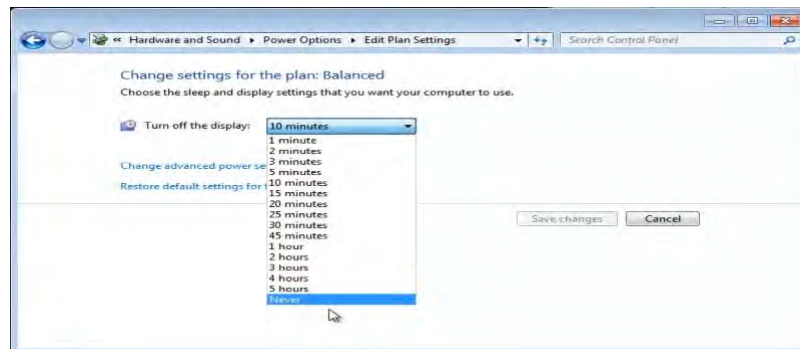
8. Click **Save Changes**.

9. Ensure all updates have finished installing before rebooting.

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Downloading the latest drivers

Before you set up your system, ensure you have all the latest drivers as described in the following topics:

| Download the graphics card driver

| Download the network card driver

| Download the Pylon driver (Basler cameras only)

Download the graphics card driver

To ensure that the system works correctly, it is important to download and install the latest driver for the graphics card.

To download the latest NVIDIA driver:

1. From a web browser, go to the NVIDIA website: www.nvidia.com.

2. Point to **Drivers** then click **All NVIDIA Drivers**.

3. On the **NVIDIA Driver Downloads** page, in Option 1 **Manually find drivers for my NVIDIA products**, make the appropriate selections.

   Tip

   The following instructions are for NVIDIA Quadro 4000 or 2000. If you have a Quadro FX card, download the appropriate Quadro FX driver instead. To check which card you are using, open **Windows Device Manager** and expand **Display adapters**.

   ▌ Product Type: **Quadro**

   ▌ Product Series: **Quadro Series**.

   ▌ Product: **Quadro 4000** (or **Quadro 2000**, if you have a lower spec PC)

   ▌ Download Type: **Quadro Performance Driver**

4. In the driver screen for Quadro/Tesla Desktop Driver, click **Download**.

5. Agree to the licensing conditions and click **Agree & Download**.

Download the network card driver

Before proceeding, you need to download and install the latest driver for the network card.

To download the drivers for the Intel card:

1. In a web browser, go to the **Download Center** on the Intel website http://downloadcenter.intel.com/.

2. In the **Find downloads by product name** area, select:

   ▌ Product family: **Network Connectivity**

   ▌ Product line: **Intel Server Adapters**

   ▌ Product name: **Intel Ethernet Server Adapter I350-T4**

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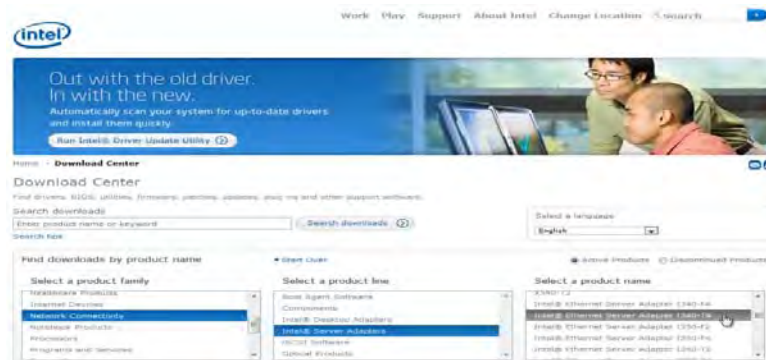
3. In the next window, select the correct operating system (**Windows 7 (64 bit)***) and select the latest version:

Tip

If you are already using the previous version of the driver, you must uninstall the previous version before installing the downloaded version.

4. Download the driver.

Download the Pylon driver (Basler cameras only)

Download the Pylon drivers from the Vicon website.

To download the Pylon drivers:

1. In your web browser, visit www.vicon.com/downloads.

2. At the top right of the **Downloads** page, click **Search downloads**.

3. In the Search field, type `Pylon` and then click **Search**.

4. In the Results list, click the **Basler Pylon Drivers** download:
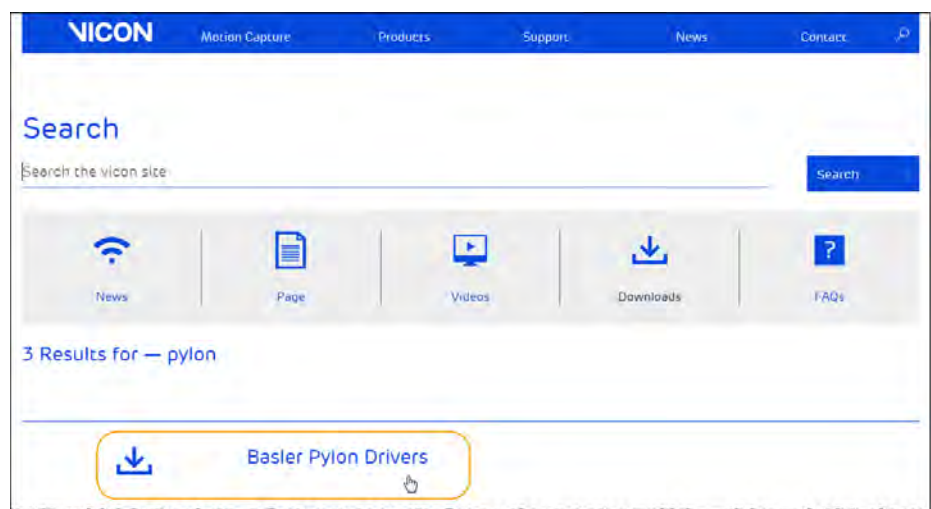
5. Download the **.zip** file to your PC.

    Important

    Note the message in the downloads window instructing you to use the **Filter drivers only**: when you install the drivers, *do not select Direct Show*.

If you are using multiple versions of Nexus, ensure you use the appropriate version of the Basler drivers for the version of Nexus with which you intend to use your Basler video cameras:

Nexus version number	Basler drivers version number
Nexus 1.7	Basler drivers 2.2
Nexus 2.x	Basler drivers 2.3.5

Caution

Although you can keep Nexus 1.7 on a machine on which you install Nexus 2.x, after you install the 2.3.5 Basler drivers, the video cameras that use the drivers are not available for use with Nexus 1.7.

Installing the downloaded drivers

When you have downloaded the required drivers, you can install them:

▌ NVIDIA Quadro 4000 (or 2000) graphics card driver. After you have installed the driver, see Configure the graphics card on page 32.

▌ You will then need to format the SSDs. For information, see Format the SSDs on page 33.

▌ Intel I350 Ethernet Server Adapter network card drivers. For information, see Install the network card driver on page 36.

▌ Pylon drivers (if you are using Basler cameras). For more information, see Install the Pylon drivers (Basler cameras only) on page 38.

Tip
If you have previously used Basler cameras, but are now using only Bonita Video cameras, uninstall the Basler drivers before using your system.

Configure the graphics card

After you install the NVIDIA driver, you may find you need to refine the settings to optimize your display.

To change the NVIDIA graphics card settings:

1. Open the **NVIDIA Control Panel** (right-click on the Windows desktop).

2. Expand the **Display** node on the left and make any required changes.
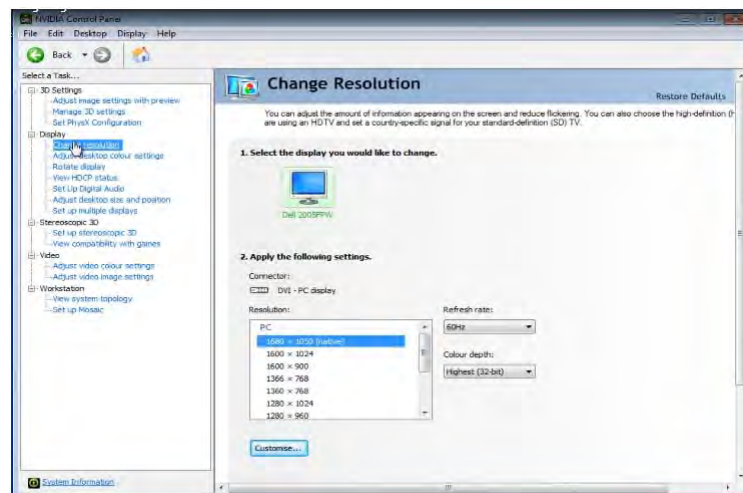
Format the SSDs

After you have installed the controller card and the SSD(s), you will find you are still unable to see the SSDs in Windows. To be able to do this, they must be formatted, using Windows disk formatting.

To format the SSDs:

1. Open the **Computer Management** window (click the Windows **Start** button, in the search field enter `Computer Management` and then click **Computer Management** in the list of found items).

2. In the **Computer Management** tree on left, click **Disk Management** and then in the lower half of the middle of the window, right-click an SSD and then click **New Simple Volume**:
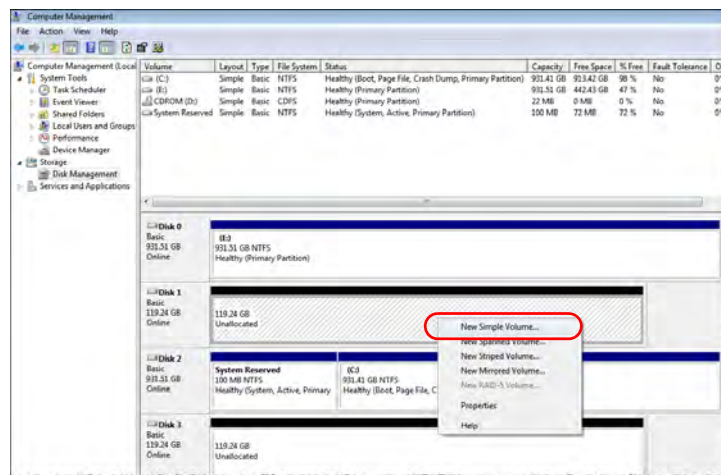
3. In the **Specify Volume Size** dialog box, check that the size is set to the maximum (the same value shown for Maximum disk space in MB) and click **Next**.

4. In the **Assign Drive Letter or Path** dialog box, choose a drive letter if required.

5. In the **Format Partition** dialog box:

    a. Ensure format volume **File system** option is **NTFS**.

    b. Leave the **Allocation unit size** at its default value.

    c. Give the **Volume label** a suitable name, such as SSD1.

    d. Leave **Perform a quick format** selected and click **Next**:
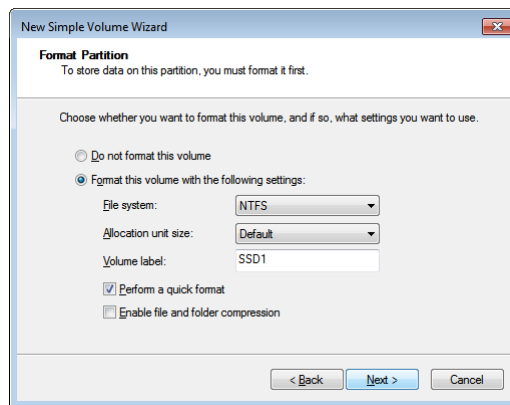
6. In the next dialog box, click **Finish**.

    The SSD is now visible in the **Computer Management** window.

7. Repeat the procedure to name and format the remaining SSDs, which are displayed as **Unallocated**:
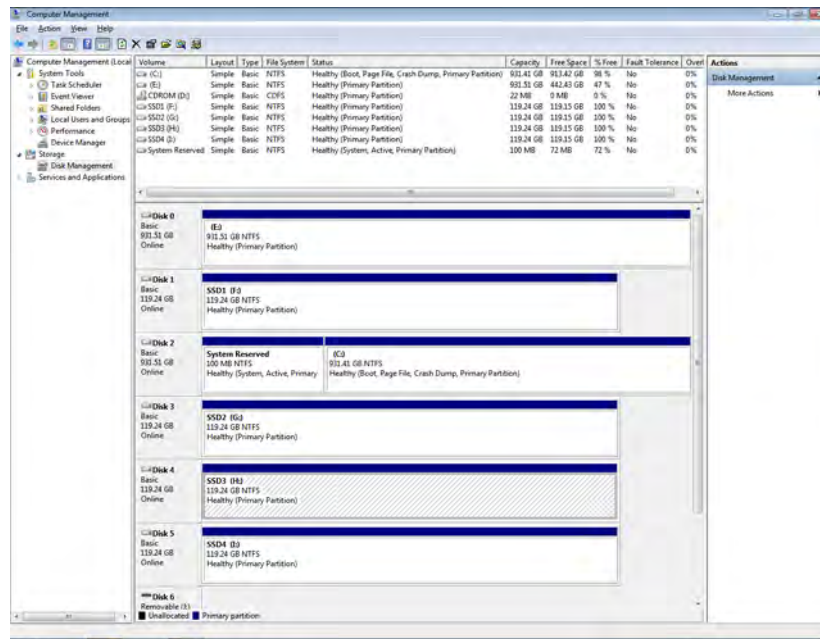
Install the network card driver

The network ports are not visible until you install the Intel I350 Ethernet Server Adapter driver.

Tip

Before you install the latest version of the network card driver, uninstall any previous versions, using **Add/Remove Programs** or **Uninstall a Program from the Computer**.

To view the currently available ports:

1. Do one of the following:

    ▌ From the **Control Panel** open the **Network and Sharing Center** (in Windows 7, **Control Panel** > **Network & Internet** > **View Network Status and Tasks)**; or

    ▌ Click the **Network and Sharing Center** icon on the right of the Windows toolbar:

2. On the left, click **Change adapter settings**:

    Note that, if your version of Windows has not automatically installed the drivers, only the onboard (LAN) network port is visible:

3. If you cannot see the other ports, install the Intel I350 Ethernet Server Adapter driver (PROWinx64 for 64-bit Windows; or PROWinx86 for 32-bit Windows).

To view all the network ports:

▸ Install the downloaded driver file, accepting all the default settings. The other ports are now visible:

Install the Pylon drivers (Basler cameras only)

To use Basler video cameras with Nexus 2.x, you must install version 2.3.5 of the Pylon drivers.

Before you begin installing the Pylon drivers, check that you have prepared your PC:

▌ If previous versions of the Pylon drivers are installed on your PC, uninstall them using **Add/Remove Programs**, or **Uninstall a Program from the Computer**.

▌ If you are using FIreWire cameras with a version of the Pylon drivers that is older than 2.3.5:

    a.   Disconnect the Basler cameras from the PC FIreWire card.

    b.   Uninstall the previous version of the Pylon drivers.

    c.   Reconnect the Basler cameras to the PC FIreWire card.

    d.   Install version 2.3.5 of the Pylon drivers.

To install the Pylon drivers:

1.   Unzip the file you downloaded from the Vicon website.

2.   Choose the appropriate folder for your version of Windows and double-click the installation file to install it:

Windows version	Folder extension
32-bit	.x86
64-bit	.x64

3. Follow the installation wizard as far as specifying the destination folder, and click **Next**:
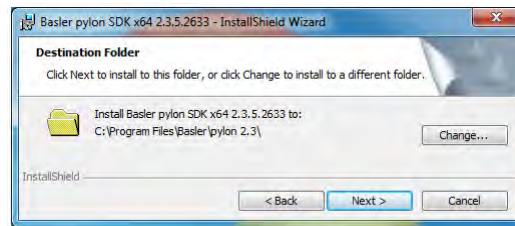
4. In the next window, specify the components to be installed. Ensure the following options are selected and deselect everything else:

▌ Pylon Viewer

▌ If you are using FIreWire cameras: **Pylon IEEE 1394 Drivers**

▌ If you are using GigE cameras: **Pylon GigE Vision Drivers**

If you selected **Pylon GigE Vision Drivers**, deselect the **GEV Performance Driver**:
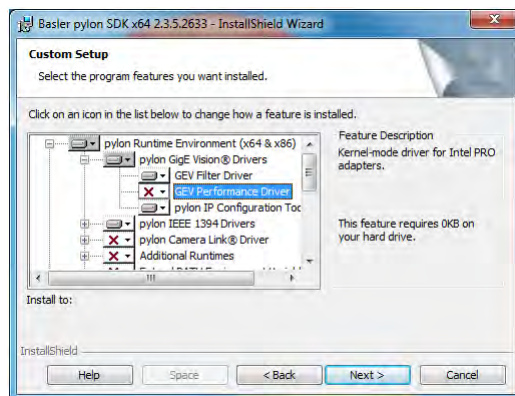
5. Click **Next** and then click **Install**. When the final window is displayed, click **Finish**.

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Configuring and connecting the network ports

After you have downloaded and installed the required drivers, and made the network ports visible in Windows, you need to configure the network ports to enable them to work with the Vicon system and Bonita Video or Basler cameras. To configure the network ports, complete the following procedures:

▎ Configure advanced adapter settings

▎ Identify and name ports

▎ Assign an IP address to a port

▎ Connecting Basler GigE cameras to your Vicon system

▎ Connecting Basler FIreWire cameras to your Vicon system

▎ Configure cameras with the Pylon IP Configuration Tool (Basler GigE cameras only)

Tip

Unless you have set Windows Update to automatically check for updates, check for any more Windows updates before continuing.

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Configure advanced adapter settings

To enable the network ports to communicate with Bonita Video or Basler (GigE) cameras, ensure the Advanced Adapter Settings are configured correctly.

To change the Advanced Adapter Settings:

1. Open the **Network Connections** window.

2. Right-click on the first network port and click **Properties**

3. In the **Properties** dialog box, click **Configure** and then click on the **Advanced** tab.

4. In the **Settings** list, ensure the following values are selected:

    a. Click **Interrupt Moderation** and in the **Value** list, click **Disabled**.
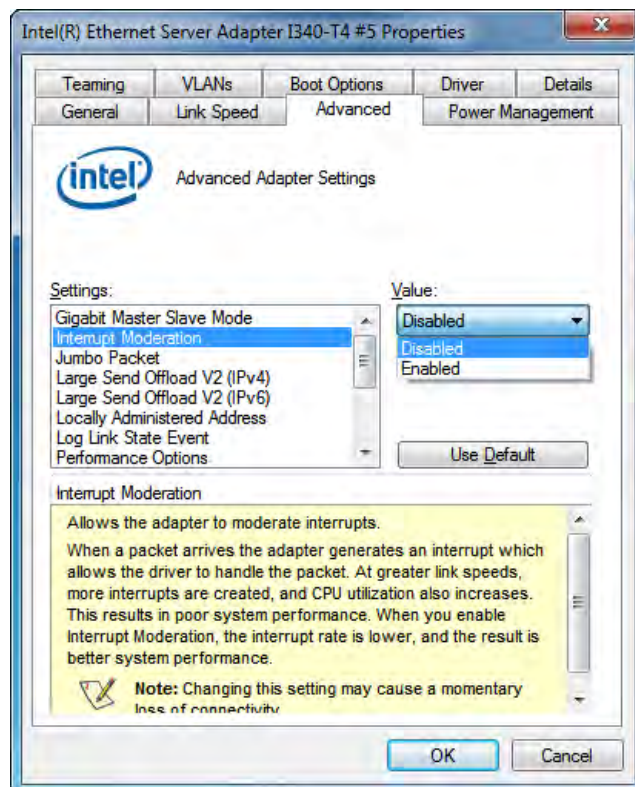
b. Click **Jumbo Packet**, and in the **Value** list, click **Disabled** and select **9014 Bytes (ie the maximum value)**:

c. Click **Performance Options** and then click **Properties**.

d.   In the **Performance Options** dialog box:

a.   Click **Interrupt Moderation Rate** and in the Value list, select **Off**.
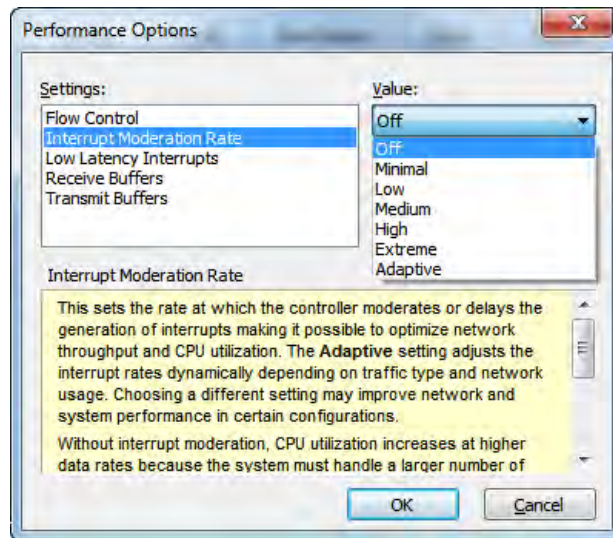
b.   Click **Receive Buffer** and in the **Value** list, select the maximum value (**2048**):
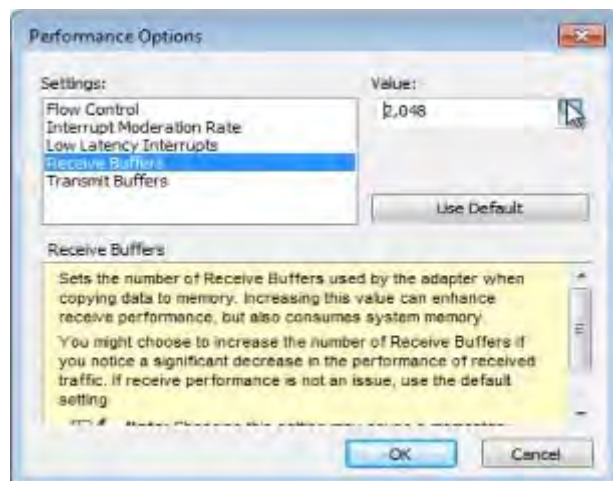
c.   Click **OK** to close the **Performance Options** dialog box and return to the **Settings** list.

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d. Click **Receive Side Scaling** and in the **Value** list, select **Enabled**.
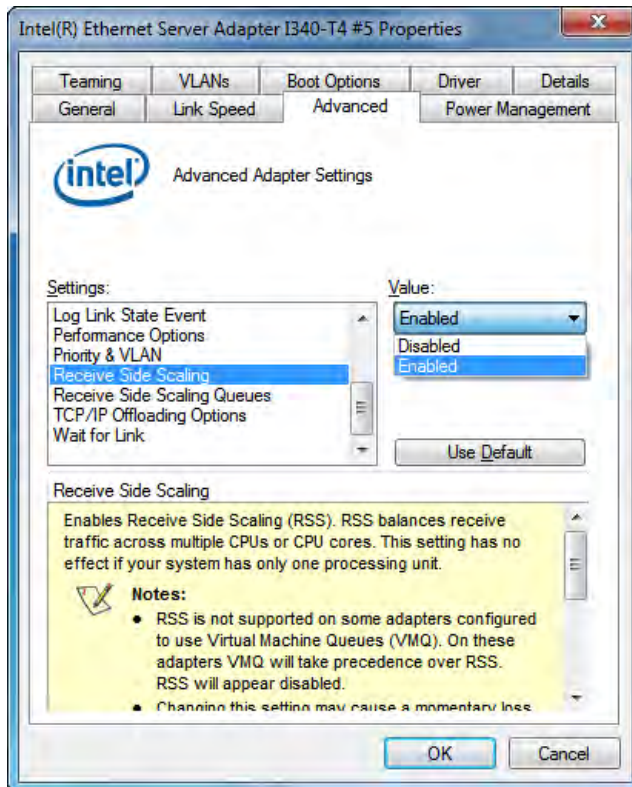
e. Click **Receive Side Scaling Queues** and in the **Value** list, select the maximum value.
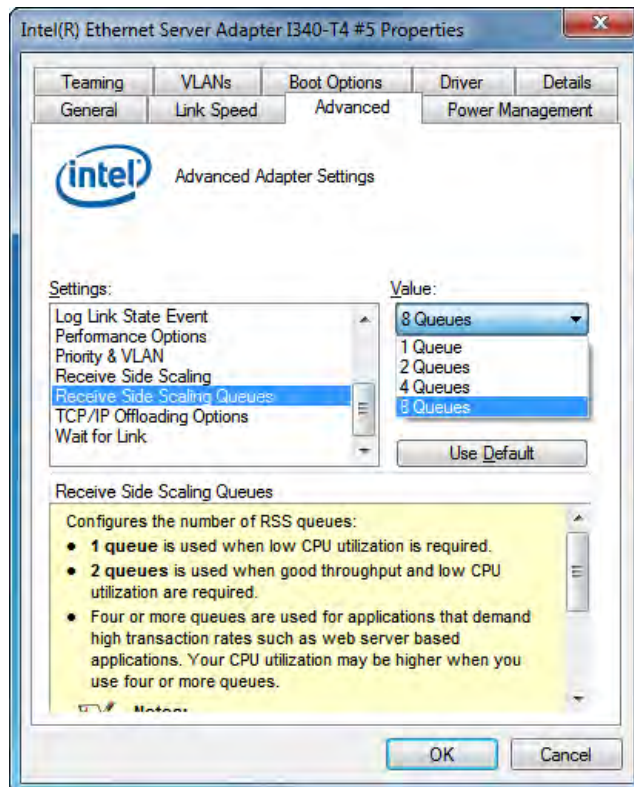
5. Click **OK** to accept changes and exit.

6. Repeat the procedure for the other network ports.

Identify and name ports

To make it easy to identify the network ports, name them with the IP addresses that you will assign to them.

To identify and name ports:

1. To see the currently available ports, open **Network Connections** (for a reminder of how to do this, see Install the network card driver) on page 36.

2. To identify the ports, begin by plugging a live network cable into a port and note its position (for simplicity, it may be easiest to choose the port on the far right or the far left).

3. Rename the identified port with the IP address you will assign to it:

Tip

For Bonita Video cameras, if your Vicon system already uses 192.168.10.1, use the next address (192.168.10.2) for the I350 T4 instead of 192.168.10.1 shown above. Number the remaining ports consecutively (that is, 192.168.10.3, 192.168.10.4 and 192.168.10.5).

For Basler cameras, use the IP address 10.0.0.1, then 11.0.0.1, 12.0.0.1 and 13.0.0.1 for additional ports. For an example of IP addresses for a complete Basler system, see Example IP configurations for Basler cameras on page 58.

For a table that lists commonly used IP addresses for Vicon systems, see Standard Vicon system IP addresses on page 51.

4. Move the network cable to the next port. **Network Connections** displays a red X to indicate that the unplugged port is now not connected, and a new

one becomes connected. Enter the next IP address as the name of the second port:

5. Repeat for all the ports.

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Assign an IP address to a port

To assign the correct IP addresses to the ports, modify their network settings.

To change the settings on the ports:

1. Start with the first port that you named in the previous section. In **Network Connections**, right-click on the port and then click **Properties**.

2. In the **Properties** dialog box, on the **Networking** tab, clear all the unwanted items, leaving only the following items selected:

   ▌ Internet Protocol Version 4 (TCP/IPv4):
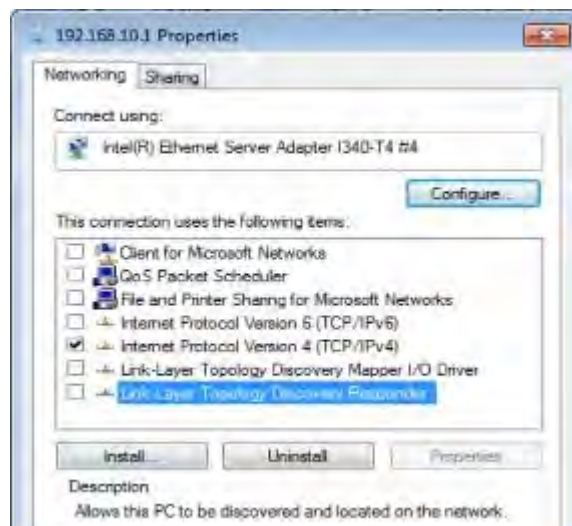
▌ For Basler (GigE) cameras only: **Pylon GigE Vision Streaming Filter**:
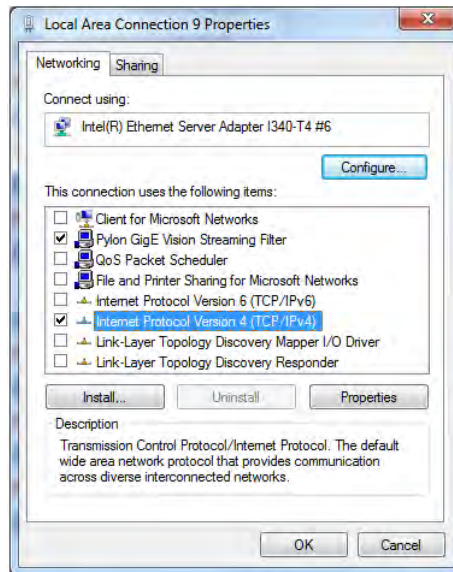
3. Click on **Internet Protocol Version 4 (IPv4)** and then click **Properties**.

4. In the **Properties** dialog box, select **Use the following IP address** and in the IP address box, enter the main system IP address (the name you gave to this

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port, for example `192.168. 10.1`) and subnet mask (`255.255.255.0`) and click **OK**:
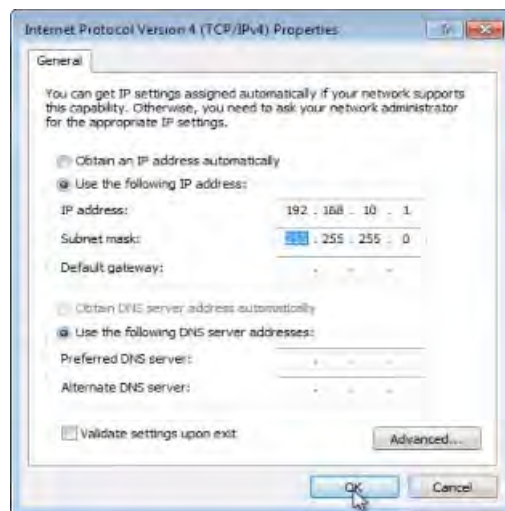
5. Click **Close** to close the **Properties** dialog box and save the settings.

6. Repeat from step 1 of for the other network ports.

If you are using Basler (GigE) cameras, you must now configure the cameras in the **IP Configuration** utility.

Standard Vicon system IP addresses

The following table shows IP addresses that are commonly used in Vicon systems:

Device	IP Address
Main network card port	192.168.10.1
Port for Bonita Video 1	192.168.10.2
Port for Bonita Video 2	192.168.10.3
Port for Bonita Video 3	192.168.10.4
Port for Bonita Video 4	192.168.10.5
Port for Basler Video 1	10.0.0.1

Device	IP Address
Port for Basler Video 2	11.0.0.1
Port for Basler Video 3	12.0.0.1
Port for Basler Video 4	13.0.0.1

Connecting Basler GigE cameras to your Vicon system

The following instructions apply to supported GigE monochrome (black and white) and color Basler cameras.

To connect a supported Basler GigE camera:

1. Connect a Basler GigE camera sync cable to one of the four Powered Sync ports on the Giganet:
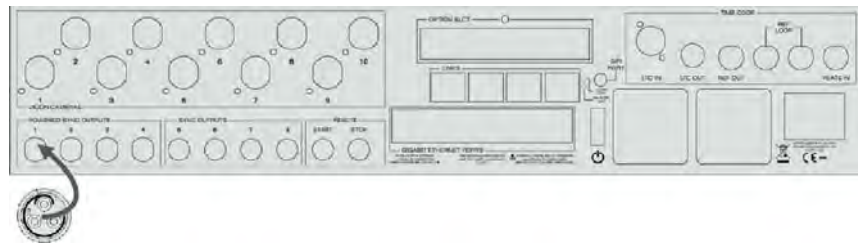
2. Connect the other end of the cable to the round 12-pin socket on the rear of the Basler GigE camera:

3. With an RJ-45 Ethernet cable, connect a PCI Ethernet port on the rear of the host PC to the Ethernet port on the rear of the Basler GigE camera:

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Connecting Basler FIreWire cameras to your Vicon system

The following instructions apply to supported FIreWire monochrome (black and white) and color Basler cameras.

To connect a supported Basler FIreWire camera:

1. Connect a Basler FIreWire camera sync cable to one of the four Unpowered Sync Outputs ports on the Giganet:
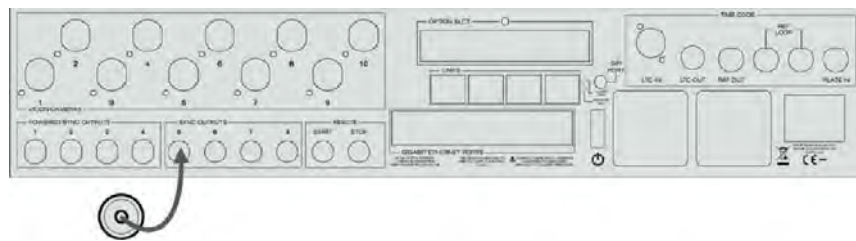
2. Connect the other end of the sync cable to the RJ-45 Ethernet cable port on the rear of the FireWire camera:

3. With a standard 6-pin FireWire cable, connect the IEEE 1394 socket on the rear of each FireWire camera to a FireWire port on the rear of the host PC.

Configure cameras with the Pylon IP Configuration Tool (Basler GigE cameras only)

After you have assigned the IP addresses for the camera ports, before you can use your system, you need to assign the camera IP addresses using the **Pylon IP Configuration Tool**.

To assign an IP address to a Basler camera:

1. Ensure your Basler camera is connected to a live connectivity device that is powered on.

2. Plug one end of an RJ45 cable into the back of a camera and the other end into the first network port of the i350 to which you assigned an IP address, for example, 10.0.0.1 (see Identify and name ports on page 47).

3. Ensure you have installed the correct Pylon driver (see Install the Pylon drivers (Basler cameras only) on page 38).

4. On the Windows desktop, double-click the **Pylon IP Configuration Tool** icon:
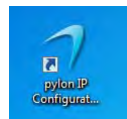
5. Note the IP address you assigned for the network card port, which is shown in the **Connected to IF** area. (As listed in Standard Vicon system IP addresses on page 51, the usual IP address for the first network port in a

system that includes Basler cameras is 10.0.0.1) Click **Change Configuration**:
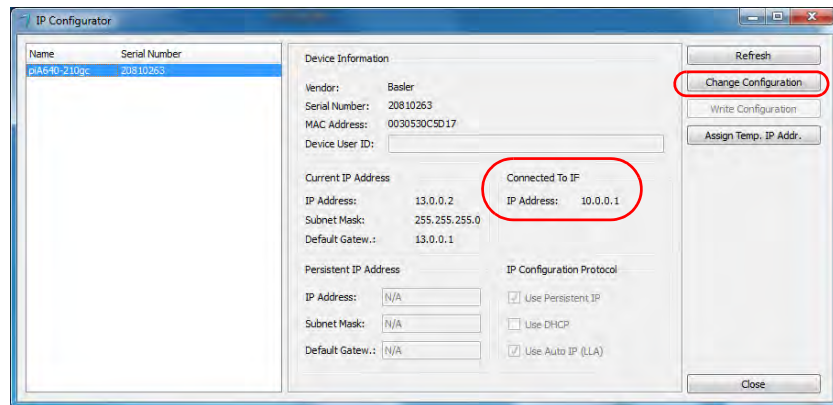
6. If you are prompted to assign a temporary IP address for the device, click **OK**:
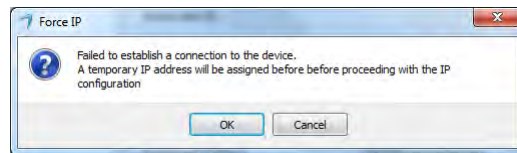
7. In the **Assign Temporary IP Address** dialog box, enter the following and then click OK:

▌ **IP Address:** Enter an address that is 1 digit higher than the IP address assigned to the I350 network card. For example if your I350 network card address was 10.0.0.1, enter `10.0.0.2`. For further examples, see (see Example IP configurations for Basler cameras on page 58). This will be the IP address for the camera.

▌ **Subnet Mask**: `255.255.255.0`

▌ **Default Gateway**: The address of the I350 network card, which is the IP address to which the camera is connected, for example `10.0.0.1` (see Example IP configurations for Basler cameras on page 58).

8. In the persistent IP address dialog box, enter the IP addresses as before and ensure **Use Persistent IP** is selected:
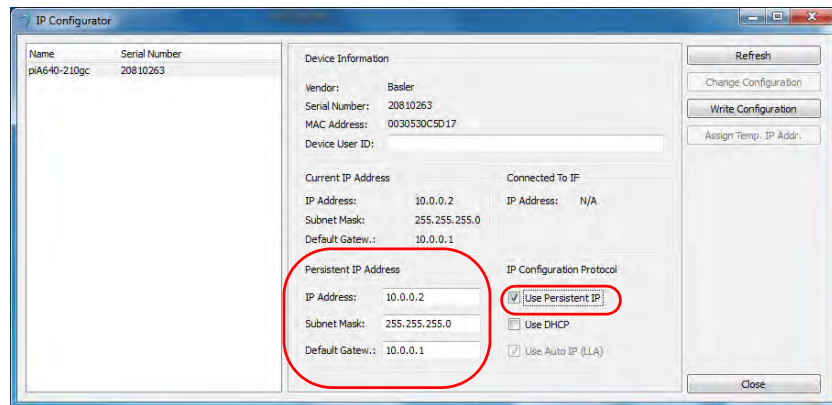
9. Click **Write Configuration**.

    The camera may power-cycle whilst the IP addresses are assigned:
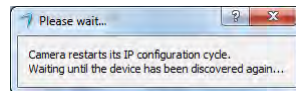
    The camera is now available in Pylon Viewer and/or Vicon Nexus.

10. Repeat the procedure for the rest of the cameras, using the next network port each time and using the correct IP addresses as shown in the examples in Example IP configurations for Basler cameras on page 58.

Tip

You can only view the output from a video camera in either Pylon Viewer or Vicon Nexus. You cannot view the camera output in both applications at the same time.

Example IP configurations for Basler cameras

The following table shows example IP addresses for four network card IP addresses and cameras:

Network Card (i350) IP Address	Persistent IP Address (Pylon IP Config)	Default Gateway (Pylon IP Config)	Subnet Mask (Network Card & Pylon IP Config)
10.0.0.1	10.0.0.2	10.0.0.1	255.255.255.0
11.0.0.1	11.0.0.2	11.0.0.1	255.255.255.0
12.0.0.1	12.0.0.2	12.0.0.1	255.255.255.0
13.0.0.1	13.0.0.2	13.0.0.1	255.255.255.0

Checking camera setup in Pylon Viewer

To check that your cameras are now correctly configured, use the Pylon Viewer.

To view cameras with Pylon Viewer:

1. On the Windows desktop, double-click the **Pylon Viewer** icon:

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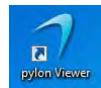
2. To ensure triggering is turned off, select an attached Basler camera and in the **Feature** tree, expand **Acquisition Controls** and in the **Generate Software Trigger** field, ensure **Off** is selected:
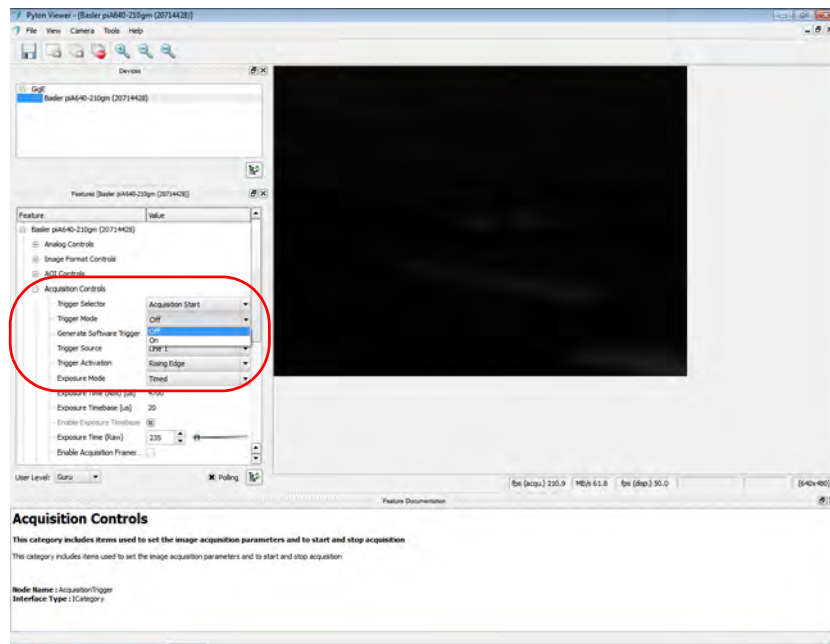
3. With the camera selected, click the **Continuous Shot** button:
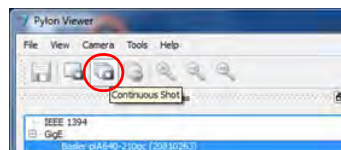
4. If the image is not displayed, set the **User Level** to **Guru**, then in the **Features** list, expand **Configuration Sets**, set the **Configuration Set Selector** to **Default Configuration Set** and **Execute** the **User Set Load**.
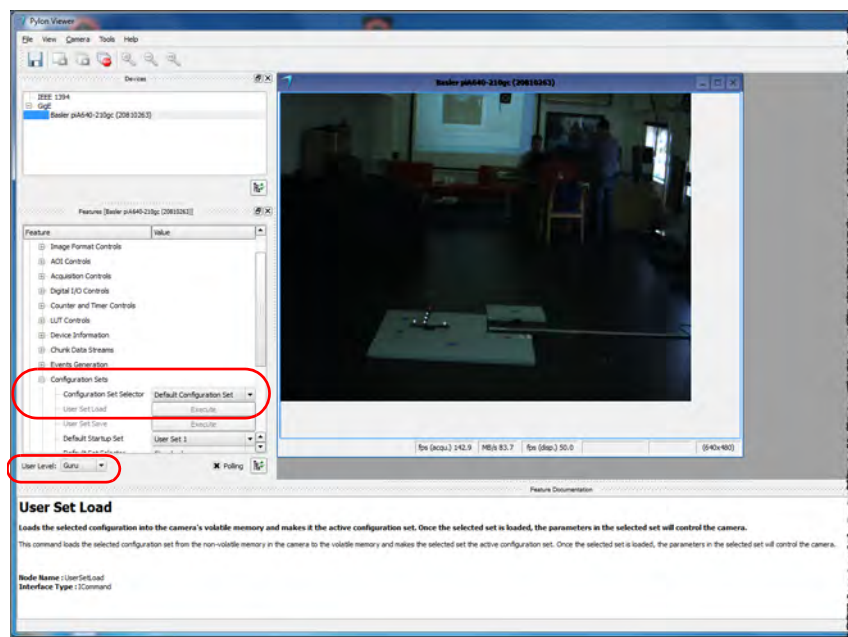
5. When the image is displayed, stop the grab and exit the Pylon Viewer.

You are now ready to set up the Basler cameras in Nexus.

Vicon system connection diagrams

This chapter includes diagrams of the following example system configurations:

▌ Vicon Vantage simple system with up to 12 cameras

▌ Vicon Vantage system with up to 12 additional cameras
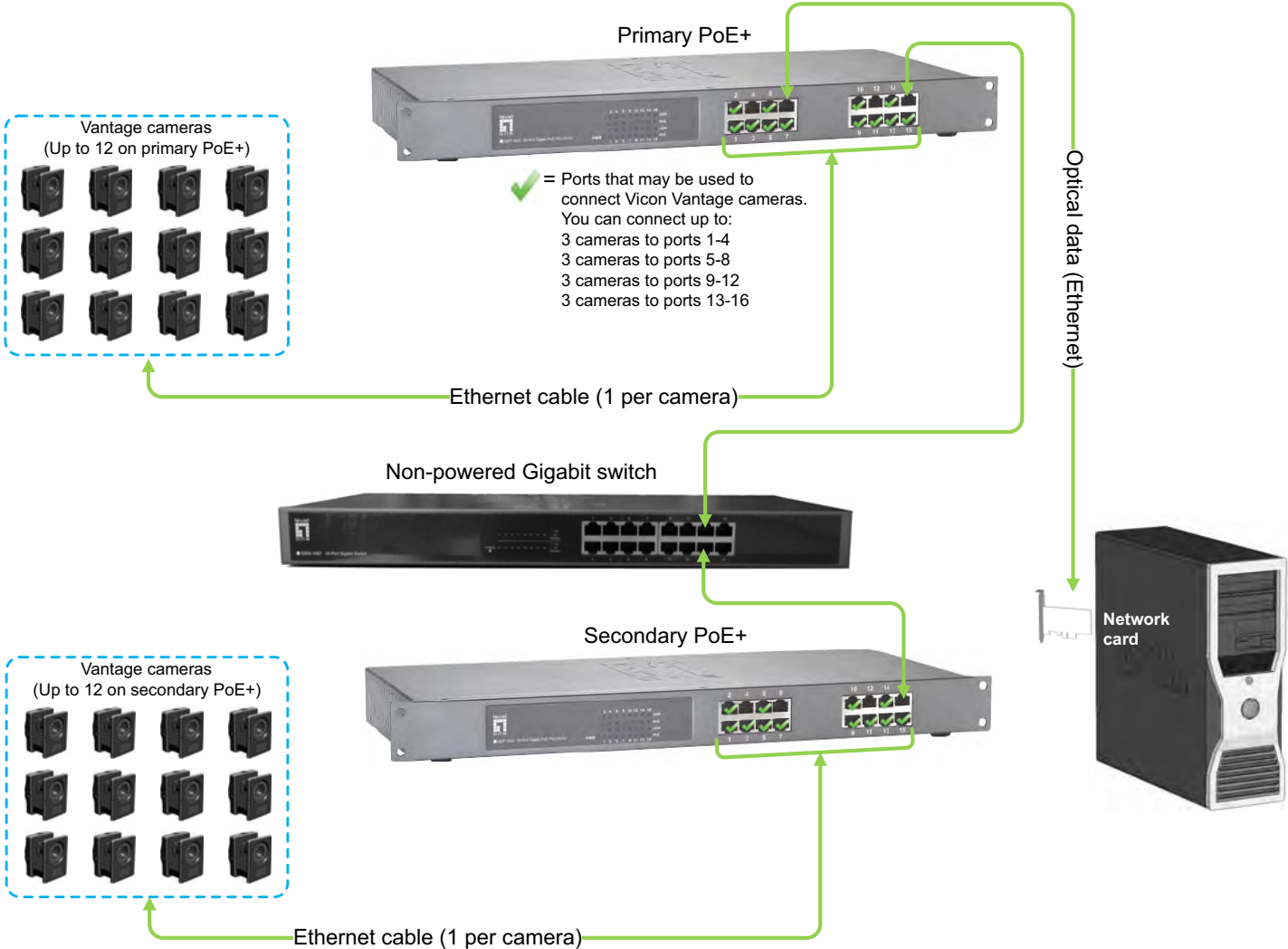
▌ Vicon Vantage extended system with Lock+ and Bonita Video

▌ Vicon MX T-Series/Bonita system with 8-Port PoE+ and Giganet

▌ Vicon MX T-Series/Bonita system with 24-Port PoE+ and Giganet

▌ Vicon MX T-Series or Bonita system with Giganet only

▌ Vicon Bonita system with no Giganet

▌ Vicon MX T-Series/Bonita system with master Giganet

▌ Vicon MX T-Series/Bonita system with Lock+

Note

The following system configurations were current at the time of publication, but may now have been superseded. For up-to-date information, please visit the **Vicon website** or contact **Vicon Support**.

Vicon Vantage simple system with up to 12 cameras

Primary PoE+

Vantage cameras
(Up to 12 per PoE+)

✔ = Ports that may be used to
connect Vicon Vantage cameras.
You can connect up to:
3 cameras to ports 1-4
3 cameras to ports 5-8
3 cameras to ports 9-12
3 cameras to ports 13-16

Optical data (Ethernet)

Ethernet cable (1 per camera)

Network card

Vicon Vantage system with up to 12 additional cameras

Primary PoE+

Vantage cameras
(Up to 12 on primary PoE+)

✅ = Ports that may be used to
connect Vicon Vantage cameras.
You can connect up to:
3 cameras to ports 1-4
3 cameras to ports 5-8
3 cameras to ports 9-12
3 cameras to ports 13-16

Optical data (Ethernet)

Ethernet cable (1 per camera)

Non-powered Gigabit switch

Secondary PoE+

Vantage cameras
(Up to 12 on secondary PoE+)

Network
card

Ethernet cable (1 per camera)

Vicon Vantage extended system with Lock+ and Bonita Video

Vantage cameras (Up to 12 on primary PoE+)

Primary PoE+

= Ports that may be used to connect Vicon Vantage cameras.

Ethernet cable (1 per camera)

Optical data (Ethernet)

Vicon Lock+

Non-powered Gigabit switch

Third-party devices (up to 64 channels)

Host PC video

Host PC video

Secondary PoE+

Vantage cameras (Up to 11 on secondary PoE+)

2 Bonita Video cameras

Video data (Ethernet)

Video data (Ethernet)

Network card

Ethernet cable (1 per camera)

Vicon MX T-Series/Bonita System with 8-Port PoE+ and Giganet

Vicon MX T-Series or Bonita Optical cameras (up to 10 per Giganet)

* Ethernet ports on Giganet do not provide power

8-Port PoE+

Camera to Giganet Cable (1 per camera)

Ethernet for sync to Video cameras

Ethernet for Optical data

Ethernet for Video cameras (1 per camera)

Ethernet for Video cameras (1 per camera)

Expansion of Bonita Optical to switch capacity

Ethernet connection for Link Aggregation

Up to 2 Bonita Video Cameras

Intel i350 T4 Quad Port network card or i210 T1 single port network card

Bonita Optical cameras

Vicon MX T-Series/Bonita System with 24-port PoE+ and Giganet

Bonita Optical or Vicon MX T-Series cameras (up to 10 per Giganet)

Bonita to Giganet Cable (1 per camera)

* Ethernet ports on Giganet do not provide power

Ethernet for Optical data

Ethernet for Optical data

24-Port PoE+

Ethernet for Video camera data (1 per camera)

Ethernet for Video camera data (1 per camera)

Ethernet connection for Link Aggregation

Up to 4 Bonita Video Cameras

Bonita Optical cameras

Intel i350 T4 Quad port or i210 T1 single port network card

Note: If you are using four video cameras, you will need more ports. Additional video connections will require an additional Intel i350 T4 Quad Port network card or an i210 T1 single port card; additional optical connections can use an Intel i340, or an additional i350 or i210.

Expansion of Bonita Optical to switch capacity

Vicon MX T-Series or Bonita System with Giganet Only

Bonita Optical or Vicon MX T-Series cameras (up to 10 cameras total per Giganet – including Video)

* Ethernet ports on Giganet do not provide power

Bonita to Giganet Cable Optional (1 per camera)

Bonita to Giganet Cable (1 per camera)

Ethernet for Optical data

Ethernet for Video cameras (1 per camera)

Ethernet for Video cameras (1 per camera)

Up to 4 Bonita Video Cameras

Intel i350 T4 or i210 T1 network card

Note: If you are using four video cameras, you will need more ports. Additional video connections will require an additional Intel i350 T4 Quad Port network card or an i210 T1 single port card; additional optical connections can use an Intel i340, or an additional i350 or i210.

Vicon Bonita System with No Giganet

Bonita Optical cameras (Up to 15 per Switch)

24-Port PoE+

Ethernet cable (1 per camera)

Ethernet for Optical data

Up to 4 Bonita Video Cameras

Ethernet for Video camera data (1 per camera)

Ethernet connection for Link Aggregation

Optional

Intel i350 T4 or i210 T1 network card

Note: If you are using four video cameras, you will need more ports. Additional video connections will require an additional Intel i350 T4 Quad Port network card or an i210 T1 single port card; additional optical connections can use an Intel i340, or an additional i350 or i210.

Vicon MX T-Series/Bonita System with Master Giganet

Vicon MX T-Series or Bonita Optical cameras (up to 10 per Giganet)

Camera Cable (1 per Camera)

Master Giganet
(master set in Nexus)

Vicon MX T-Series or Bonita Optical cameras (up to 10 per Giganet)

Camera Cable (1 per Camera)

Giganet

Intel i340, i350 T4, or i210 T1 network card
IP address: 192.168.10.1

Intel i350 T4 quad port, or i210 T1 network card
IP addresses: 192.168.10.2–5 (one per video camera)

Bonita Optical cameras

8-Port PoE+

Camera Cable (1 per camera)

Up to 4 Bonita Video Cameras (24-port PoE+) or up to 3 Bonita Video Cameras (8-port PoE+)

Camera Cable (1 per camera)

Vicon Bonita System with Lock

Bonita Optical cameras (Up to 15 per Switch)

24-Port PoE+

Up to 4 Bonita Video Cameras

Ethernet cable (1 per camera)

Ethernet for Optical data

Optional

Ethernet for Video camera data (1 per camera)

Ethernet connection for Link Aggregation

Intel i350 T4 or i210 T1 network card

Note: If you are using four video cameras, you will need more ports. Additional video connections will require an additional Intel i350 T4 quad port network card or an i210 T1 single port card; additional optical connections can use an Intel i340, or an additional i350 or i210.

Vicon Lock

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Using video cameras with Vicon Nexus
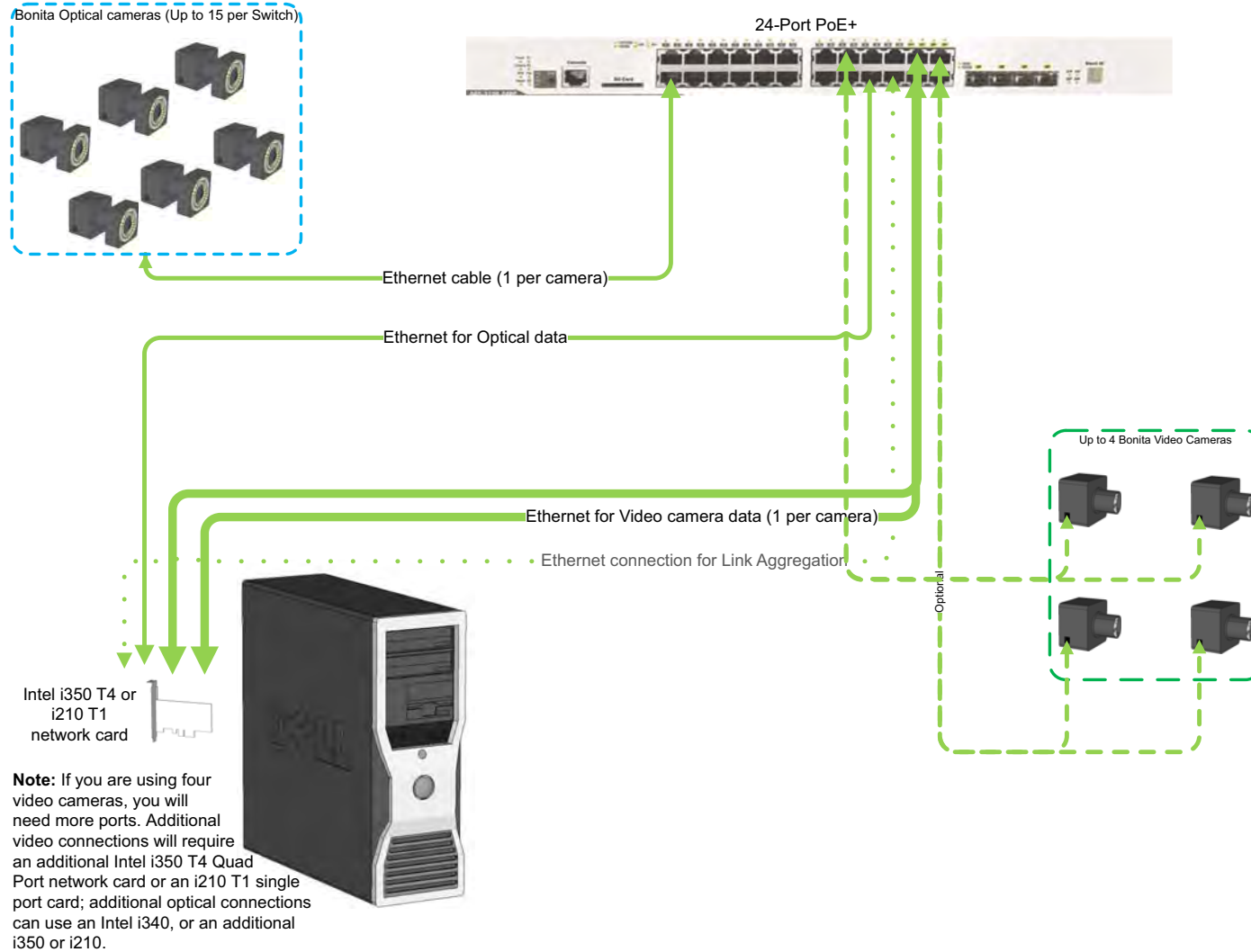
Video files (.**avi**) recorded by video cameras can be previewed live and played back in Nexus and/or transcoded for use in other applications. This chapter includes the following information:

▌ Set up Bonita Video cameras in Vicon Nexus

▌ Bonita Video camera settings in Vicon Nexus

▌ Set up Basler video cameras in Vicon Nexus

▌ Basler camera settings in Nexus

▌ Set the Basler camera frame rate

To change camera properties, ensure that your system is connected and that you are in **Live** mode, then in the **System** tree, select the relevant camera(s).

Set up Bonita Video cameras in Vicon Nexus

When you have set up your PC to work with Bonita Video cameras, and physically connected up to four Bonita Video cameras to your Nexus system, you can preview the video output in Nexus. You can then set the Bonita Video camera attributes to give the required output.

To configure video cameras for digital video capture:

1. In Nexus, In the Resources pane, click the Go Live button.

   On the **System resources** tab, yellow icons are displayed in front of the Bonita Video camera nodes, indicating that further setup is needed.

2. To add the required information, click on a Bonita Video node and in its **Properties** pane, go to the **MX Hardware** section and enter a **Destination IP Address**.

   When you supply a valid IP address, the video camera's icon goes green and you can view live video in the Nexus view pane.

   ### Note
   Cameras with gray icons are connected to the network but are not contributing data. For example, if you have connected Vicon Bonita video cameras, but your Giganet does not support jumbo packets, the icons for the Vicon Bonita video cameras will remain gray. For more information and help with upgrading your system, contact Vicon Support.

3. To be able to capture data, in the Settings section, enter a location in the Capture Path field. If possible, enter a separate HDD or an SSD drive for each camera. (However, note that if required, two Bonita Video cameras can capture to a single SSD.)

   You can now capture data.

   In subsequent sessions, you may want to configure additional properties to suit the needs of your motion capture application.

As you have made changes to the system setup, the current configuration, shown at the top of the System tab, is displayed with an asterisk, indicating that you need to save your changes.
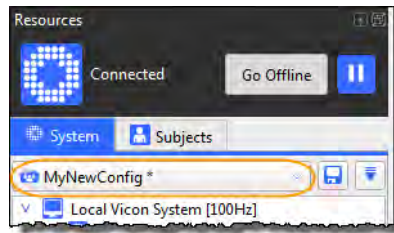
4. At the top of the System tab, click the Save button to save your system configuration settings to a .system file in the Systems configurations folder (by default, C:\Program Files (x86)\Vicon\Nexus2.x\Configurations\Systems).

Bonita Video camera settings in Vicon Nexus

The following table lists the main settings that you can specify in the **Properties** list in Nexus for Bonita Video cameras.

Property	Section	Notes
Showing	General	Toggles representation of Bonita Video camera in a 3D view.
Destination IP Address	MX Hardware	For each video camera, set to a valid address that is unique (that is, not shared with any other device).
Shutter Duration	Settings	May need to be reduced to a value between 0 and 1 (with 1 the maximum exposure time).
CapturePath	Settings	Set to an SSD.
Sub Sample Ratio	MX Hardware	The **Sub Sample Ratio** is related to the **Requested Frame Rate** for the **Local Vicon System**. If the **Requested Frame Rate** cannot be met, a warning symbol is displayed next to **Local Vicon System** in the **System** tree. To display further details, hold the mouse pointer over **Local Vicon System**.
		If necessary, change the **Sub Sample Ratio** to enable the video cameras to meet the **Requested Frame Rate** of the **Local Vicon System**. For example, a value of 2:1 samples half of the frames.
		For more information, see **Specifying the Requested Frame Rate** in **What's New in Nexus**.

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Set up Basler video cameras in Vicon Nexus

Ensure you have set up the Pylon drivers and specified the correct IP addresses for the Basler video cameras, and that they are now displayed in green in the Nexus system tree. If the video cameras are not green in Nexus, see Troubleshooting on page 81.

When all the cameras are running at the correct frame rate, you can trigger them, as explained in the following steps.

To set up Basler video cameras:

1. To set the correct aperture for the camera, open or close the F-stop on the camera. (The **Camera** view will appear dark when the aperture is closed and bright when the aperture is open.)

2. Focus the Basler camera using the focus ring on the camera.

3. Ensure each camera's settings in Nexus are adjusted so that the video image is as clear as possible. To do this you may need to adjust camera **Gain** and **Brightness**.

4. Set the system frame rate and **Requested Frame Rate** to be an achievable frame rate for the Basler cameras. Note that Baslers must always be set to a frame rate which is divisible by the system frame rate , as each video frame must have a corresponding system frame.:

Basler	System frame rate	Basler frame rate
piA 640 – 210	100Hz	100Hz
piA 1000 - 48	120Hz	40Hz
A602	120Hz	60Hz

Tip

To achieve these frame rates, you may need to adjust the **Shutter Duration** and **Packet Size** settings. When you adjust Shutter Duration or change the Basler frame rate, you must then align the shutters. To do this, in the system tree right-click on **Video Cameras** and then click **Align Shutters (Basler)**. The frame rate at which the camera is running is displayed in square brackets next to the camera ID in the system tree.

5. At the top of the System resources pane, click the Save button to save your system configuration settings to a .system file in the Systems configurations folder (by default, C:\Program Files (x86)\Vicon\Nexus2.x\Configurations\Systems).

To trigger Basler video cameras:

1. Set the trigger source for each camera to the correct port on the correct Giganet.

2. Ensure that the Giganet that is trigger source is also the master. To do this:

   a. Click **Local Vicon System**.

   b. In the **Properties** pane, ensure **Show Advanced** is selected, click **Master Select** and select the required master.

   ▌ Powered (GigE) = ports 1–4

   ▌ Unpowered (FireWire) = ports 5–8

   Tip
   Note: When the Basler cameras are triggered, their running frame rate appears in the **Frame Rate** section of the **Properties** pane, as **Incoming Frame Rate**. The number in square brackets in the system tree now represents the **Requested Frame Rate**.

3. To capture, go to the **Settings** section of the **Properties** pane and set the **Capture Path** of each Basler camera. Set each camera to capture to its own SSD. (If you have insufficient SSDs, you can set two Basler video cameras to each SSD, however, note that this is not supported.)

4. At the top of the System tab, click the Save button to save your system configuration settings to a .system file in the Systems configurations folder (by default, C:\Program Files (x86)\Vicon\Nexus2.x\Configurations\Systems).

Now that the cameras are set up and triggered, they are in sync and are ready to be calibrated.

Basler camera settings in Nexus

The following table lists settings you must specify in the Vicon Nexus **Properties** list before using Basler cameras.

Property	Section	Notes
Capture Path	Settings	Set to a remote drive.
Trigger Source	Frame Rate	Make sure the correct master has been selected then set the **Trigger Source** to the correct port for each device. If you do not do this the video camera will produce unsynchronized data. Ensure the **Trigger Source** is set to the master.
Requested Frame Rate	Frame Rate	Specify a frame rate that is based on the Basler camera you have attached. Vicon Nexus provides feedback on the frame rate achieved by the camera in the **Incoming Frame Rate** field, and in the information next to the camera node in the **System** tree. For more information, see Set the Basler camera frame rate on page 78. The following properties also affect performance.
Shutter Duration	Settings	May need to be reduced. This also reduces motion blur when the camera is requested to run at high frame rates.
Advanced Properties		
Packet Size	Frame Rate	You may need to reduce this setting.
Camera AOI (Area of Interest)	Frame Rate	If running at maximum frame rate, reduce this value. For example, a Basler GigE 640-210 has a sensor size of 640 x 482. The camera cannot achieve a **Requested Frame Rate** of 210 fps because the **AOI** is 100%. To enable the camera to achieve the **Requested Frame Rate**, reduce the **AOI** to 99%.

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Set the Basler camera frame rate

If you have used Basler cameras with previous versions of Vicon Nexus, note that instead of setting the camera frame rate by triggering from the connectivity device (Giganet, Ultranet, etc), you now set the **Requested Frame Rate** in Vicon Nexus.

Important

Do not trigger the camera until it achieves the **Requested Frame Rate**.

If your camera cannot run at your required **Requested Frame Rate**, you must change the **Shutter Duration**, **AOI** and **Packet Size** to achieve the required frame rate before triggering the camera. If your camera does not allow you to set the **Requested Frame Rate** unless it is triggered, the **Requested Frame Rate** controls only the trigger signal, and has no effect on the free running camera.

To set the camera frame rate:

1. If you are using multiple connectivity devices, make sure the required master device has been selected (in the **Advanced Properties** for **Local Vicon System**, click the **Preferred Master** list and then click the required device in the list).

2. In the **System** tree, ensure that the relevant Basler camera is selected.

3. In the **Frame Rate** area of the **Properties** list, click in the **Trigger Source** list and select **None**.

4. Do one of the following, depending on whether your camera has an editable **Requested Frame Rate** field in the **Frame Rate** area of the **Properties** list:

   ▌ If the **Requested Frame Rate** field is editable, change this setting to achieve the required frame rate. Do not change the **AOI** and/or packet size to achieve the required frame rate until you have first tried changing the **Requested Frame Rate**.

   ▌ If the **Requested Frame Rate** field is not editable and/or the camera is not showing the **Requested Frame Rate** next to the relevant camera

node in the **System** tree, adjust the following settings in the order shown until it meets the required frame rate:

  a. **Shutter Duration** If the shutter duration is the limiting factor, reduce this setting.

  b. **AOI** If the AOI is the limiting factor, reduce this setting.

  c. **Packet Size**   In some circumstances (for example, if you have multiple cameras connected to the same FIreWire bus), try reducing this setting to say, 2048, for all cameras.

5. If the camera is still not producing at least the **Requested Frame Rate** (displayed next to the relevant camera node in the **System** tree), reset it to its default settings in the **Pylon Viewer**, and/or power-cycle it. Verify the camera's frame rate by checking the **Incoming Frame Rate**.

6. When the camera produces the **Requested Frame Rate**, in the **Frame Rate** area of the **Properties** list, click in the **Trigger Source** list and select the required device.

> **Important** ──
> Do not set the GPO pin directly on the Giganet.
> ───

If the image goes black again, the camera does not have enough free time in its frame cycle to service the trigger. To enable the camera to operate correctly, increase the camera's **Requested Frame Rate** as described in the following steps.

To increase the camera's spare capacity:

1. Return to step 3 in the previous workflow and repeat the subsequent steps, but this time specify a **Requested Frame Rate** that is faster (by at least 20%), than the final required frame rate.

2. With the camera free running faster than the final required frame rate, set the **Requested Frame Rate** back to the original value.

3. Select the trigger source as in step 6 above.

4. At the top of the System tab, click the Save button to save your system configuration settings to a .**system** file in the **Systems** configurations folder (by default, C:\Program Files (x86)\Vicon\Nexus2.x\Configurations\Systems).

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Troubleshooting

The following table lists solutions to known issues that you may encounter when setting up and using your Vicon system.

Issue	Description	Solution
Image from Basler cameras appears black	After triggering the camera and setting the **Requested Frame Rate**, the image appears black.	The image is black because the camera is not able to meet the desired frame rate, and is triggered. To correct this, follow the steps in Set the Basler camera frame rate on page 78.
	After altering the **Shutter Duration** and/or **Camera Brightness** the image appears black, but the camera icon in the **System** tree is green (healthy).	To resynchronize the system, right-click **Local Vicon System** and then click **Resynchronize**. In the **System** tree, right-click the **Video Cameras** node and click **Align Shutters (Baslers)**.
Bonita Video camera icon is gray	In the **System** tree, the Bonita Video camera icon is gray and there is no image in the view pane.	Enable jumbo packets (see Configure advanced adapter settings on page 42).
Problems when setting up system with multiple Giganets	When setting up multiple Giganets, system does not work or halts	Check your cabling (for guidance, see Vicon system connection diagrams on page 61). Always connect your cameras to the PC via the most direct route possible.

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Issue	Description	Solution
Images from Bonita Video cameras are dim.	Images from Bonita Video cameras appear dim in the view pane.	Open the camera apertures. Because the maximum exposure time is based on the system rate as a whole, rather than on the individual camera rate, reduce the overall system rate to brighten images, rather than the rate of individual cameras.
Shutters are non-aligned (Basler cameras)	For Basler cameras in Calibration mode, Active Wand markers are dim or non-existent; in Live mode reconstructed markers do not accurately reproduce the markers in the video	In the **System** tree, right-click the **Video Cameras** node and click **Align Shutters (Baslers)**. If this does not solve the problem, extend the shutter duration and align shutters again.

Tip

If you are using Basler cameras, whenever you have made a change to controls that affect shutter alignment, such as **Pulse Width Ratio**, **Shutter Duration**, etc (during both calibration and during live captures), in the **System** tree, right-click the **Video Cameras** node and then click **Align Shutters (Basler)**.

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Contact Vicon

If you need more information than that supplied in the documentation or on the Vicon Support website, please use the following resources to contact Vicon:

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