

IMPERX



GigE Vision and 10 GigE Vision Cameras Ethernet Adapter Configuration Guide (Windows 10)

This guide describes how to adjust your Ethernet adapter, disable Windows Firewall, configure Windows power management, and set IP addresses for multiple NICs when working with Imperx GigE Vision and 10 GigE vision cameras.

Revision 1.2

Configuring an Ethernet Adapter

⚠ CAUTION

Make sure that the version of your NIC driver is the most recent one, update it if necessary. Using an outdated version of a NIC driver might negatively affect the data transmission.

For the best system performance, Imperx recommends configuring the following parameters of your network interface card (NIC): Jumbo Frames (Jumbo Packets), Receive/Transmit Buffers, Interrupt Moderation Rate to the values shown below. You also might need to disable antivirus software and Firewalls, turn off power saving plan, enable Imperx Filter Driver, and configure IP addresses for multiple NICs on the host computer.

Parameter	Value
Jumbo Frames (or Jumbo Packets)	9000 (9014, 16K, or 9 KB MTU)
Receive Buffers (or Receiver Descriptors)	Maximum
Transmit Buffers	Maximum
Interrupt Moderation	Enable
Interrupt Moderation Rate (or Interrupt Throttling)	Extreme

See section [Adjusting Jumbo Frames, Receive/Transmit Buffers, Interrupt Moderation Rate in Windows](#) for adjusting procedures.

NOTE *

The parameter names and configuring procedures depend on the adapter model and manufacturer and may differ from the ones described in this chapter. When adjusting the adapter parameters, select the ones that relate to the parameters listed above. For more information, please refer to the NIC documentation.

Jumbo Frames

Jumbo Frames (or **Jumbo Packets**) parameter allows for payloads larger than the standard maximum transmission unit (MTU) of 1,500 bytes and supports up to 9,000 bytes per packet. Jumbo Frames are used to reduce overhead load per packet, decrease CPU load, and increase data transfer rate. As fewer packets are needed to transfer data, the number of interrupts decreases resulting in lower overall CPU usage.

Please make sure that your network equipment (cameras, switches, routers, Network Interface Cards (NICs)) supports Jumbo Frames and is configured to use the same frame size. If any network devices do not support Jumbo Frames, packets and frames may be dropped.

Most network adapters have Jumbo Packets disabled. To enable Jumbo Frames, please follow the steps in section [Adjusting Jumbo Frames, Receive/Transmit Buffers, Interrupt Moderation Rate](#).

TIP i

Connect the Cheetah GigE Vision or 10 GigE Vision camera to a dedicated Ethernet port and use an Ethernet adapter that supports Jumbo Packets.

Receive/Transmit Buffers

Receive Buffers (or **Receive Descriptors**) and **Transmit Buffers** parameters set the amount of system memory that can be used by the adapter driver when copying data to the memory. Typically, it is set to a low value by default (usually 256) which causes dropped packets (older packets will be overwritten). For maximum performance, Imperx recommends that you set these parameters as high as possible.

Increasing the Receive Buffers and Transmit Buffers size will improve stability and can be configured on the most systems without causing any system level impact. However, please keep in mind that it can negatively affect systems which have limited system memory.

NOTE * Receive/Transmit Buffers settings do not affect your system's CPU usage.

Interrupt Moderation Rate

Interrupt Moderation Rate (or **Interrupt Throttling**) sets the maximum number of interrupts per second to the CPU when processing the transmitted and received packets.

Minimizing the interval between interrupts reduces the latency on each packet but increases CPU usage and decreases throughput. To minimize CPU usage, larger interrupt intervals are required.

Some NICs support only Interrupt Moderation control, while the others support both Interrupt Moderation and Interrupt Moderation Rate control.

When the Interrupt Moderation setting is disabled, an interrupt is created for every packet, reducing the latency on each packet. However, this significantly increases CPU usage. Enabling the Interrupt Moderation setting allows multiple packets to be processed for each interrupt lowering CPU usage.

TIP i The Interrupt Moderation Rate can be set at about 8,000 (or Extreme) interrupts per second to achieve lower latency.

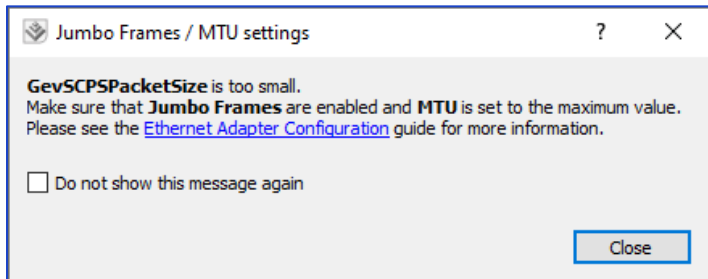
If some latency is acceptable, the Interrupt Moderation Rate can be set at about 1,000 (or Low) interrupts per second to achieve lower CPU usage.

Experiment with your system to determine the optimal setting. You can try the following options as well:

- Use the default value set by the manufacturer's drivers.
- Set NIC to adaptive interrupt moderation mode. In this mode, the interval is dynamically changed according to packet size and throughput.

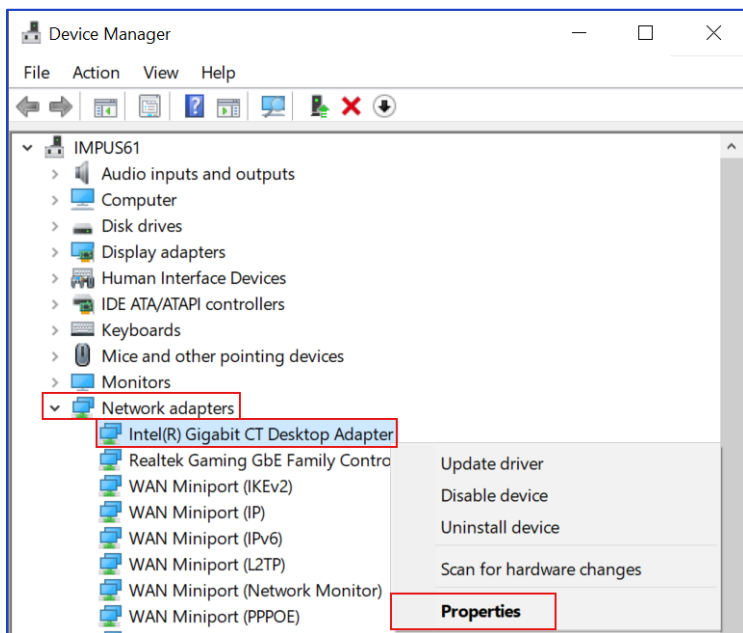
Adjusting Jumbo Frames, Receive/Transmit Buffers, Interrupt Moderation Rate

If your network adapter has Jumbo Frames disabled, the following pop-up window opens while connecting the camera (see [Appendix A](#) on how to connect to the camera):




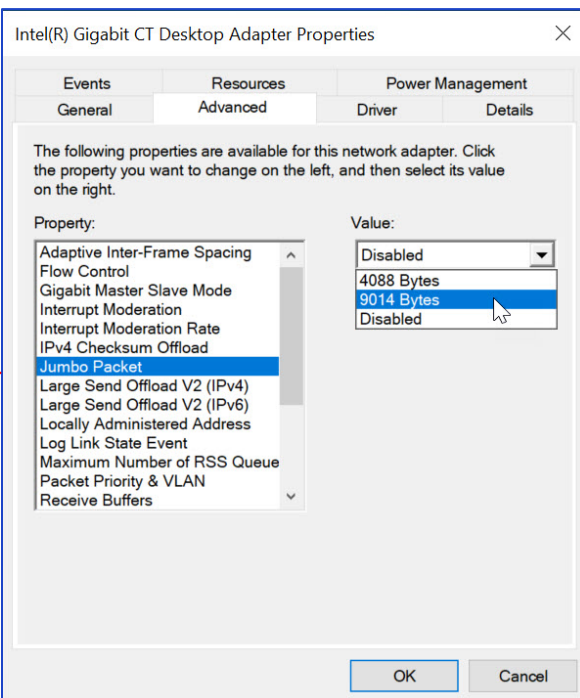
To adjust Jumbo Frames, MTU size, and other parameters, follow the steps below:

1. Click **Start** icon → **Windows System** → **Control Panel**.
2. Click **Hardware and Sound** → **Devices and Printers** → **Device Manager**.
3. Expand **Network Adapters** list → Right-click the Ethernet adapter that works with your camera → **Properties**.



4. On the **Advanced** tab, set the following parameters:
 - **Jumbo Packet** (or **Jumbo Frame**) → Set **Value** to *9014 Bytes* (or *9 KB MTU, 9000, 16K* – depends on NIC).
 - **Receive Buffers** (or **Receive Descriptors**) → Set to the maximum value possible.
 - **Transmit Buffers** → Set to the maximum value possible.
 - **Interrupt Moderation** → *Enable*.
 - **Interrupt Moderation Rate** (or **Interrupt Throttling**) → Set to *Extreme*.
 At higher data rates, the Extreme setting may improve system performance. At lower data rates, a Low setting is preferred, since delayed interrupts cause additional latency.

If **Jumbo Packet** or **Jumbo Frame** is absent from the list, your NIC does not support Jumbo Packets. Maximum camera performance cannot be achieved.

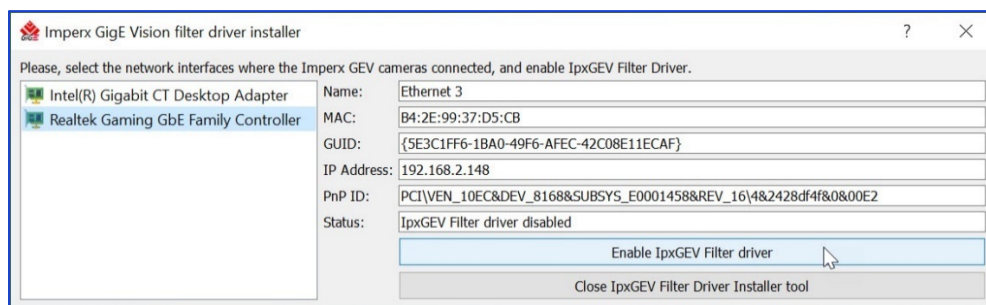
5. Click **OK**. The network connectivity may be lost for a couple of seconds.
6. Reboot your PC to ensure that new settings have been activated.

Enabling Imperx Filter Driver

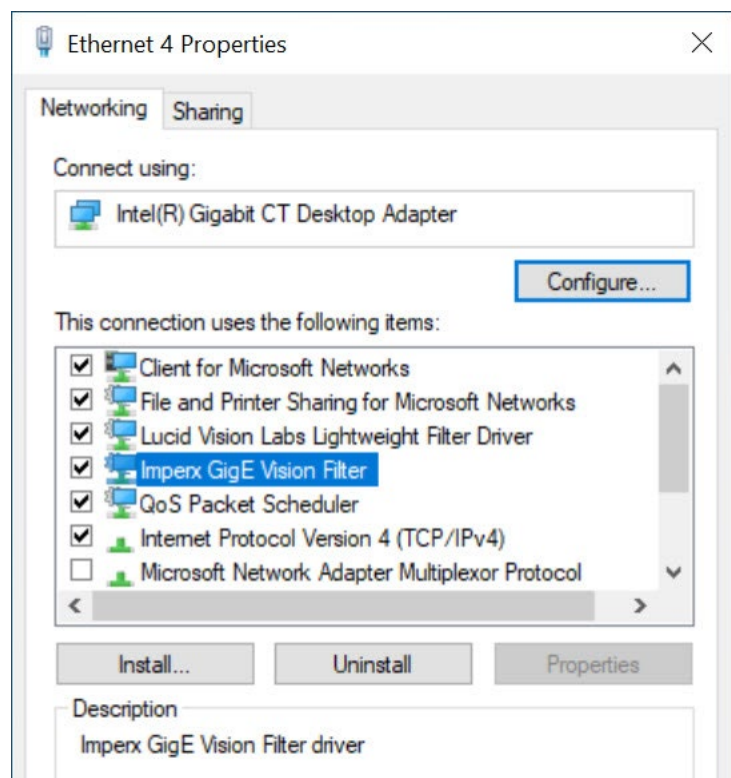
Imperx recommends enabling Filter Driver when multiple GigE Vision are connected to a host computer. It allows to prevent or significantly reduce frame drops.

The Imperx Filter Driver is available in Imperx Camera SDK ver.1.5.x.xxxx or later. Make sure that the version of your Camera SDK is the most recent one, update it if necessary. The Filter driver installs during the Camera SDK installation. To download the most recent Camera SDK version, visit the Imperx website <https://www.imperx.com/subscribers/downloads/>.

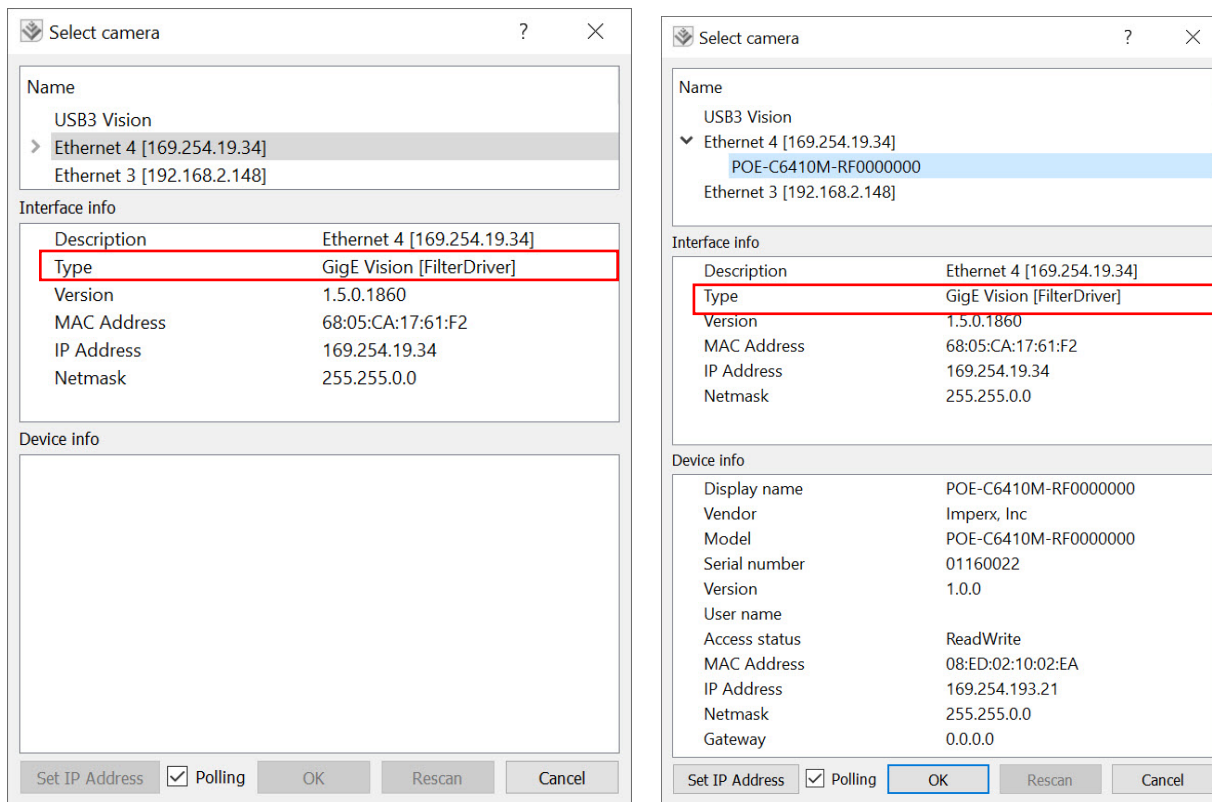
You can install Filter Driver yourself by running the executable file that is located in SDK binaries folder C:\Program Files\Imperx\Imperx Camera SDK\bin\win64_x64\IpxGEVFilterInstaller.exe. On the **Imperx GigE Vision filter driver installer** screen, select network adapters that are connected to Imperx GigE Vision cameras, click **Enable IpxGEV Filter driver**, and close the filter driver installer.



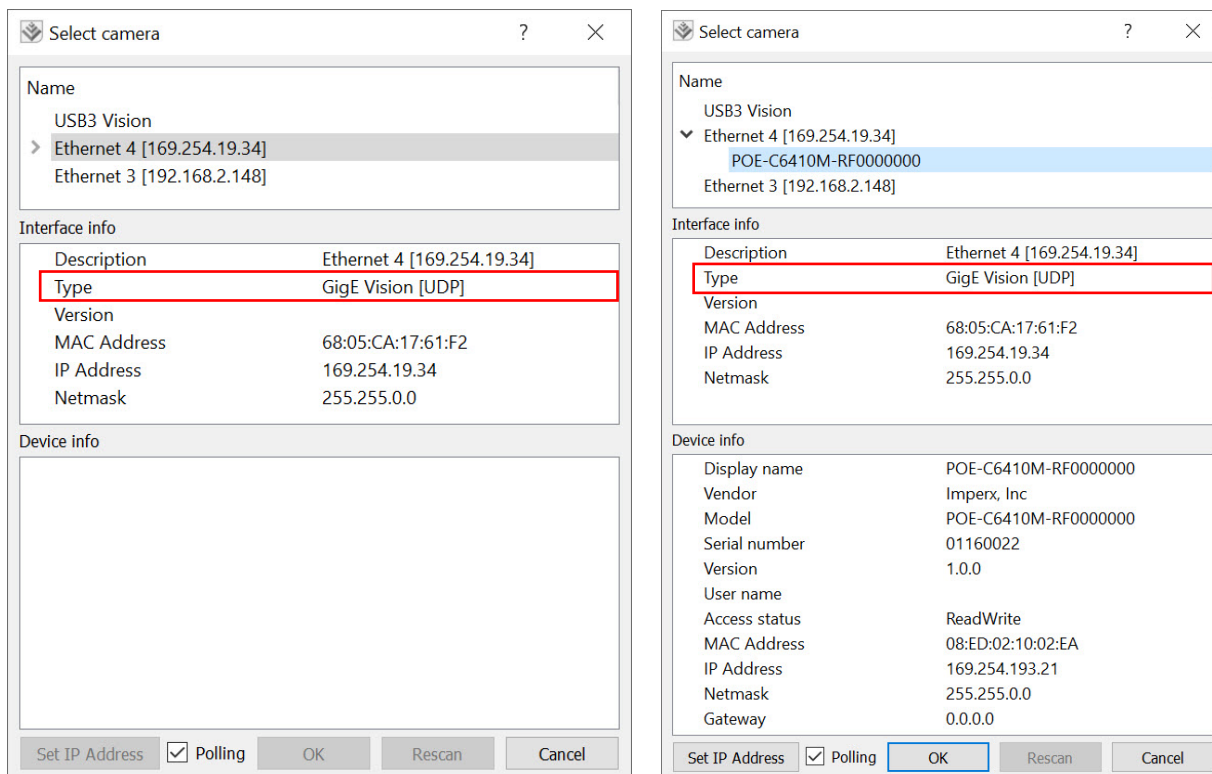
When installed, the Filter Driver appears in Ethernet connection properties. Make sure that the **Imperx GigE Vision Filter** check box is checked. (If it is unchecked, the Filter Driver is disabled.)



The Filter Driver also appears, if installed and enabled, in the Select camera dialog (in SDK or IpxPlayer), when you select NIC or camera.



If the Filter Driver is disabled or not installed, GigE Vision [UDP] will be displayed:

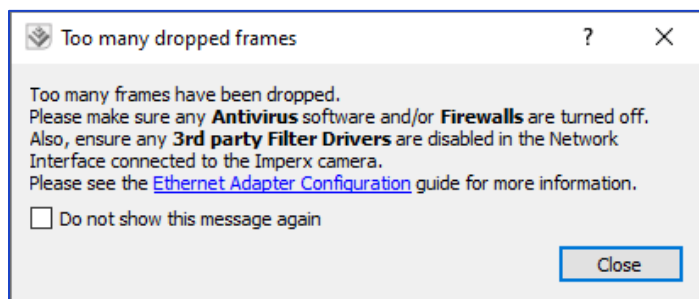


Configuring a Host Computer

This chapter describes how to disable the Windows Firewall, turn off the power saving plan, and configure IP addresses for multiple NICs on the host computer.

Antivirus software, Firewalls, or third-party filter drivers may impact the efficiency of the system resulting in an excessive number of dropped frames and slow video streaming.

When too many frames have been dropped, the video acquiring slows down. The following pop-up window opens:



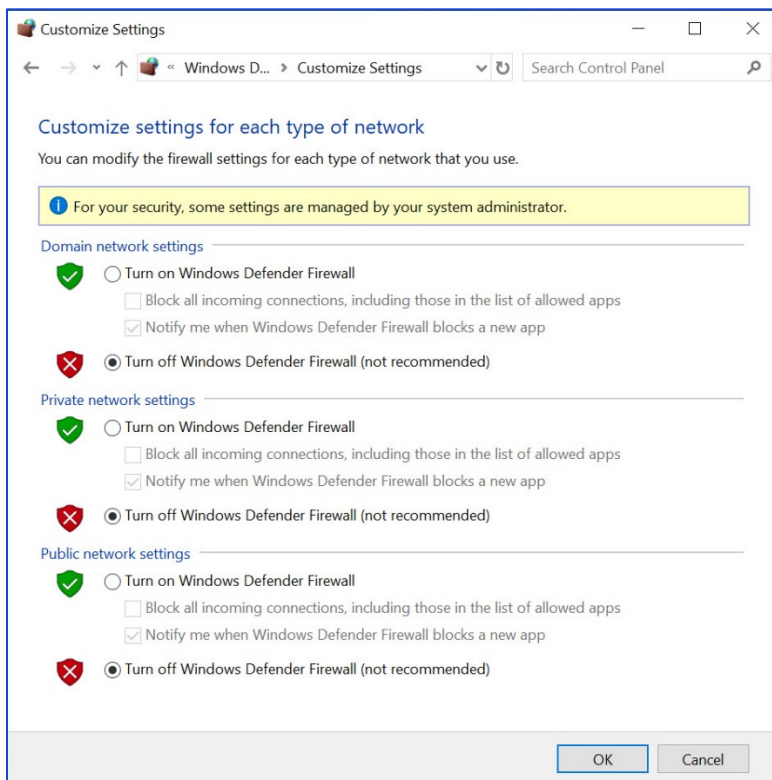
Imperx recommends **turning off** any Firewalls, antivirus software, and third-party filter drivers and to disable Windows Performance Monitor (perfmon.exe) or Wireshark (use it solely for debugging purposes), and not to open the Networking tab in Windows Task Manager.

To turn off the Firewall, please refer to the section [Disabling Windows Firewall](#).

Please contact your IT Department on turning off antivirus software and any third-party filter drivers.

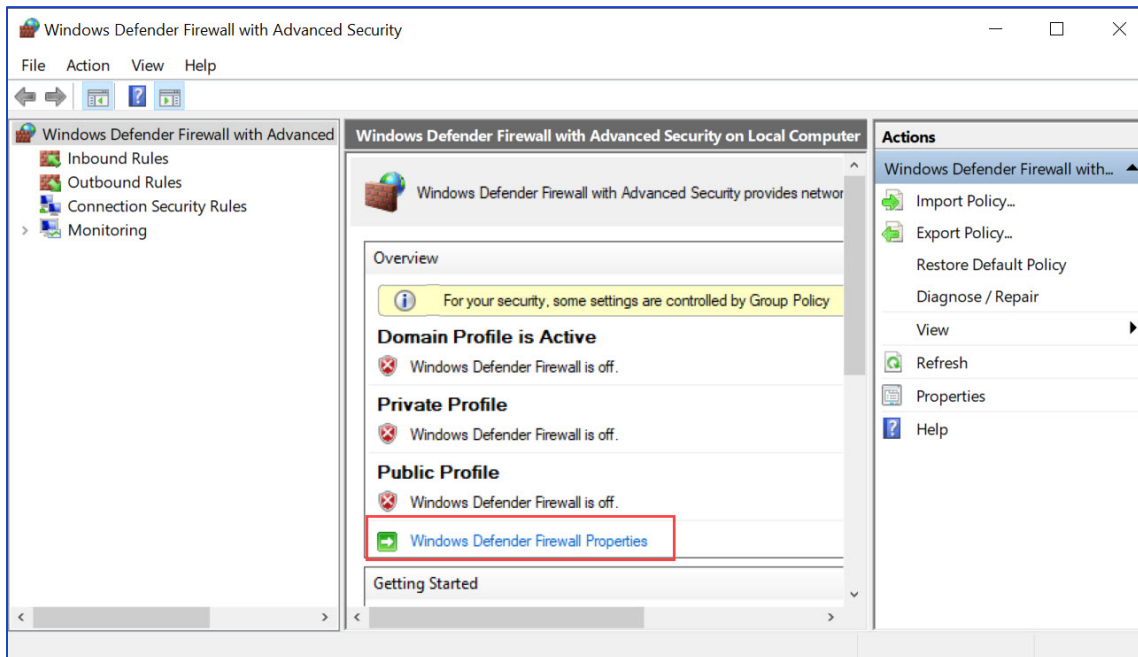
Disabling Windows Firewall for All Connections

1. Click **Start** icon → **Windows System** → **Control Panel**.
2. Click **System and Security** → **Windows Defender Firewall**.
3. On the left panel, click **Turn Windows Defender Firewall on or off**. The **Customize settings** windows opens.
4. Select a network type that your camera is connected to, and click **Turn off Windows Defender Firewall (not recommended)**. Click **OK**.

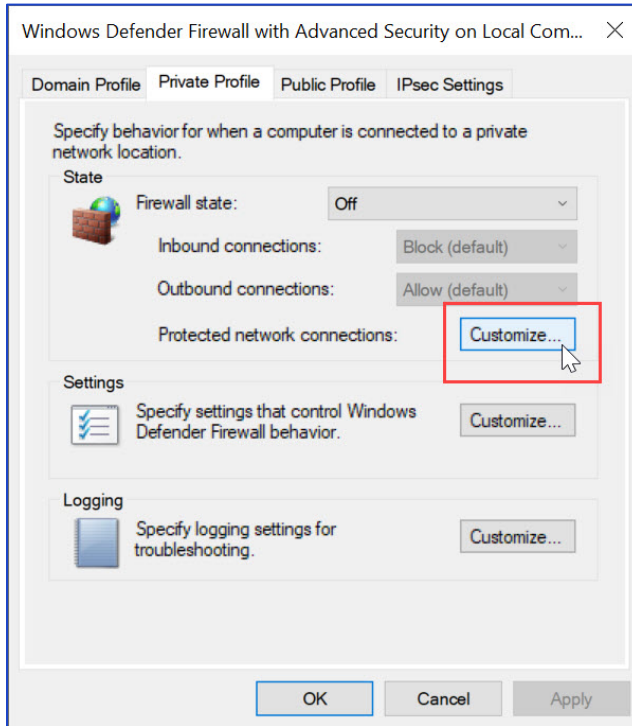


Disabling Windows Firewall for Selected Network Adapters

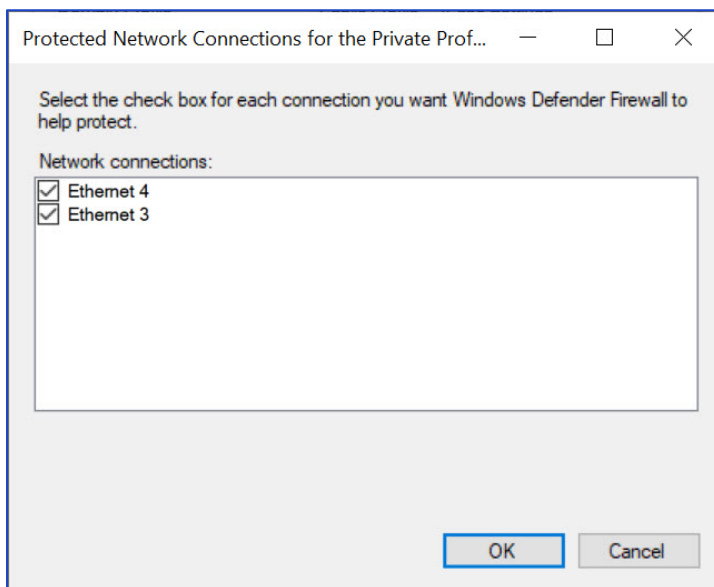
1. Click **Start** icon → **Windows System** → **Control Panel**.
2. Click **System and Security** → **Windows Defender Firewall**.
3. On the left panel, click **Advanced settings**. The **Windows Defender with Advanced Security** windows opens.
4. Click **Windows Defender Firewall Properties**.



5. In the **Windows Defender Firewall with Advanced Security on Local Computer Properties...** window, select the tab of the profile to turn off the firewall and click **Customize...** in the State section.



6. The **Protected Network Connections for the Private Profile** windows shows a list of the network connections with the firewall turned on. To disable the firewall, uncheck those connections that contain your cameras. Click **OK**.

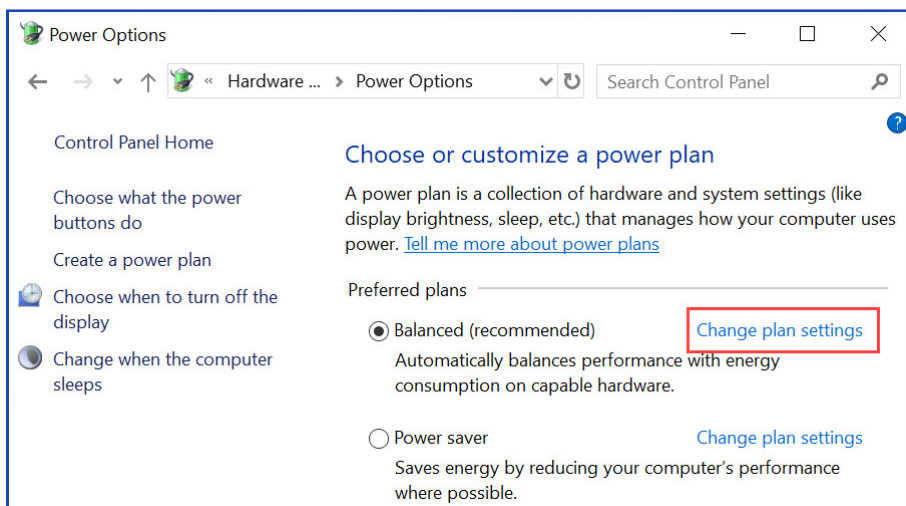


Configuring Power Management

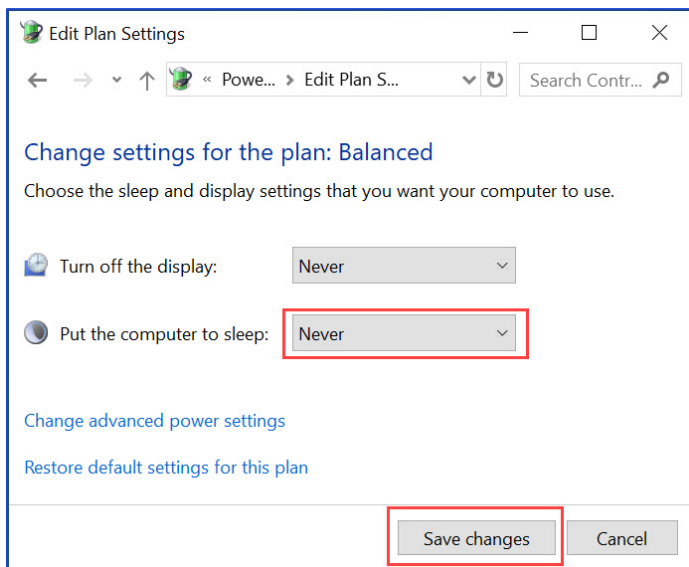
For applications with extended periods of image streaming, configuring power management is required. Typically, if there is no activity from the keyboard or mouse, the computer or NIC will go to sleep, and the image stream will be interrupted. To prevent Windows from powering down the NIC or computer, you need to change the power plan settings.

To change power plan settings for the computer:

1. Click **Start** icon → **Windows System** → **Control Panel**.
2. Click **Hardware and Sound** → **Power Options**.
3. Next to the power plan, click **Change plan settings**.

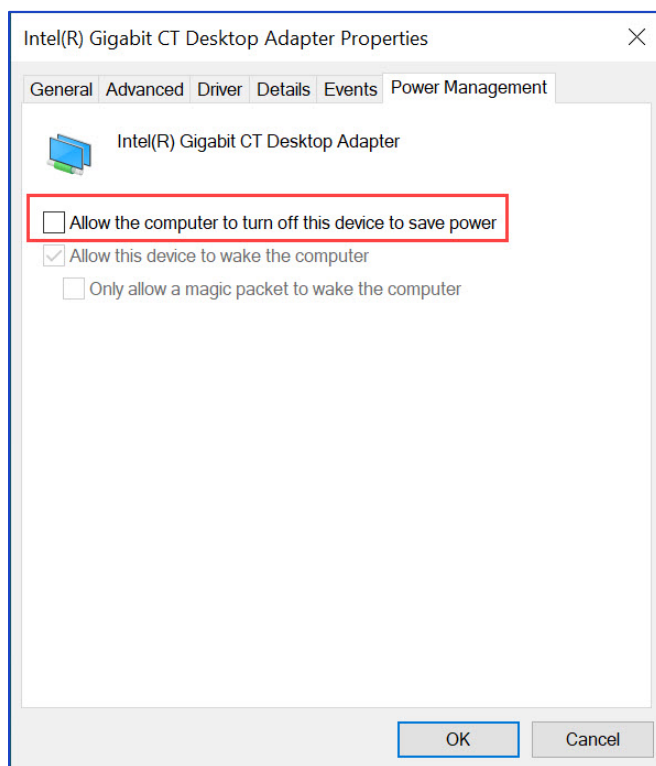


4. In the **Put the computer to sleep** dropdown list select **Never** and click **Save changes**. **Turn off display** can be set to any value.



To change power plan settings for the NIC:


1. Click **Start** icon → **Windows System** → **Control Panel**.
2. Click **Network and Internet** → **Network and Sharing Center**.
3. On the left panel, click **Change adapter settings**.
4. Right-click the Ethernet adapter that works with your camera → **Properties**.
5. Click **Configure**. Adapter Properties window opens.
6. On the **Power Management** tab, uncheck the **Allow the computer to turn off this device to save power** option, click **OK**.
7. Repeat steps 4–6 for each NIC.



Configuring IP Addresses

Camera and NIC IP addresses must be in the same subnet. To assign a unique IP address to a NIC, you can use one of the following methods:

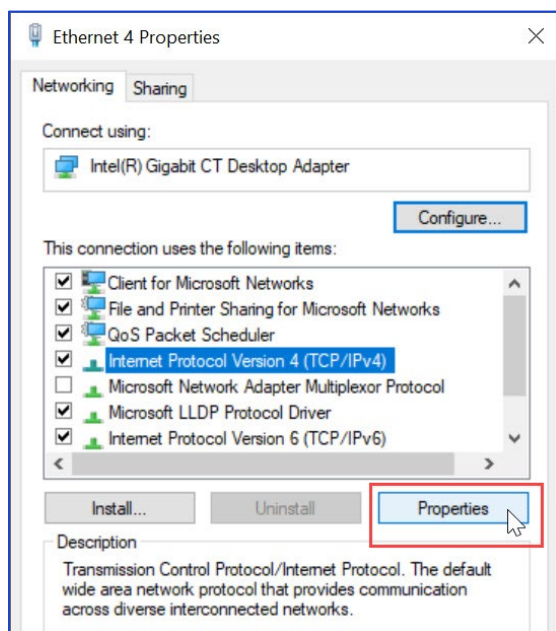
Method	When to use
Configure a static IP address	In networks without a DHCP server, if cameras have persistent IP address specified
Configure a dynamic IP address via DHCP	In networks with a DHCP server installed
Link-Local IP Addressing	In the absence or failure of static or dynamic address configurations

TIP  Before assigning a dynamic IP address configuration, please make sure that a DHCP server is running in your network. The DHCP server assigns the IP address to each NIC and camera with DHCP/Auto IP setting enabled.

If the DHCP server is not running in the network, you can use the LLA configuration or manually assign static IP addresses to each NIC and GigE Vision camera.

Configuring a Static IP Address for a NIC

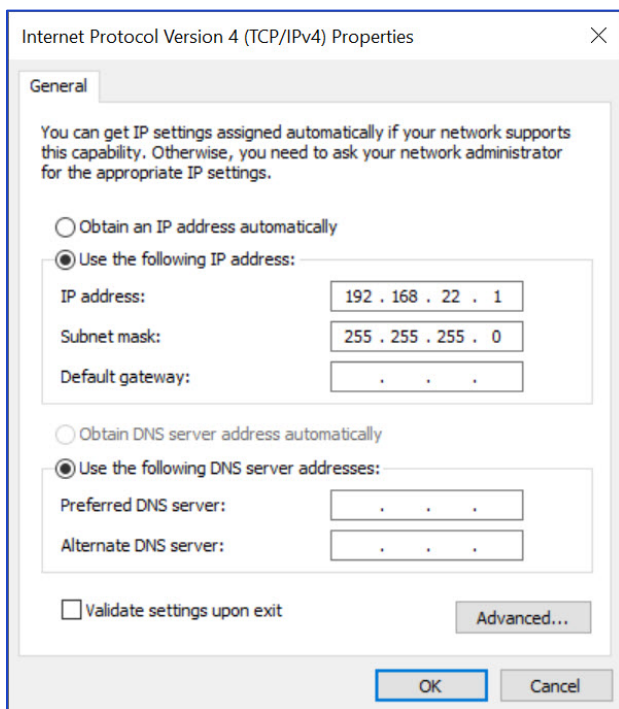
1. Click **Start** icon → **Windows System** → **Control Panel**.
2. Click **Network and Internet** → **Network and Sharing Center**.
3. On the left panel, click **Change adapter settings**.
4. Right-click the Ethernet adapter that works with your camera → **Properties**.
5. Select **Internet Protocol Version 4 (TCP/IPv4)**, click **Properties**.



6. Select **Use the following IP address** and assign an IP address to the network adapter. The **Default gateway** field should be blank.

Imperx recommends using a private network IP address. The following IPv4 address ranges are reserved for private networks:

RFC1918 name	IP address range	Largest CIDR block (subnet mask)
24-bit block	10.0.0.0–10.255.255.255	10.0.0.0/8 (255.0.0.0)
20-bit block	172.16.0.0–172.31.255.255	172.16.0.0/12 (255.240.0.0)
16-bit block	192.168.0.0–192.168.255.255	192.168.0.0/16 (255.255.0.0)

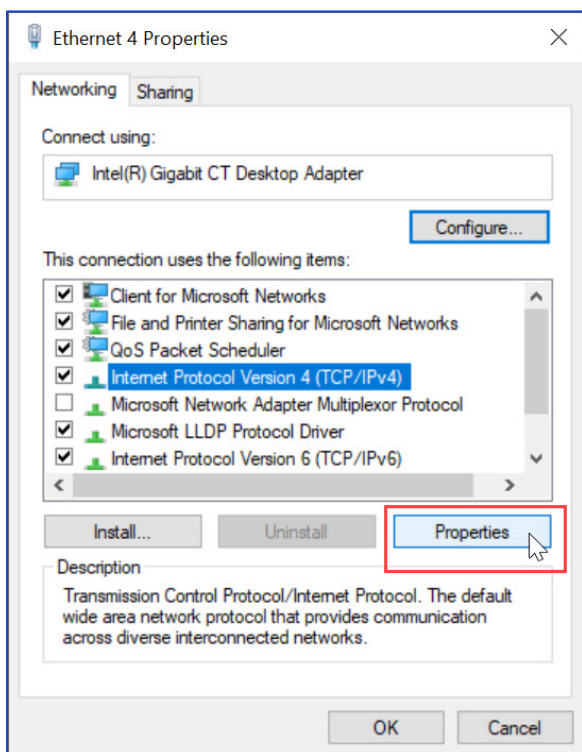


7. Click **OK**.
8. Repeat steps 4–7 for each NIC on your computer.

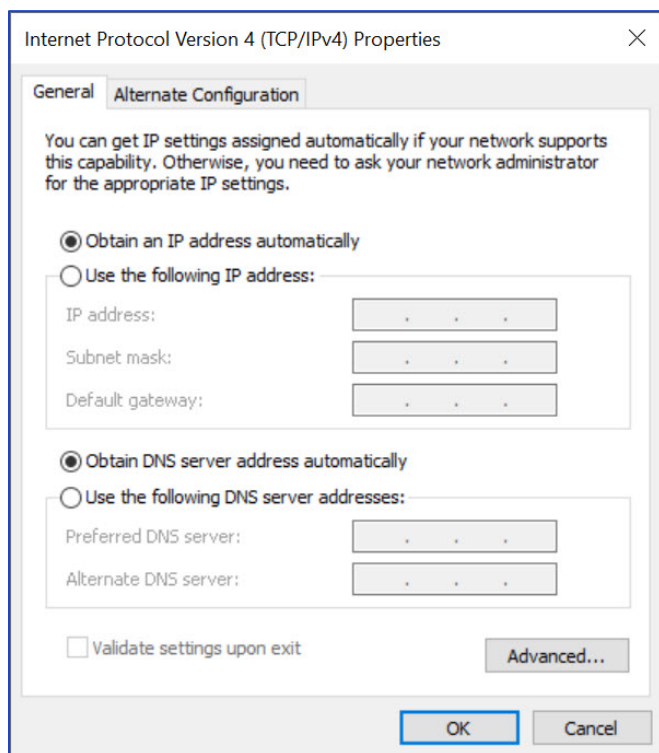
Configuring an IP Address for a NIC Using DHCP

For a NIC to obtain an IP address automatically, follow the steps below.

1. Click **Start** icon → **Windows System** → **Control Panel**.
2. Click **Network and Internet** → **Network and Sharing Center**.
3. On the left panel, click **Change adapter settings**.
4. Right-click the Ethernet adapter that works with your camera → **Properties**.
5. Select Internet **Protocol Version 4 (TCP/IPv4)**, click **Properties**.



6. Make sure that **Obtain an IP address automatically** is enabled.



NOTE * The DHCP server assigns a dynamic IP address to the NIC and camera. If the DHCP server is not available/not running, a link-local address assignment takes place.

Configuring a Link-Local IP Address for a NIC

A NIC assigns a link-local IP address automatically when a static IP address has not been configured and a DHCP is not enabled. This address is valid only for a local network and is not routable.

The IPv4 address range is 169.254.0.0–169.254.255.255.


When a static IP address or DHCP becomes available, assign a new IP address instead of the link-local address.

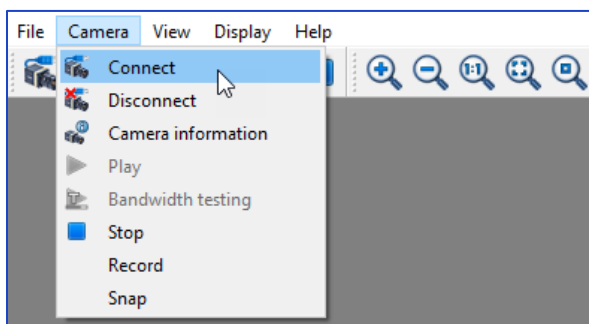
Configuring a Persistent IP Address for a Camera

A camera has the following default parameters:

LLA	True (Enabled)
DHCP	True (Enabled)
Persistent IP	False (Disabled)
Subnet Mask	255.255.0.0
Default Gateway	0.0.0.0

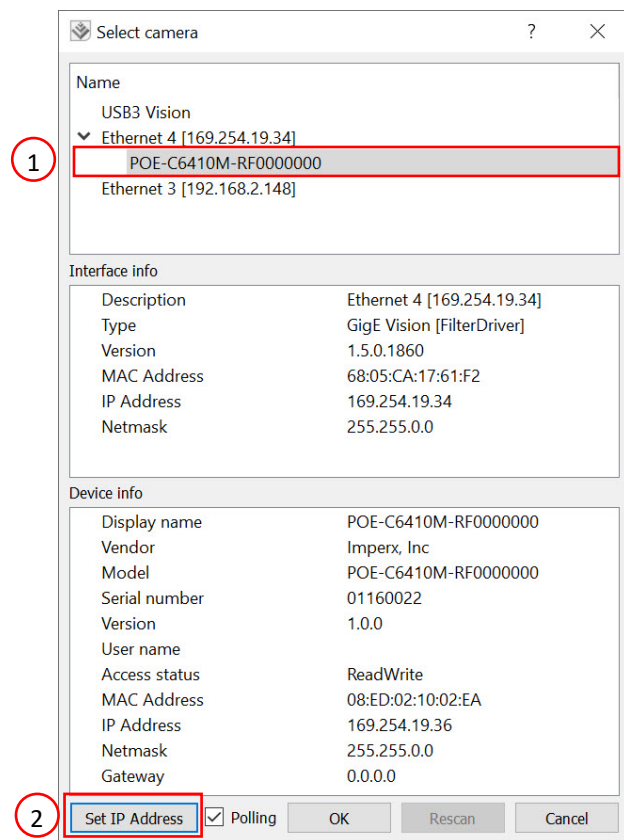
To set a persistent IP address, subnet mask, and default gateway, follow the steps below:

1. Open the IpxPlayer application and click **Camera** menu and select **Connect** (or click the **Connect** icon  on the tool bar).

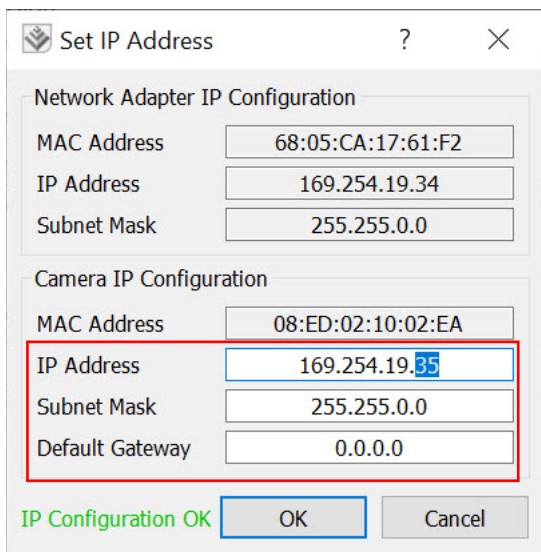


The Select Camera dialog appears. The dialog lists all connected cameras and adapters if visible.

2. Select a camera and click **Set IP Address**.



3. Set IP Address, Subnet Mask, and Default Gateway to values that will meet your network constrains and then click **OK**.



4. In the **TransportLayerControl** category, make sure that the following parameters are configured:

- *GevCurrentIPConfigurationPersistenIP*: True
- *GevPersistentIPAddress*: What you set it to previously
- *GevPersistentSubnetMask*: What you set it to previously
- *GevPersistentDefaultGateway*: What you set it to previously

TransportLayerControl	
PayloadSize	31492800
GigEVision	
GevMACAddress	08:ED:02:10:02:EA
Enable Extended ID Mode	Off
GevCurrentIPConfigurationLLA	True
GevCurrentIPConfigurationDHCP	True
GevCurrentIPConfigurationPersistenIP	True
GevCurrentIPAddress	169.254.19.35
GevCurrentSubnetMask	255.255.0.0
GevCurrentDefaultGateway	0.0.0.0
GevPersistentIPAddress	0.0.0.0
GevPersistentSubnetMask	0.0.0.0
GevPersistentDefaultGateway	0.0.0.0
GevLinkSpeed	1000
GevFirstURL	LOCAL:ipxGev_CheetahPregius_1.5.9.zip;30210000;9b8c
GevSecondURL	
GevCCP	ExclusiveAccess
GevPrimaryApplicationSocket	51371
GevPrimaryApplicationIPAddress	169.254.19.34

Appendix A

Camera's UDP Ports


A standard GigE Vision Control Protocol (GVCP) port is a UDP port used to receive camera commands. The Internet Engineering Task Force (IETF) has designated port number 3956 as the standard GVCP port. For multi-service device, this is the port attached to the first service.

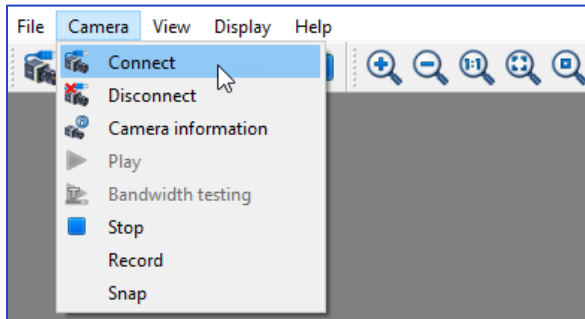
The camera Outgoing UDP port for Control Channel GVCP packets is 3956 (0x0F74), while the incoming port on SW side - can be any dynamic port within the range 49152–65535.

The camera Outgoing Stream Channel UDP port for GigE Vision Stream Packets (GVSP) is 3011 (0x0BC3) for FW v1.*, and 49153 (0xC001) for FW v2.*. The incoming port on SW side is any dynamic port within the range 49152–65535.

The camera Outgoing UDP port for Message Channel GVCP packets is 49152 (0xC000), while incoming port on SW side is any dynamic port within the range 49152–65535.

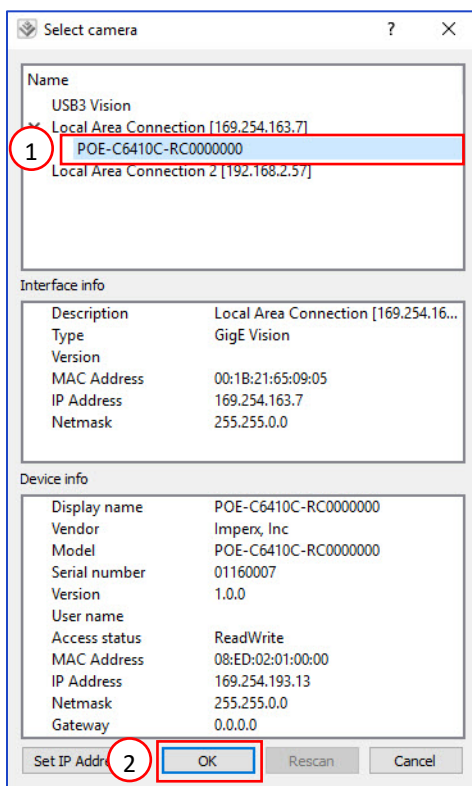
Connecting to a Camera

1. Launch the IpxPlayer application by double clicking the shortcut on your desktop.
2. Click **Camera** menu and select **Connect** (or click the camera icon  on the tool bar).



The Select Camera dialog appears. The dialog lists all connected cameras. The version number refers to the installed Imperx GUI driver.

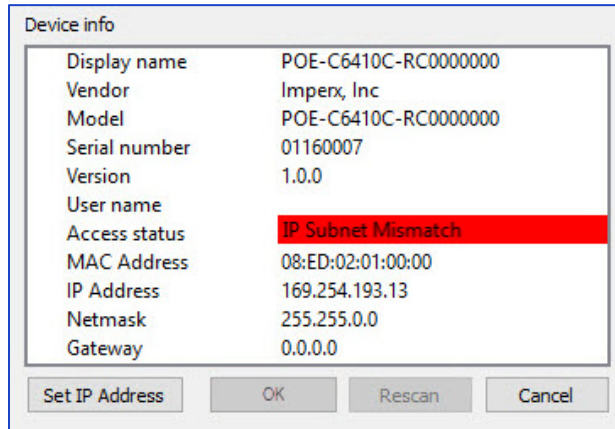
3. Select a camera listed on the dialog. Camera information appears in the Device info section of the dialog.




4. Click **OK**. If needed, click **Rescan** to update the list of cameras.

TIP ⓘ

The first time you attempt to connect to the camera, you might need to set the IP address if IP Subnet Mismatch appears highlighted in red and the OK button is not available.



To set the camera IP address:

- 4.1. Click **Set IP Address**.
- 4.2. When the Set IP Address screen appears, click **OK**.
- 4.3. On the Select Camera screen, click **OK**.
5. If the camera is connected, the Ethernet LEDs on the camera back panel and on your Ethernet switch are blinking.
6. After the camera is connected, click the **Play**  icon on the IpxPlayer to begin capturing and displaying images.