

# IMPERX



## GigE Vision® and 10 GigE Vision® Cameras Ethernet Adapter Configuration Guide (Linux OS)

This guide describes how to adjust your Ethernet adapter, and set IP addresses for multiple NICs when working with Imperx GigE Vision® and 10 GigE vision® cameras.

Revision 1.1

# Configuring an Ethernet Adapter



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 Using an outdated version of a NIC driver might negatively affect the data transmission.

To find the driver name, run the following command:

```
lspci -v
```

See the **Kernel driver in use** parameter for driver name:

```
Kernel driver in use: r8169
```

To find the driver version, run the following command:

```
modinfo <drv_name>
```

See the **vermagic** parameter for driver version:

```
vermagic: 5.4.0-73-generic SMP mod_unload modversions
```

For the best system performance, Imperx recommends configuring the following parameters of your network interface card (NIC): Jumbo Frames (Jumbo Packets) and Receive/Transmit Buffers to the values shown below.

Parameter	Value
Jumbo Frames (or Jumbo Packets)	9000
Receive Buffers (or Receiver Descriptors)	Maximum
Transmit Buffers	Maximum

See sections [Enabling Jumbo Frames](#) and [Adjusting Receive/Transmit Buffers](#) 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 [Enabling Jumbo Frames](#).

**TIP** ⓘ 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 Buffer 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.

## Enabling Jumbo Frames

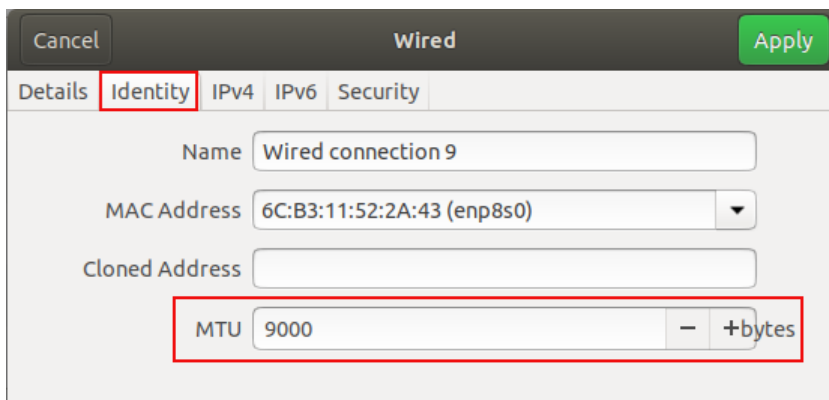
To enable Jumbo Frames and set MTU size to 9000 using the console, run the following command:

```
sudo ip link set <eth_link_name> mtu 9000
```

To enable Jumbo Frames and set MTU size to 9000 using the Network Settings in the Ubuntu GUI, follow the steps below:



2. On the **Identity** tab, set the **MTU** size to 9000 bytes and click **Apply**:



## Adjusting Receive/Transmit Buffers

To set RX/TX buffer size, use the **ethtool** utility.

1. If the **ethtool** utility is not installed, run the following command to install it:

```
sudo apt-get install ethtool
```

2. Find the maximum RX/TX values by running the following command:

```
ethtool -g <eth_link_name>
```

```
tester@kola-ubuntu18:~$ ethtool -g enp6s0
Ring parameters for enp6s0:
Pre-set maximums:
RX:                4096
RX Mini:           0
RX Jumbo:          0
TX:                4096
Current hardware settings:
RX:                512
RX Mini:           0
RX Jumbo:          0
TX:                512
```

3. Set the maximum RX/TX (as shown above, rx-max = 4096, tx-max=4096) by running the following command:

```
sudo ethtool -G <eth_link_name> rx 4096 tx 4096
```

```
tester@kola-ubuntu18:~$ sudo ethtool -G enp6s0 rx 4096 tx 4096
tester@kola-ubuntu18:~$ ethtool -g enp6s0
Ring parameters for enp6s0:
Pre-set maximums:
RX:                4096
RX Mini:           0
RX Jumbo:          0
TX:                4096
Current hardware settings:
RX:                4096
RX Mini:           0
RX Jumbo:          0
TX:                4096
```

## Getting Started with IpxPlayer or Sample Application

To start the IpxPlayer or sample application, from your environment run commands shown below and then run the application:

```
sudo ./manage_rp_filter.sh
```

This script will allow the cameras to be discovered on different subnets.

```
sudo ./manage_socket_buffer_size.sh
```

This script will increase the size of the memory buffers, allocated for sockets for Read and Write operations.

```
tester@kola-ubuntu18:~$ cd ~/IpxCameraSDK-1.5.0.54/bin/Linux64_x64/
tester@kola-ubuntu18:~/IpxCameraSDK-1.5.0.54/bin/Linux64_x64$ sudo ./manage_rp_filter.sh
[sudo] password for tester:
Setting rp_filter mode to 'Strict Reverse Path'...
For all the system's interfaces
Setting rp_filter mode to 'Strict Reverse Path' DONE
tester@kola-ubuntu18:~/IpxCameraSDK-1.5.0.54/bin/Linux64_x64$ sudo ./manage_socket_buffer_size.sh
Setting socket write maximum buffer size to 10485760 bytes
Setting socket read maximum buffer size to 10485760 bytes
tester@kola-ubuntu18:~/IpxCameraSDK-1.5.0.54/bin/Linux64_x64$ ./IpxPlayer
```

# 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 persistent or dynamic address configurations

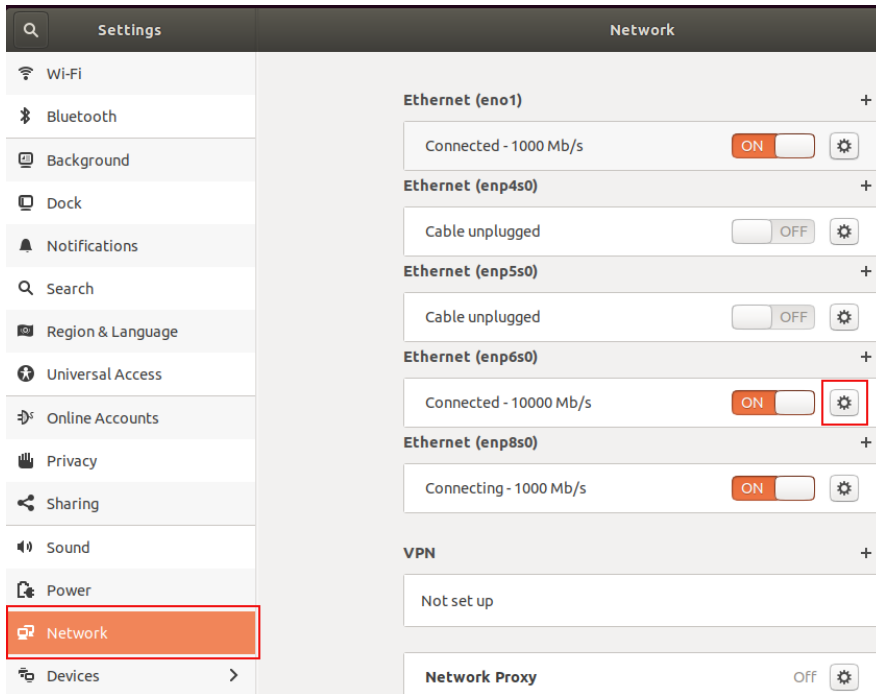
**TIP** ⓘ

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.

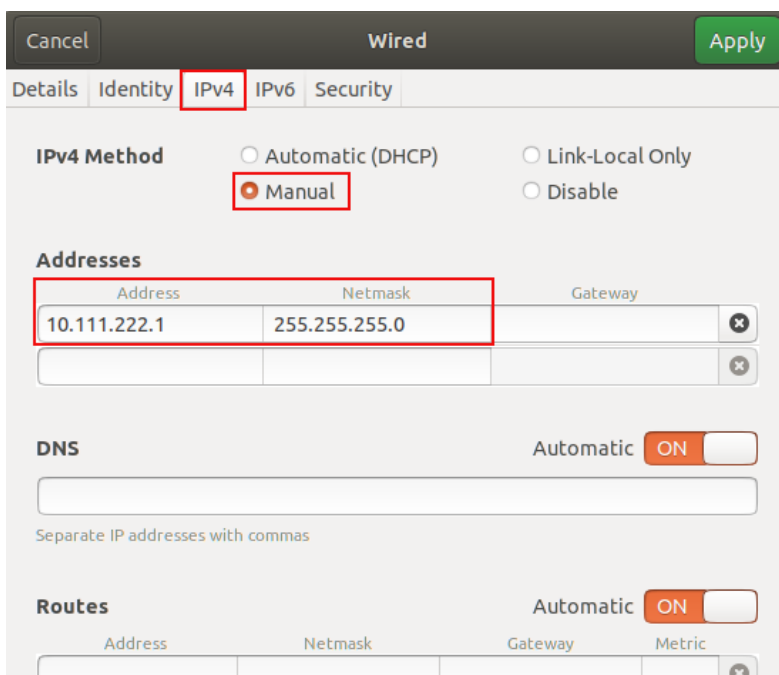
If the DHCP server is not running in the network, you can use the LLA configuration or manually assign static IP addresses to each NIC and GigE Vision camera.

# Configuring a Static IP Address

To assign a static IP address manually, follow the steps below.



2. On the **IPv4** tab, set **IPv4 Method** to **Manual** and enter an IP address and Netmask in the Addresses area. The **Gateway**, **DNS**, and **Routes** fields should be left blank.



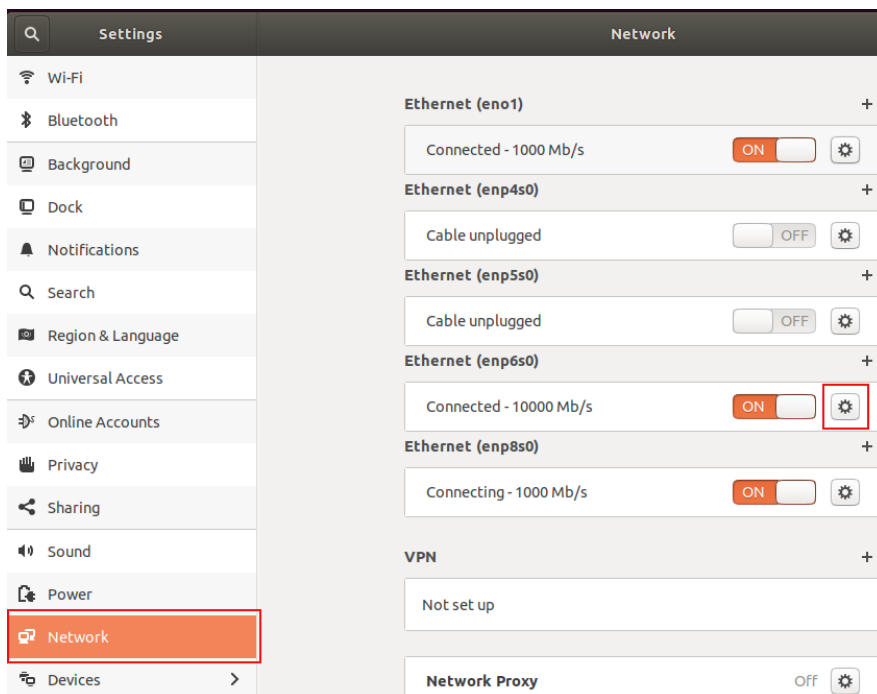
Imperx recommends using a private network IP address. The following IPv4 address ranges are reserved for private networks:

<b>RFC1918 name</b>	<b>IP address range</b>	<b>Largest CIDR block (subnet mask)</b>
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)

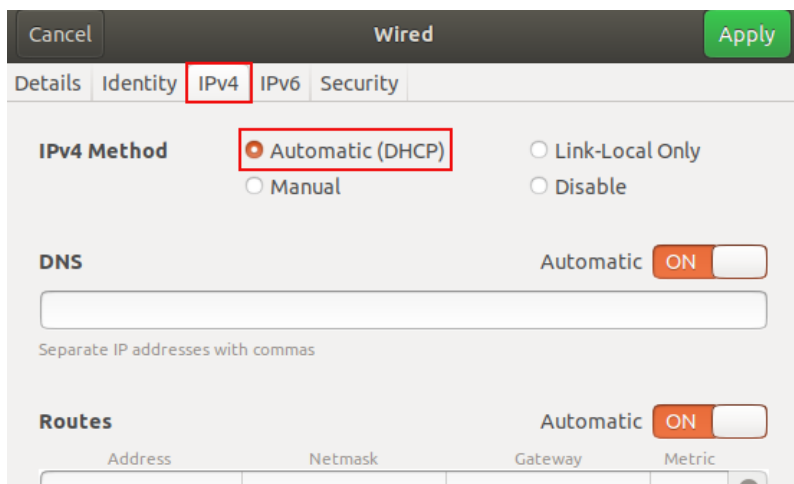
3. Click **Apply**.
4. Repeat steps 1–3 for each NIC on your computer.

# Configuring an IP Address Using DHCP

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



2. On the **IPv4** tab, set **IPv4 Method** to **Automatic (DHCP)** and click **Apply**.

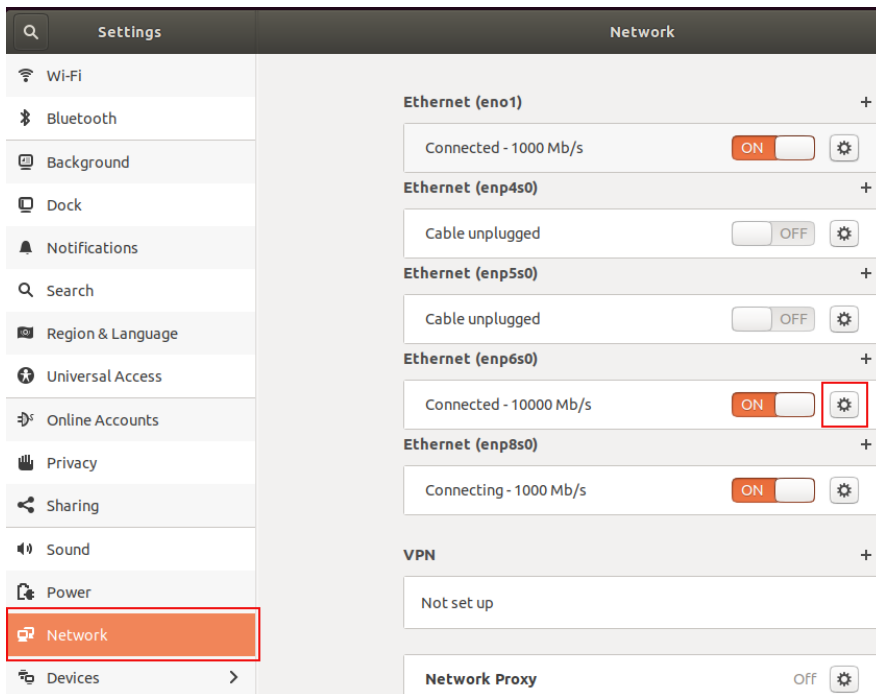


3. Repeat steps 1, 2 for each NIC that is connected to a camera and has a running DHCP server.

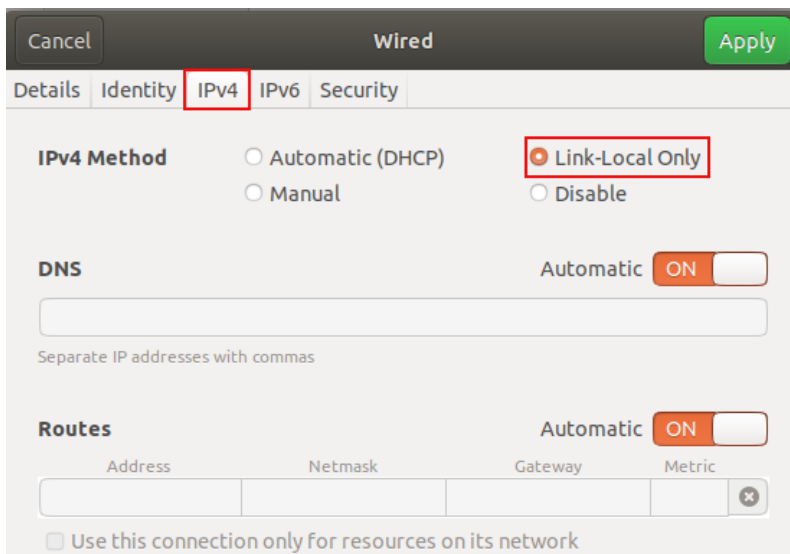
**NOTE** \* The DHCP server assigns a dynamic IP address to the NIC and camera. If the DHCP server is not available/not running, a link-local address assignment takes place.

# Configuring a Link-Local IP Address

For a NIC to obtain a link-local IP address, follow the steps below.



2. On the **IPv4** tab, set **IPv4 Method** to **Link-Local Only** and click **Apply**.



3. Repeat steps 1, 2 for each NIC on your computer.

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.

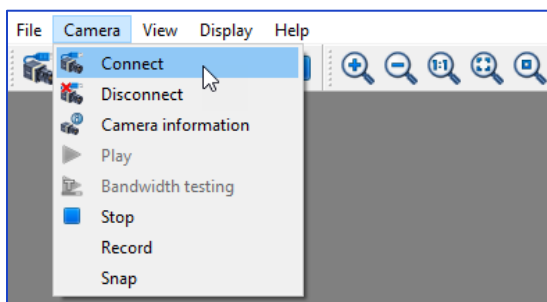
# Configuring a Persistent IP Address for a Camera

A camera has the following default parameters:

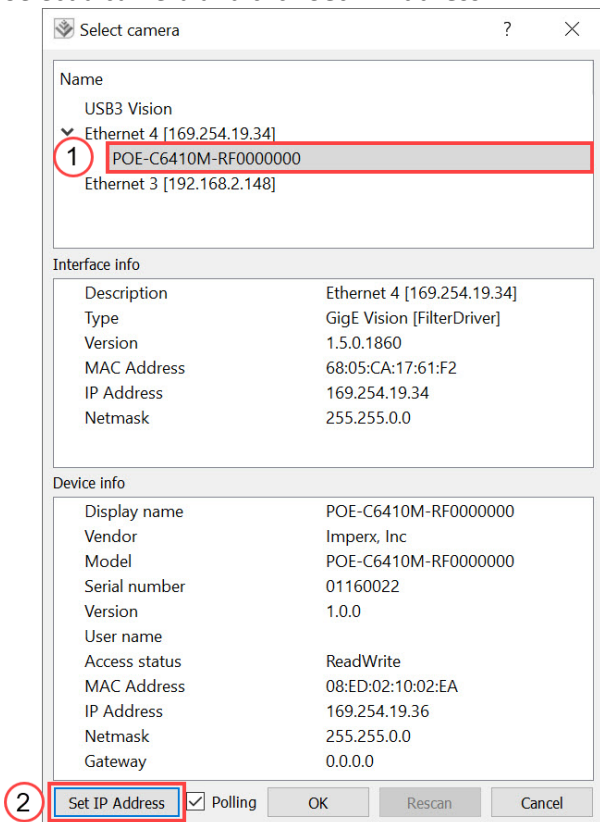
LLA	True (Enabled)
DHCP	True (Enabled)
Persistent IP	False (Disabled)
Subnet Mask	255.255.0.0
Default Gateway	0.0.0.0

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

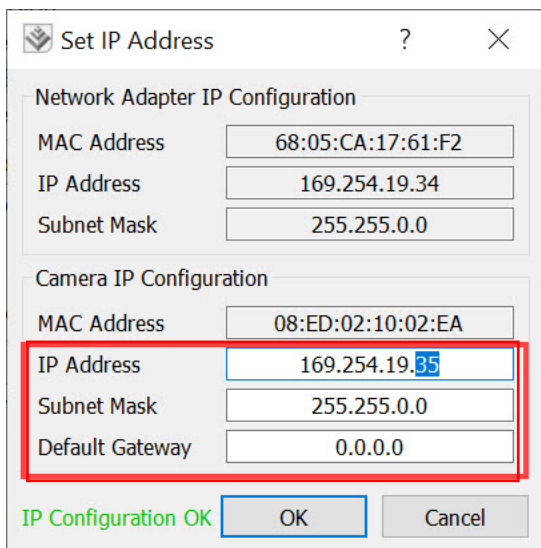
1. Open the IpxPlayer application and click **Camera** menu and select **Connect** (or click the **Connect** icon  on the tool bar).



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



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



Set IP Address

Network Adapter IP Configuration

MAC Address: 68:05:CA:17:61:F2

IP Address: 169.254.19.34

Subnet Mask: 255.255.0.0

Camera IP Configuration

MAC Address: 08:ED:02:10:02:EA

IP Address: 169.254.19.35

Subnet Mask: 255.255.0.0

Default Gateway: 0.0.0.0

IP Configuration OK OK Cancel

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

- GevCurrentIPConfigurationPersistentIP*: 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
GevCurrentIPConfigurationPersistentIP	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;30
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.

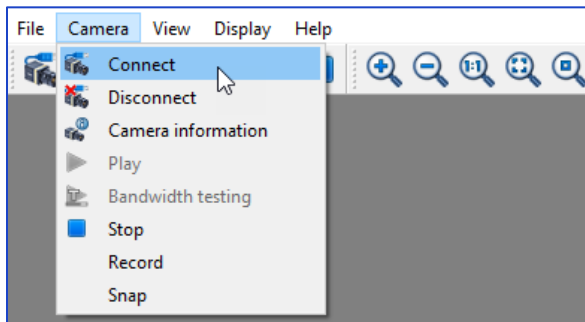
The camera Outgoing UDP port for Control Channel GVCP packets is 3956 (0x0F74), while the incoming port on SW side - can be any dynamic port within the range 49152–65535.

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.

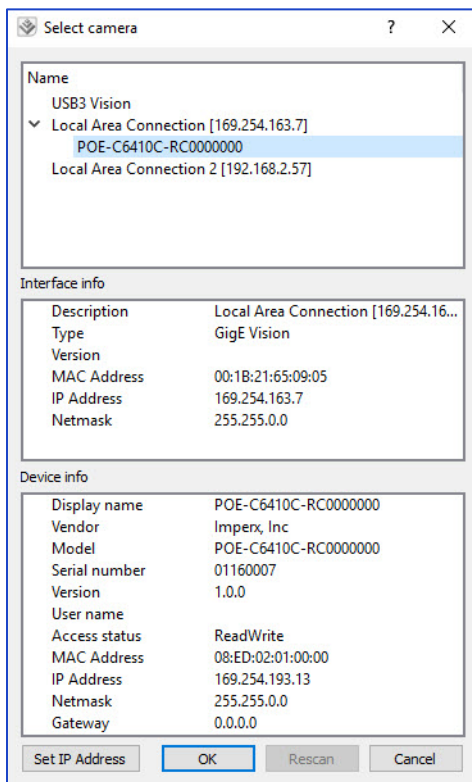
# Connecting to a Camera

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



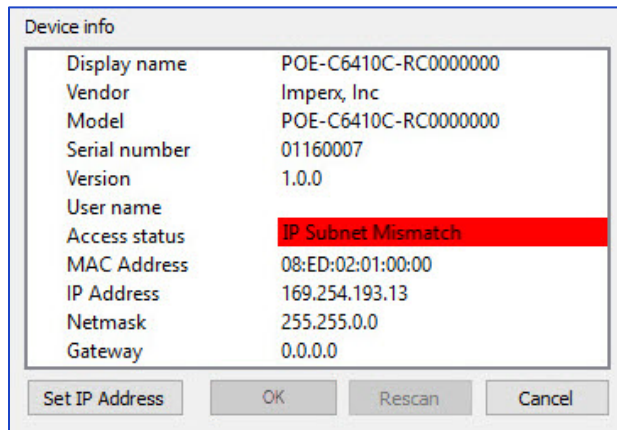
The Select Camera dialog appears. The dialog lists all connected cameras. The version number refers to the installed Imperx GUI driver.

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



8. 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:

- 8.1. Click **Set IP Address**.
- 8.2. When the Set IP Address screen appears, click **OK**.
- 8.3. On the Select Camera screen, click **OK**.
9. If the camera is connected, the Ethernet LEDs on the camera back panel and on your Ethernet switch are blinking.

