

## 10GbE Network Configuration Guide for **SM200C** Operation.

# **10GbE Network Configuration Guide**

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# SM200C 10GbE Network Compatibility Guide

## 1 SM200C 10GbE Network Compatibility Guide

This document outlines the hardware requirements for networking the SM200C.

### 1.1 Adapters and Cables

Signal Hound recommends fiber cables with SFP+ fiber adapters. The SM200C will work with single and multi-mode fiber cables with appropriate transceiver modules.

The SM200C has been tested with passive copper cables up to 2 meters. Longer passive cables may have increased data reliability issues.

#### Tested Transceivers and Cables

- FS SFP-10GSR-85
- FS SFP-10GLR-31
- FS SFP-10GZR-55
- FS-OM3 50/125 multi-mode fiber patch cables
- FS 9/125 single mode fiber path cable

### 1.2 Recommended 10GbE Network Interface Cards

- X722-DA2/4
- X520\*DA2
  - ZR modules may have issues with this card on Windows 10.
- X710-DA2/4

### 1.3 Recommended Thunderbolt To 10GbE Adapters

- QNAP Thunderbolt 3 to 10GbE Adapter (QNA Series) (Recommended)
- Sonnet Solo10G SFP+ (Thunderbolt 3 Edition)

### 1.4 Operating Systems

Signal Hound recommends the following operating systems.

- Windows 10
- Linux Ubuntu 18.04
- CentOS 7

### 1.5 Processor Requirements

All measurement capabilities other than the 200MS/s I/Q streaming of the SM200C have modest processor requirements. Typical i5/i7 processors will have the necessary performance. For

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200MS/s I/Q streaming, single threaded CPU performance is critical. Signal Hound recommends CPUs that can sustain 4GHz single threaded performance and 8th generation or newer Intel processors.

The use of Thunderbolt 3 to SFP+ adapters has shown to reduce processor requirements and, in many cases, standard laptop processors can be sufficient.

## 2 Windows 10 Setup

This section guides you in setting up your Windows 10 machine for SM200C operation.

These instructions assumes you have already installed a 10GbE NIC or are using a thunderbolt to SFP+ adapter. If using an adapter, you have already installed the proper drivers and enabled the thunderbolt device.

The SM200C should be powered up and connected to the network interface via provided fiber cable and SFP+ connectors.

This section will step you through the three main steps in configuring the 10GbE network interface.

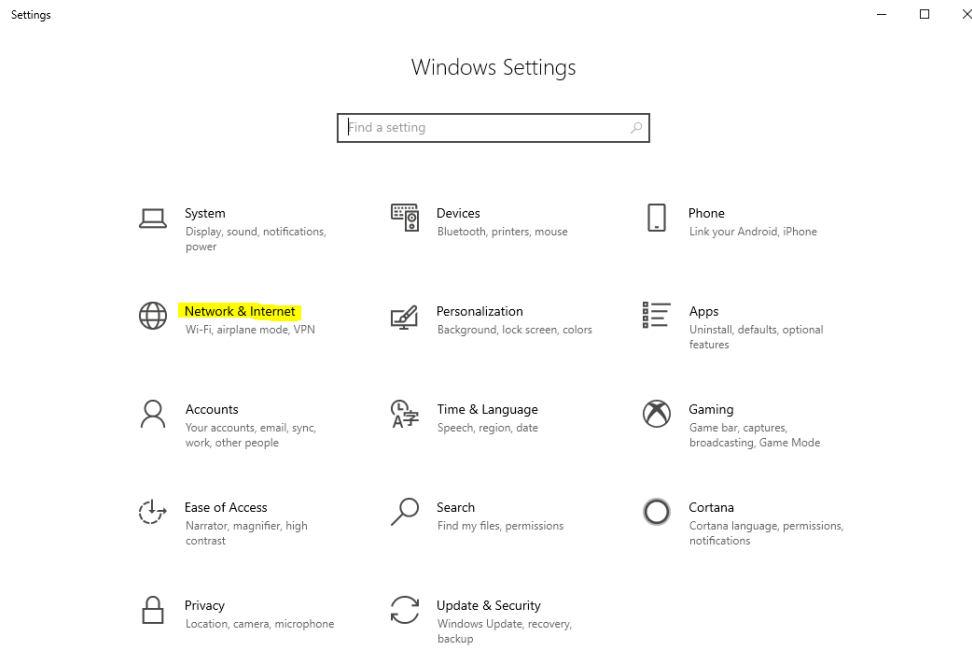
- Specifying a fixed IP for the network interface.
- Increasing the MTU size, (enable jumbo packets)
- Verifying remaining network parameters.

The default IP address for the SM200C is 192.168.2.10 and uses port 51665. These instructions assume you have not modified the default network configuration of the SM200C.

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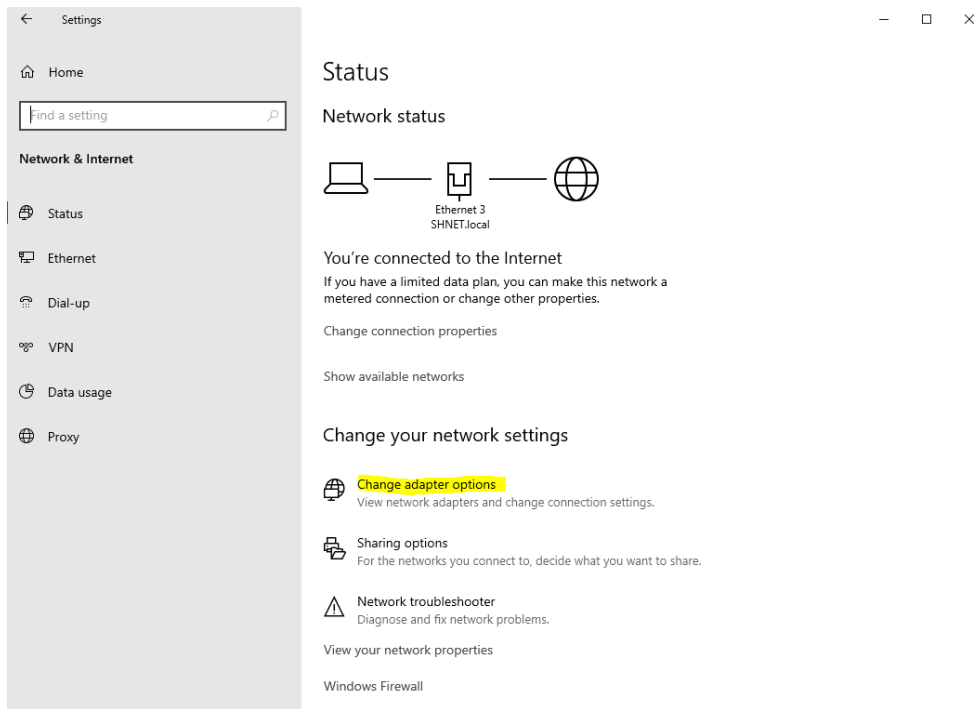
## 2.1 Configuration Steps

First, you must navigate to the network settings. Start by going to the system settings and select “Network and Internet”.



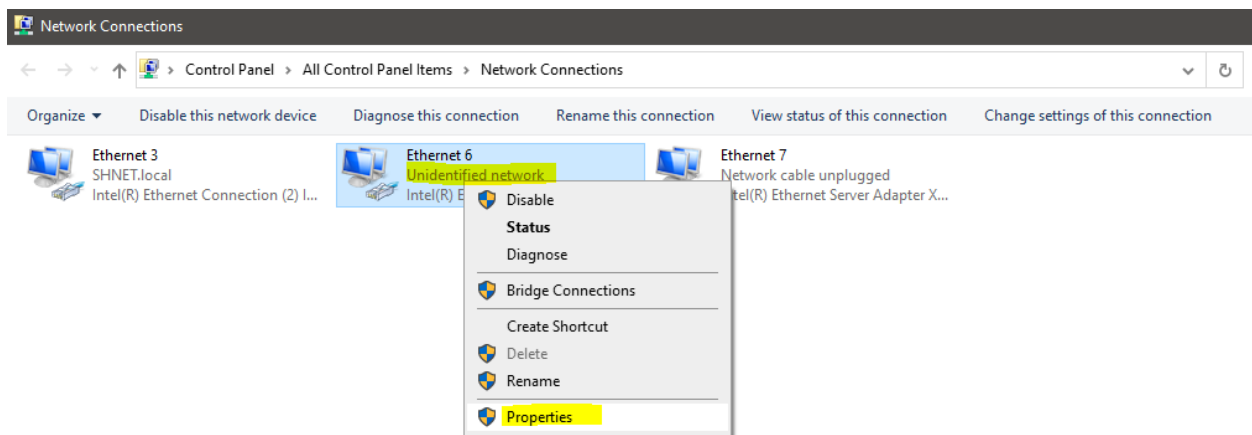
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Once in the Network and Internet settings, select “Change adapter options”



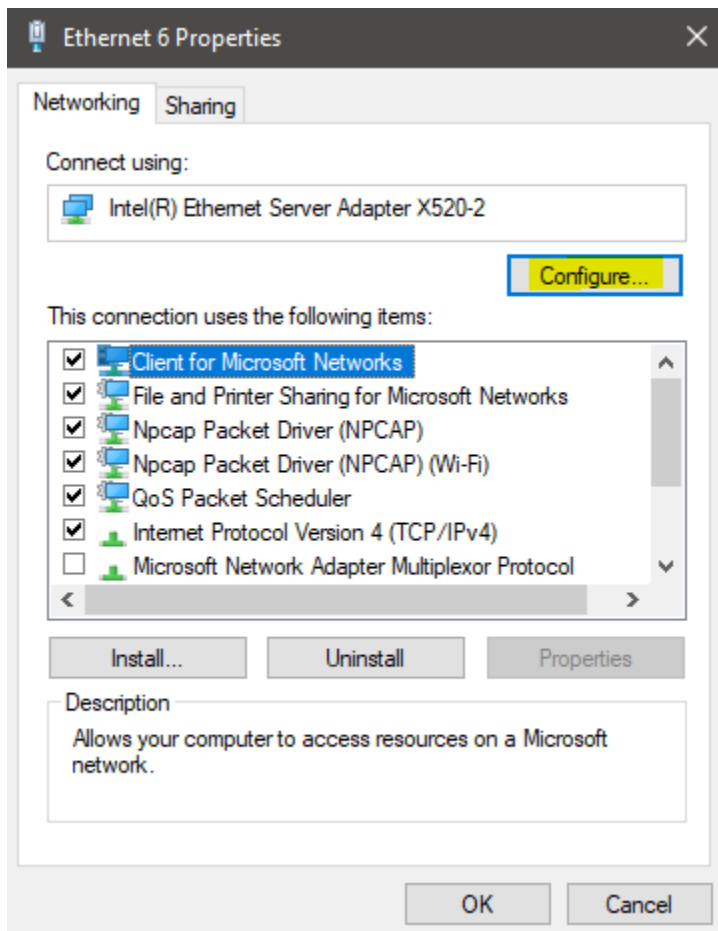
You should now see the “Network Connections” dialog. You should see your 10GbE network interfaces listed here.

When an SM200C is connected powered on and connected, one of the 10GbE interfaces will report “Unidentified network”. Right click that interface and select properties to configure the interface.



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First, we must configure the network adapter settings. In the network interface properties press the “Configure” button. This will bring up the 10GbE adapter settings.





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In the adapter properties dialog, select the “Advanced” tab and configure the adapter with the following settings. If any are missing, move on. When finished press OK.

*Flow Control* – **Rx & Tx Enabled**

*Interrupt Moderation* – **Enabled**

*Interrupt Moderation Rate* – **Adaptive**

*Jumbo Packet* – **9014 Bytes**

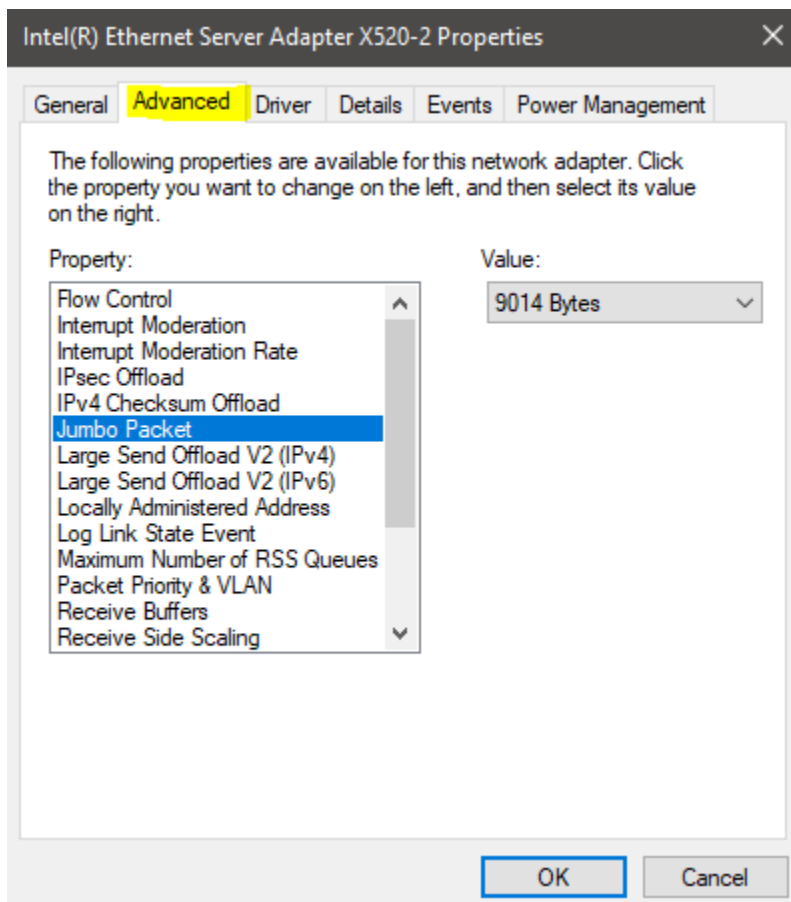
*Receive Buffers* – **4096**

*Transmit Buffers* – **4096**

*Any checksum offloads* – **Enabled**

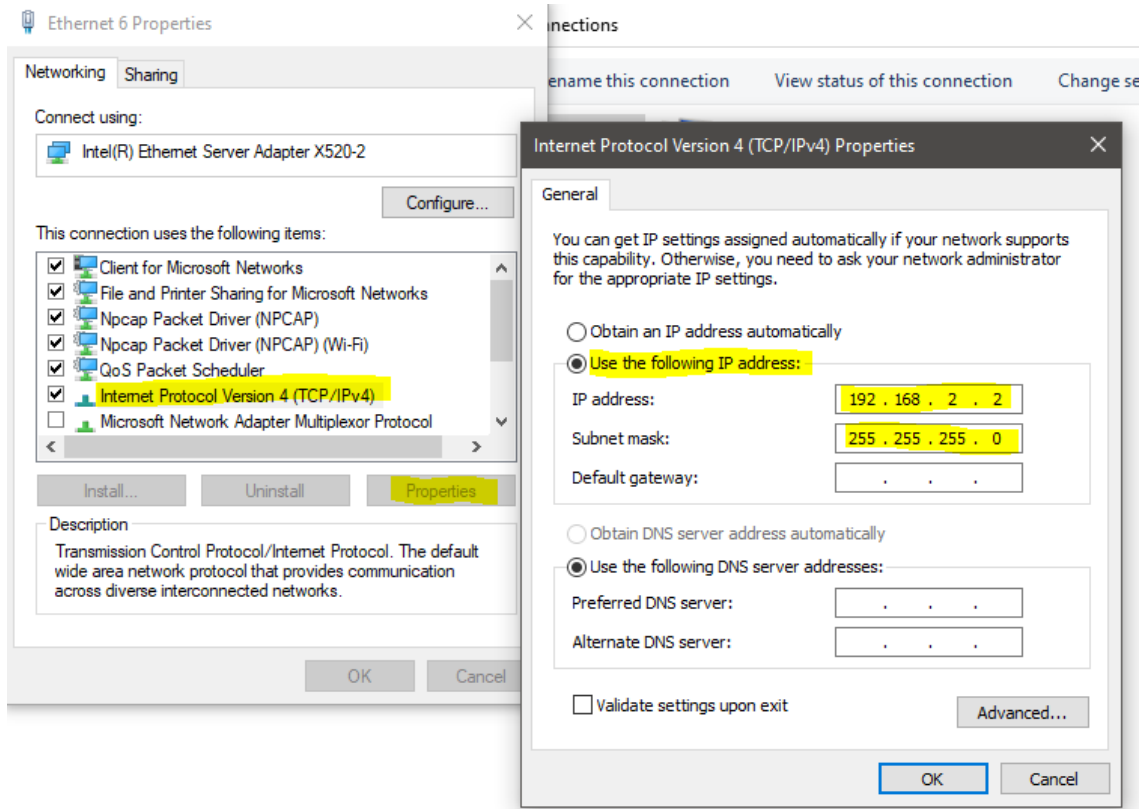
*And Large Send/Receive offloads* – **Enabled**

*Speed & Duplex* – **10Gbps Full Duplex**



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The next step is to setup the TCP/IPv4 IP address and subnet mask. Re-enter the interface properties menu and select the Internet Protocol Version 4 (IPv4) line and press properties to bring up the IPv4 properties dialog. In this dialog, select “Use the following IP address” and manually fill out the highlighted lines with the corresponding values. Select OK when done.



At this point the interface should be properly configured and the SM200C can be connected in Spike. Use the File->Manage Ethernet Devices menu in Spike, add a new device using the default network parameters, and connect to the device using the File->Connect menu.

## 2.2 Troubleshooting

If you are having difficulties connecting to the SM200C in Windows 10, quickly verify proper setup with the following steps.

- Verify the SM200C is connected to the correct network interface, the SM200C power cable is plugged in and the LED is on the SM200C is solid green. The LED should be solid green ~12 seconds after power is applied if a valid network connection is detected.

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- In the Network Connections dialog, you should see “Unidentified Network” listed next to the network interface that the SM200C is connected to.
- Verify that the network interface that the SM200C is connected to has been configured properly and no settings were reverted.

### 3 Ubuntu 18.04 Setup

This section guides you in setting up an Ubuntu 18.04 machine for SM200C operation.

These instructions assumes you have already installed a 10GbE NIC or are using a thunderbolt to SFP+ adapter. If using an adapter, you have already installed the proper drivers and enabled the thunderbolt device.

The SM200C should be powered up and connected to the network interface via provided fiber cable and SFP+ connectors.

This section will step you through

- Specifying a fixed IP for the network interface.
- Increasing the MTU size, (enable jumbo packets)
- Setting socket buffer sizes and rx/tx ring parameters.

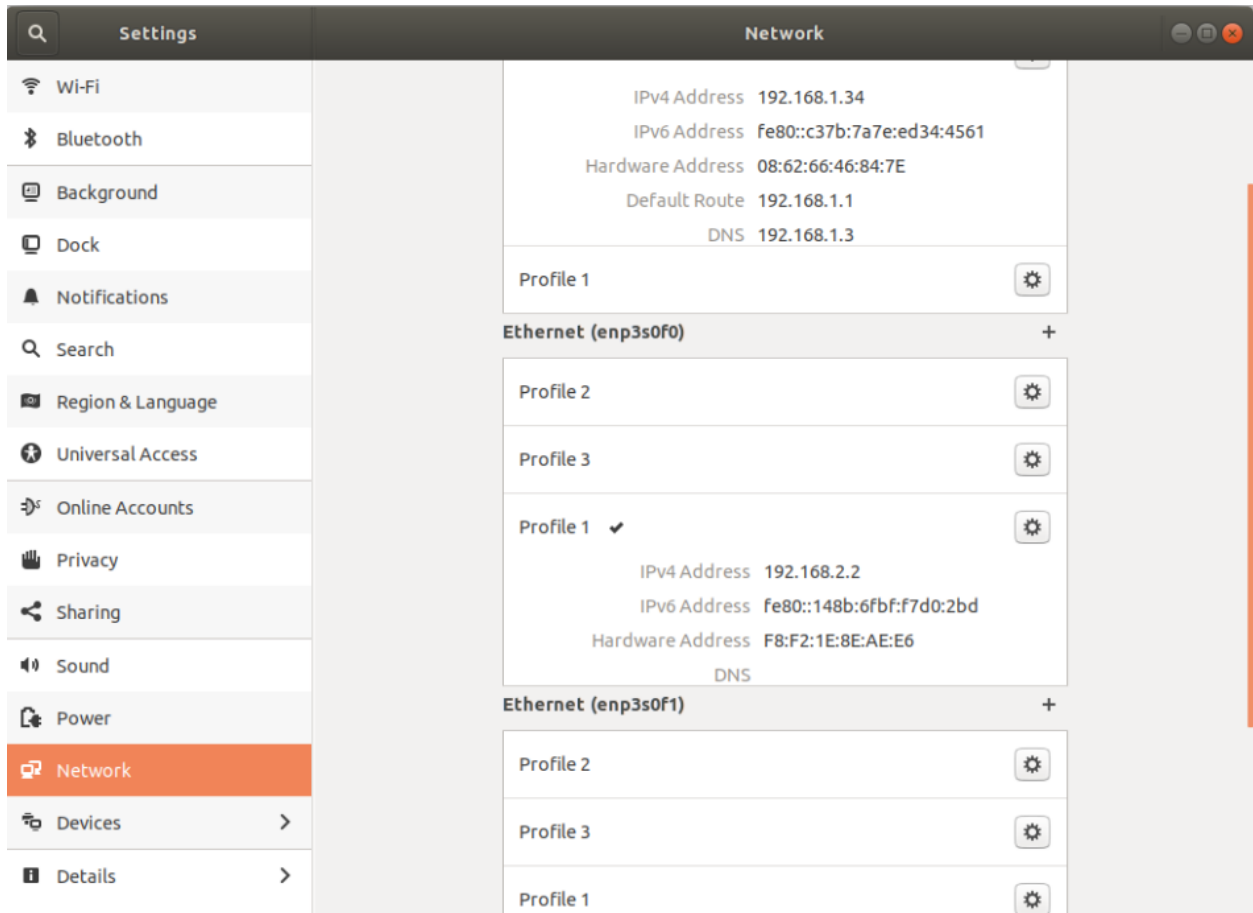
The default IP address for the SM200C is 192.168.2.10 and uses port 51665. These instruction assume you have not modified the default network configuration of the SM200C.

The steps outlined in the Configuration Steps section will allows you to permanently set the network configuration, meaning the configuration is not lost after a network interface restart. For a more temporary approach, see the network configuration commands.

#### 3.1 Configuration Steps

With the SM200C connected to a valid 10GbE network interface, navigate to the Network Settings.

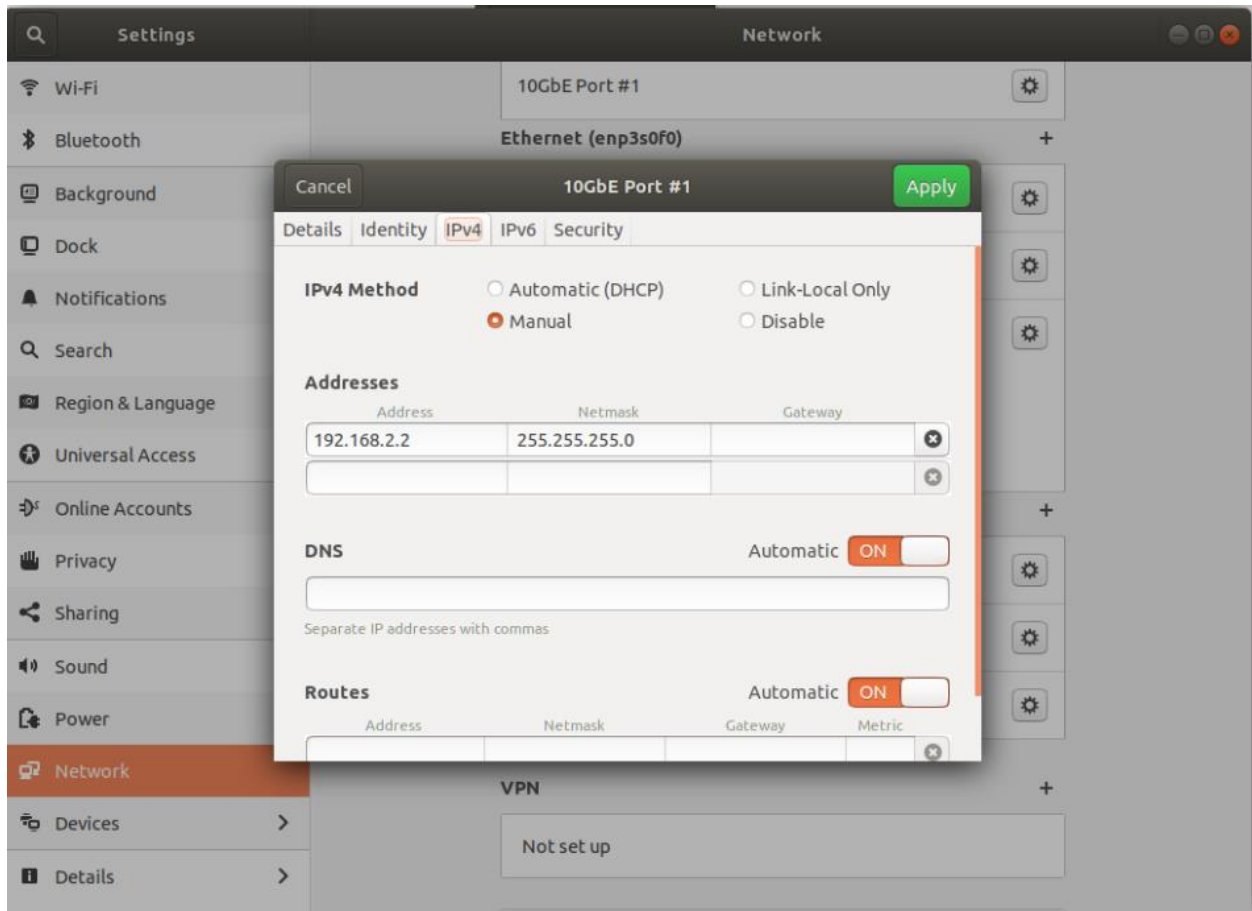
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Find the 10GbE network interface in the list, and create a new profile using the '+' button located to the right of the interface name. Please note the interface name (enp3s0f0 in the picture above) as it will be used in the commands documented here.

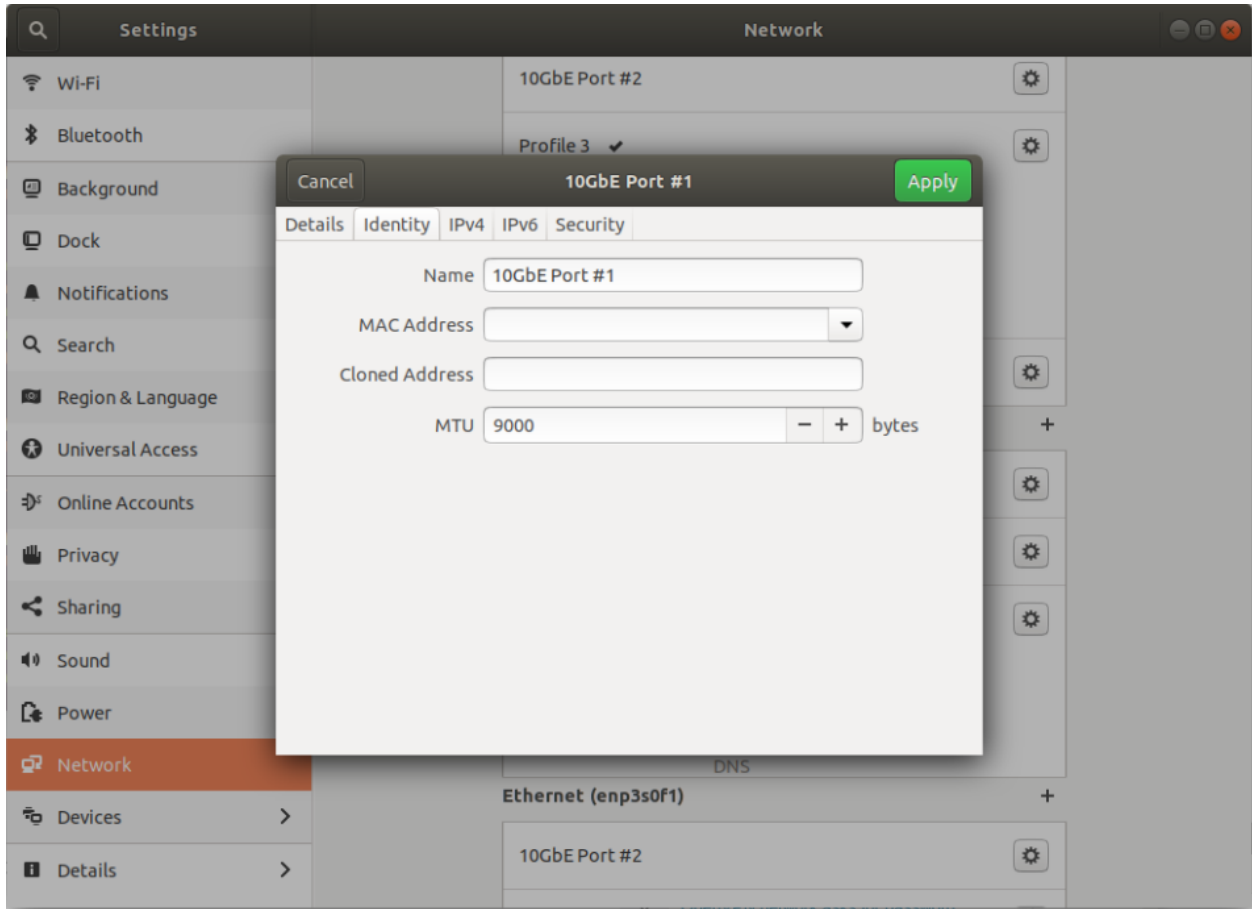
In the new profile, under the IPv4 tab, set a manual IPv4 address of 192.168.2.2 and netmask of 255.255.255.0.

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Set the MTU size to 9000 bytes in the Identity tab. Also set a profile name here (if desired).

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Hit apply when finished, and verify the new profile is selected. The profile will have a checkmark next to its name when selected.

Next is to configure the read and write socket buffer sizes. The SM200C can keep up to 32MB of UDP traffic in flight at any given time. We will configure the maximum buffer sizes to 50MB. To do this, edit the `/etc/sysctl.conf` file and add the following lines at the end of the file,

```
net.core.rmem_default=10000000
net.core.rmem_max=50000000
net.core.rmem_default=10000000
net.core.rmem_max=50000000
```

These settings will take effect the next time the network interface/PC is restarted.

The rx/tx ring parameters must also be updated. Signal Hound recommends setting the rx/tx ring entries to 4096. This can be performed permanently by modifying the `/etc/network/interfaces` file by appending the following line

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```
pre-up /sbin/ethtool -G enp3s0f0 rx 4096 tx 4096
```

This modification will run the proper ethtool command to modify the ring parameters the next time the network interface is restarted.

Restart the computer for all settings to take effect. The SM200C should now be able to be interfaced.

### 3.1.1 Network Configuration commands

The following commands can be used from the terminal to configure the network interface. The changes that occur for all of the following commands is temporary and will not persist through a network interface restart. See the main configuration steps for permanent methods. Also included are commands that can be used to verify the network settings are configured properly.

These commands can be used in a configuration script that is ran on program startup or run manually as needed. For all commands, replace *iface-name* with the name of the network interface the SM200C is connected to.

Set the MTU size.

```
$ sudo ip link set iface-name mtu 9000
```

View the current MTU sizes.

```
$ ip link show | grep "mtu"
```

Set the socket buffer sizes.

```
$ sudo sysctl -w net.core.rmem_default=10000000
```

```
$ sudo sysctl -w net.core.rmem_max=50000000
```

```
$ sudo sysctl -w net.core.wmem_default=10000000
```

```
$ sudo sysctl -w net.core.wmem_max=50000000
```

Read socket buffer sizes

```
$ cat /proc/sys/net/core/rmem_default
```

```
$ cat /proc/sys/net/core/rmem_max
```

```
$ cat /proc/sys/net/core/wmem_default
```

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```
$ cat /proc/sys/net/core/wmem_max
```

Set rx/tx ring parameters for a network interface

```
$ sudo ethtool -G iface-name rx 4096 tx 4096
```

List rx/tx ring parameters for network interface

```
$ ethtool -G iface-name
```

### 3.2 Troubleshooting

If you are having difficulties connecting to the SM200C in Ubuntu 18.04, quickly verify proper setup with the following steps.

- Verify the SM200C is connected to the correct network interface, the SM200C power cable is plugged in and the LED is on the SM200C is solid green. The LED should be solid green ~12 seconds after power is applied if a valid network connection is detected.
- Verify the correct profile is selected in the Network Settings for the given network interface.
- Use the commands in the Network Configuration commands section to view and verify all network parameters have been properly set.