AXIS and AirLink modems

Application Note

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Using a Sierra Wireless AirLink Raven X or Raven XE with an Axis Network Camera

An Axis network camera can be described as a camera and computer combined in one intelligent unit. It captures and sends live video directly over an IP network such as a LAN, intranet or the Internet and enables users to view and/or manage the camera using a standard Web browser or video management software on any local or remote computer on a network. It allows authorized viewers from different locations to simultaneously access images from the same network camera.

- Stand-Alone

With a built-in Web server, Axis network cameras do not need a direct connection to a PC or any other hardware or software to capture and transfer images. They operate as stand-alone units and require only a connection to an IP network by wired or wireless means.

- Security

Remote and cost-effective monitoring using streaming video, sequentially uploaded images at a certain frequency, and/or built-in motion detection with pre- and post-alarm buffers helps to secure people, property and industrial processes.

- Alarm or Sensor Triggered Events

Digital inputs that are connected to alarm devices or sensors can, for instance, be used to trigger the transmission of images from a camera to a select destination for recording, or request that e-mail alerts or SMS notification be sent, for example, to a mobile phone.

- Control Other Devices

Digital outputs enable you to remotely, or automatically upon alarm, close or open doors, turn lights on or off, or control other devices. Network cameras also have image buffers that can save and send the images collected before an alarm occurred.

- Audio

Besides visually being able to see remotely from any networked computer, anywhere and at any time, Axis also provides products that enable two-way audio communication over networks. With both visual and audio communication,

you can question intruders, conduct remote education, troubleshooting, or broadcast both sights and sounds of a location or event on Web sites.

The Axis Network camera is designed to connect directly to an Ethernet network and be assigned a public Internet address. However, in remote locations, a wired Ethernet network might not be practical and the range possible with a wireless LAN can be too limiting.

The Sierra Wireless AirLink Raven X or Raven XE provides a cellular solution for the Axis Network camera providing an unparalleled flexibility of location. The rugged design of AirLink modems makes it practical for any location where surveillance might be desired.

Figure 1: Axis Network Camera with a Raven XE

- Flexible Location

An Axis Network camera connected to an AirLink cellular modem can be placed in a spot which cannot be or is not cost effective to be wired into an Ethernet network.

- Quick Deployment

Since the Raven X or Raven XE uses an existing network with the cellular connection, there is no need to plan Ethernet wire "drops". As soon as the modem is activated, it can connect to the cellular network and the camera can begin transmitting through the modem.

- Versatility

An Axis Network camera using a Raven X or Raven XE could be moved to a new location, quickly and easily, no wires to move, no local wireless transmitters to reposition.

- Rugged Construction

With a hardened case and an operating temperature range of -30 degrees C to +60 degrees C, AirLink modems are suitable for industrial or other harsh environments. Note: The modem is not sealed against weather, dust, or other elemental conditions.

- Software Tools

Enhanced with the intelligence of ALEOS, Sierra Wireless AirLink modems are equipped with the AceWare(TM) suite of remote management software tools. AceWare lowers total cost of ownership by simplifying installation and deployment, and enabling remote device configuration, management and troubleshooting.

- Dynamic DNS

One of the many features of ALEOS is the ability to configure an AirLink modem to work with a dynamic DNS server. Even without a static IP, the Raven X or Raven XE, and the Axis Network Camera with it, can be contacted from anywhere on the Internet.

Easy Configuration

The step by step configuration outlined in this guide allows an Axis Network Camera to use a Sierra Wireless AirLink Raven X or Raven XE for remote access.

Note: The 211/211A and 214 cameras were tested with this configuration; however, other Axis Network Cameras with a similar configuration will also work.

Warning: *This document is intended to provide suggestions for communications setup only, and in no way commits Sierra Wireless to provide consulting, integration, or technical support for any Axis Camera Server or the integration of such with any Sierra Wireless product. The assembly and integration of the Sierra Wireless AirLink Raven X or Raven XE modem and the Axis Network Camera is the responsibility of a technology solutions integrator or end-customer, as neither Sierra Wireless nor Axis sell or support such an integrated solution.*

Before You Start

You will need to decide if you want the modem to pass the IP address it receives to the camera (Public Mode) or if you want the modem and the camera to be on a local network with a static IP which is not Internet routable (Private Mode).

If you choose Private Mode, you will need IP addresses for both the camera and the modem. The IP addresses will need to be on the same subnet and local to each other. Generally, you will want to use a 192.168.x.x address for both. The third octet (set of numbers) will need to be the same and the last octet will need to be different.

- Example IP for the modem: **192.168.13.31**
- Example IP for the camera: **192.168.13.30**

Caution: *If the modem and the camera are going to be on a hub which is connected to a local network, you will need to be sure the addresses you select are not used by any other device on the network. Consult with your network administrator if you are unsure.*

Software Required

- **AceManager** - Graphical interface for configuring your AirLink modem. You can download the most recent version of AceManager from the Sierra Wireless AirLink Solutions website: http://www.sierrawireless.com. A default installation of this utility is assumed later in these directions.
- **Axis IP Utility** - Axis provides a small utility with their cameras which you can use to set the initial IP of the camera so you can connect to its internal web server where you can configure it. If you do not have the CD that came with your camera, you can obtain the Axis IP Utility from the Axis website: http://www.axis.com.

Software Recommended

- **AceManager** - Deeply integrated with ALEOS, AceManager provides comprehensive remote management and configuration for AirLink wireless gateways. AceManager is available for all customers for free of charge..
- **AceNet** - Multiple modem configuration and monitoring utility for all AirLink modems. With AceNet, you can save a working configuration in AceManager and then load it into several modems concurrently saving time and

ensuring all the modems are configured the same. AceNet is available for separate purchase from your Sierra Wireless AirLink Solutions representative.

Hardware Required

- **Ethernet Cable -** A cross-over or straight through Ethernet cable.

If you have a Raven X or if your computer is equipped with an auto-sensing Ethernet port, you have the option of using a straight-through Ethernet cable.

- **Power supplies and a power source** - You will need a power supply and power source for both the AirLink modem and the Axis camera.
- **PC or Laptop** - To configure both the Axis camera and the AirLink modem, you will need a computer with an available Ethernet port.

Cellular Account Required

- **Cellular Account -** To use this guide you need to already have an active account with a cellular provider and to have activated your modem with that provider. Sierra Wireless AirLink Solutions modems are certified to work with a variety of cellular providers.

If you need to activate your modem, you can use the Setup Wizard for your cellular provider which you can obtain from the Sierra Wireless AirLink Solutions website: http://www.sierrawireless.com/support/.

Important Information about Cellular Networks

- HTTP (web server) Port - Many cellular providers and other ISPs block port 80 which is the default port for HTTP (web-based communication). If your provider blocks this port, you will need to configure a port you can access. Some providers also block port 8080, another commonly used port for HTTP.
- Upload Speed for 2G and early 3G cellular technologies (1x, GPRS, EDGE, iDEN, and EV-DO Rev0) - These technologies have a much lower upload (transmit) speed than download. In addition, many cellular providers can "throttle" the upload speeds of devices connected to their networks, reducing the amount of upload traffic. Even with good signal, it is not uncommon to see upload speeds of only 60 to 100kbps while you have download speeds in

excess of 600kbps (2G) or 1000kbps (3G). The framerate of your camera in a live stream configuration will be heavily impacted by the upload speed you can attain on your provider's network.

- Upload Speed for Cellular "Broadband"- The Raven X and the Raven XE have the ability to connect at EV-DO Rev A or HSUPA speeds.

EV-DO Rev A and HSUPA offer 3G high speed data rates for both downlink and uplink. The uplink improvements in data speeds are vital to video applications, which typically require broadband uplink speeds.

All AirLink devices are backward compatible to earlier technologies where EV-DO Rev A and HSUPA are not available.

- Signal Strength and Quality - The upload performance of your camera will also be heavily influenced by the signal strength and signal quality of the cellular connection in the installed location. If you do not have optimal signal for video, the framerate and/or quality can be impacted. Sierra Wireless AirLink Solutions recommends an RSSI of -60 to -80 or better for optimal signal. However, even with a strong signal, if the modem is connecting to a particular cell site that has heavy data traffic to share the total available bandwidth to the cellular provider's network, the quality of the signal may be lower which can also impact the camera's remote performance. These two aspects are also referred to as the coverage and capacity for a specific location. Your cellular carrier's representative or your Sierra Wireless representative may be able to help you determine what is best for your installation.

Configuring the Raven X or Raven XE

1. Connect your Raven X or Raven XE directly to the Ethernet port on your computer and to power.
2. Start **AceManager** and connect to your modem.

Start > All Programs > AirLink Communications > AceManager

   a. Click on **Connect**.
   b. Select **UDP**.
   c. Type in the modem's local IP (default is ***192.168.13.31***).
   d. Type in the modem's password (default ***12345***)

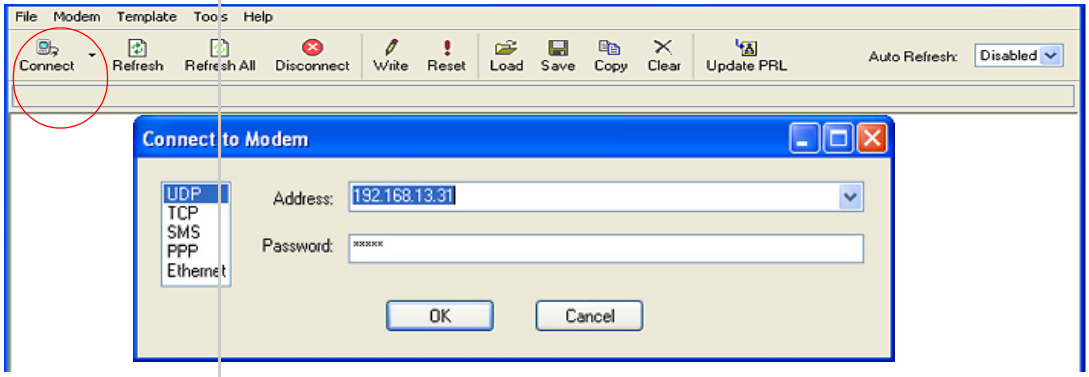


Figure 2: AceManager: Connect

*Note: If you don't know the IP of your modem, you can connect to it using the **Ethernet** option for "Connect to Modem". Your modem should be automatically detected.*

3. Select **PPP/Ethernet** from the menu on the left side of AceManager (under "Groups").

Private Mode

In this mode, the modem communicates with the Axis camera via a static local IP address.

a. Set the ***HOSTPRIVMODE** to **1**.

b. Set the ***HOSTPRIVIP** to the IP address for the camera (in the example, **192.168.13.30**).

c. Verify the ***HOSTPEERIP** is the local IP of the modem (to the camera, the modem is the default router; in the example this is **192.168.13.31**).

d. Set the ***HOSTNETMASK** to the Subnet Mask (generally **255.255.255.0**).

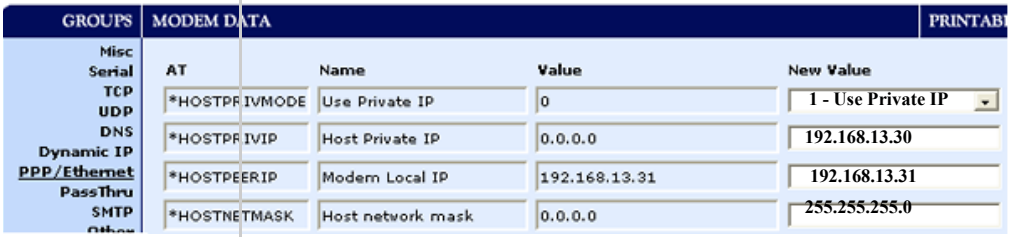


Figure 3: AceManager: PPP/Ethernet

Public Mode

In this mode, the modem assigns the Axis camera the IP address it has received from your cellular provider.

a. Set the ***HOSTPRIVMODE** to **0**.

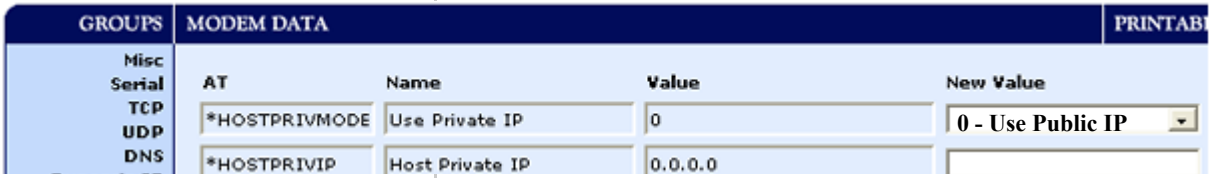


Figure 4: AceManager: PPP/Ethernet

1. When you have finished configuring the Ethernet settings, click the **Write** button on the tool bar of AceManager and wait for the message "Write Successful" to appear in the status bar.

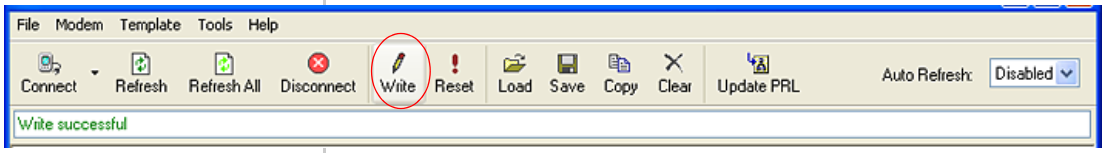


Figure 5: AceManager: Write

2. Disconnect the modem from your computer.

Note: If you have multiple camera sites that will be equipped with the Raven X or Raven XE, you can make a template with AceManager and use AceNet to apply it to all your modems at one time. Refer to the guide "How to Make and Apply Templates" available from the Sierra Wireless AirLink Solutions website.

Configuring the Axis Camera

1. Connect the Axis camera to your computer and to power.
2. Start **Axis IP Utility** and set the IP Address of your Axis camera.

Run **IPutility.exe** from the camera CD or from your hard drive.

a. Axis IP Utility should detect all cameras connected to your computer.

b. Right-click on the modem displayed and select **Set IP Address** (or you can use the "IP" icon in the top left).

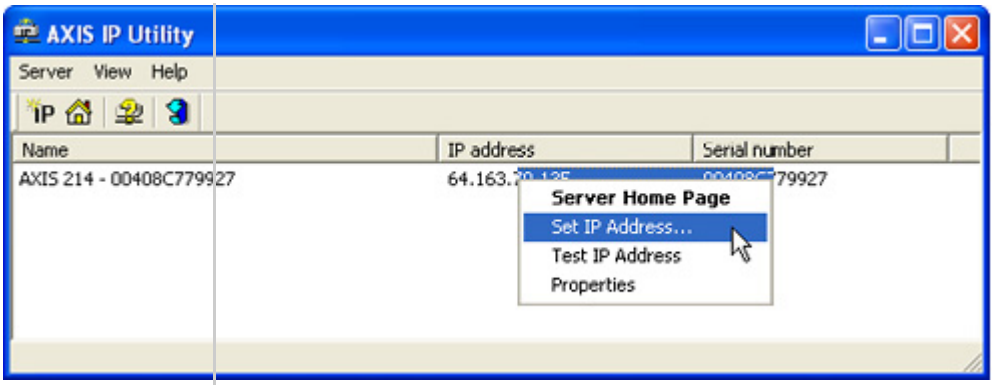


Figure 6: Axis IP Utility

c. Set the **IP Address** to the IP address for the camera. This should be the same as what you set ***HOSTPRIVIP** for in the modem (in the example, **192.168.13.30**). Click Set IP.

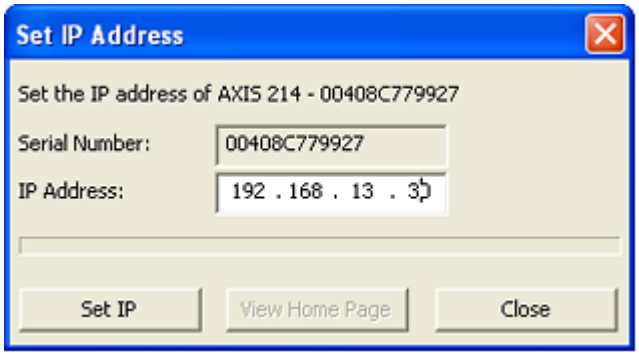


Figure 7: Axis IP Utility: Set IP Address

3. Configure how the Axis camera obtains its IP using its internal web-based configuration utility.

a. In the Axis IP Utility, right-click on the camera and select **Server Home Page** (or you can select the "home" icon in the top left).

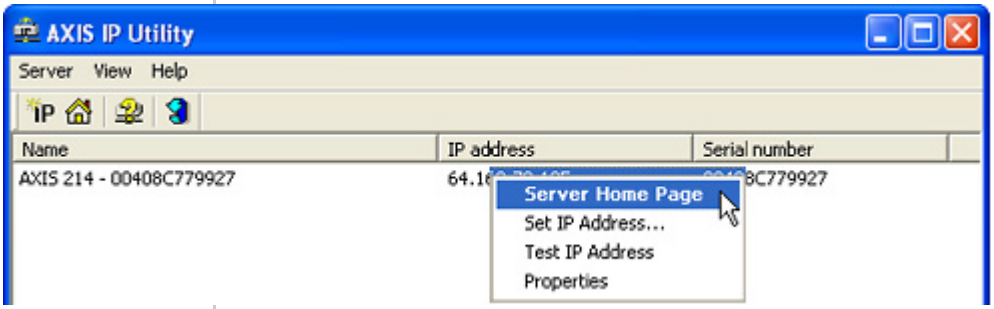


Figure 8: Axis IP Utility: Server Home Page

b. Enter your user name and password. The user name account needs to have 'admin" rights to the camera.

Note: If this is the first time you are accessing the camera, you will be prompted to create a password. You cannot change the Administrator name from the default "root".

c. Your default web-browser will open and the first page that will be shown is the "Live View" of the camera. Select **Setup**.

Figure 9: Axis Camera web-based interface

Tip: *To view (and hear) the camera streaming, you may need to install additional Active X components from Axis.*

d. Select TCP/IP from the Basic Configuration group in the menu on the left.

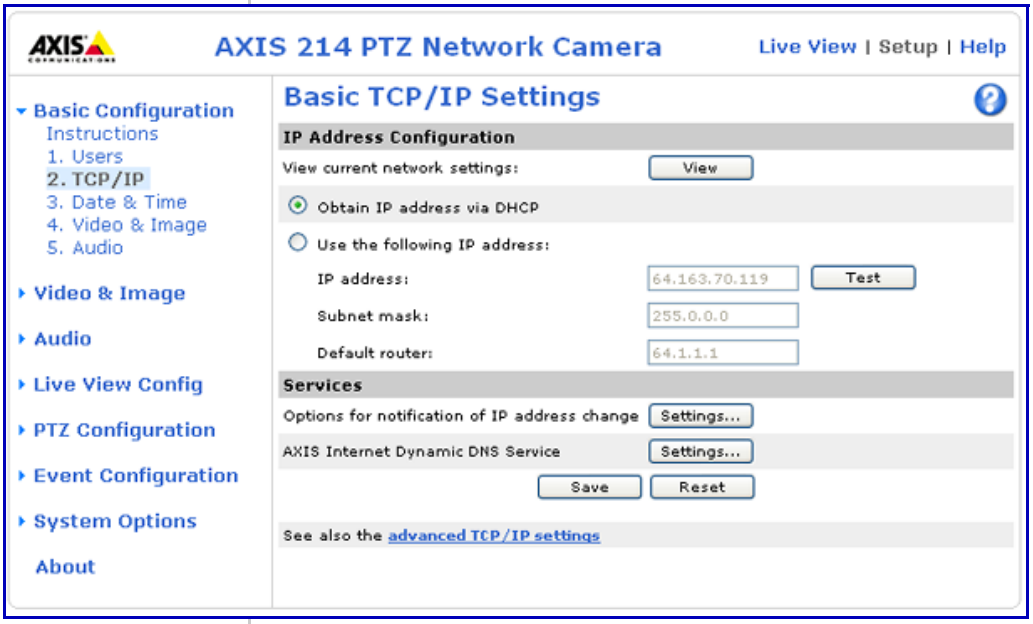


Figure 10: Axis Camera: TCP/IP Settings

e. Configure how the camera obtains its IP address:

- If you want to use Public Mode (the modem passes the IP address assigned by your cellular provider directly to the camera), select Obtain IP address via DHCP (as shown).

- If you want to use Private Mode (static local IP for the camera), select Use the following IP address:.
  - 1. Enter the IP Address for the camera (the same as the ***HOSTPRIVIP** in the modem configuration, for example, 192.168.13.30).
  - 2. Enter the Subnet mask (the same as ***HOSTNETMASK**, generally 255.255.255.0).
  - 3. Enter the Default router as the IP address for the Raven X or Raven XE (the same as ***HOSTPEERIP** in the modem configuration, for example 192.168.13.31).

f. Click on **Save** and then **Reset**.

4. Configure the port for HTTP. *This is an optional step.*

Note: Some cellular providers block port 80 which is the default port for HTTP (web-based communication). If your provider blocks this port, you will need to configure a port you can access. Some providers block port 8080, another commonly used port for HTTP, as well.

a. Select **Advanced TCP/IP Settings** at the bottom of the Basic TCP/IP Settings window.

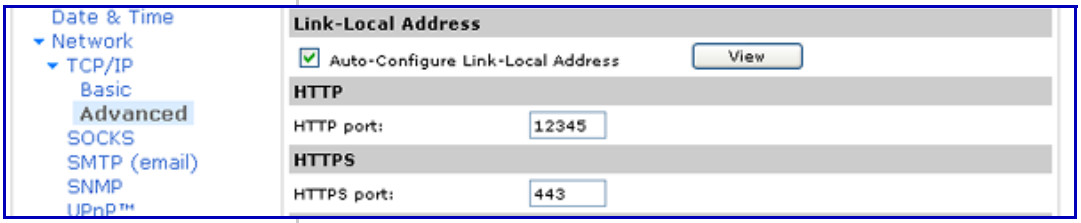


Figure 11: Advanced TCP/IP Settings

b. Change the setting for HTTP port. A port number above 1024 is recommended since 1024 and below are commonly blocked by cellular providers. Possible ports would be **12345** or **8080** (commonly used as an alternate HTTP port).

c. Click on **Save** and then **Reset.**

d. Close your web browser.

5. Disconnect the Axis camera from your computer.

Testing the Configuration

1. Connect the Axis camera directly to the Raven X or Raven XE using the Ethernet cable.

2. Attempt to connect to the Axis camera through the modem.

When the modem's indicator lights show that it is registered on the cellular network, open a web-browser and type in the IP address assigned to the modem from your cellular provider (or use the domain name you have configured for IP Manager) followed by a colon **:** and the port number you assigned (or 80 for default).

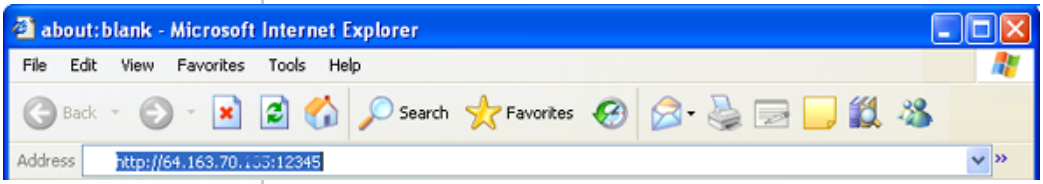


Figure 12: Connect to the Axis Camera through the Raven X or Raven XE

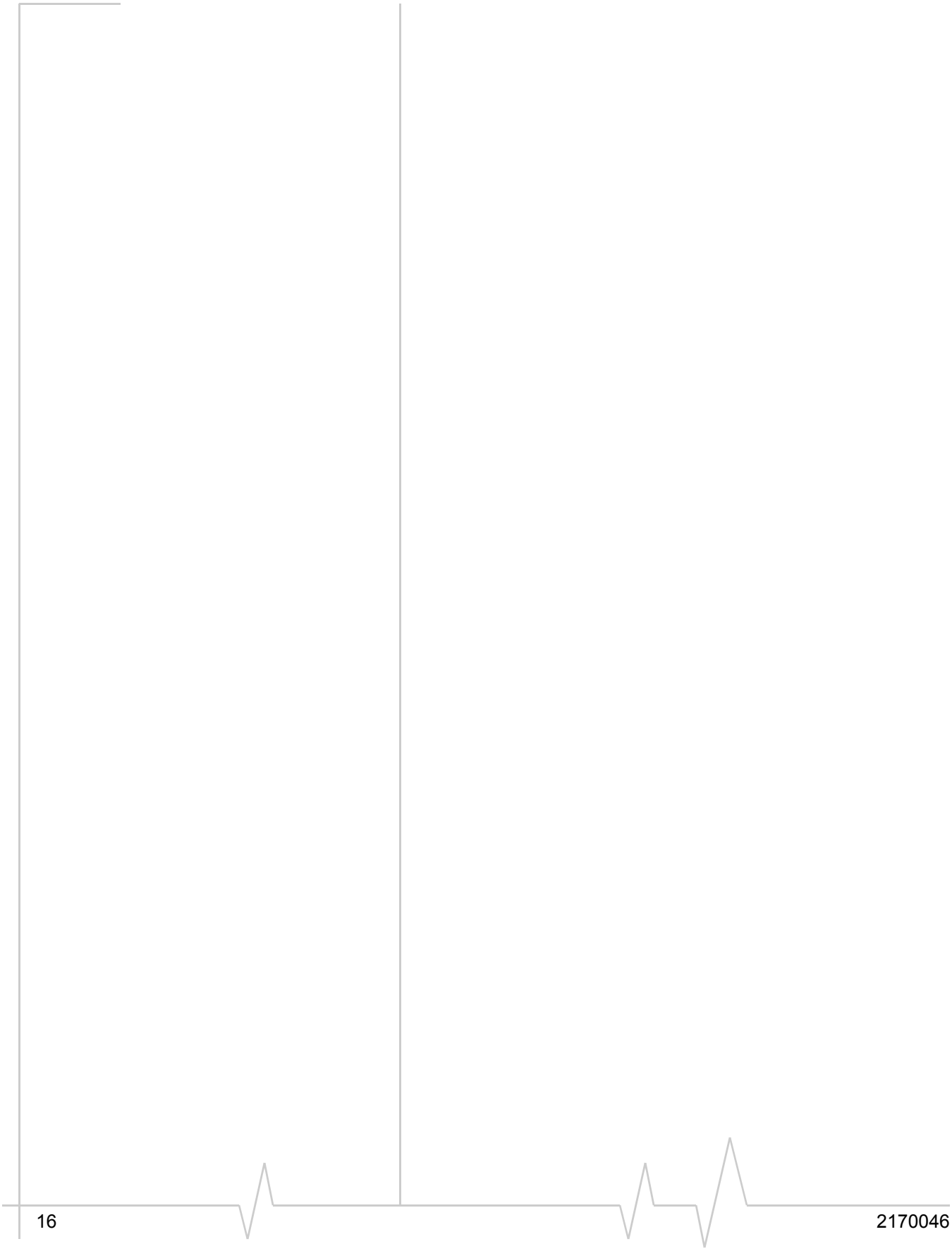
If you are prompted for a user name and password, the configuration was a success. Log on to the camera to view the streaming video.

Note: The number of frames per second which you can view from the camera is heavily reliant on the cellular network coverage at the camera location.

Troubleshooting

1. If you cannot connect to the camera through the modem, try changing the HTTP port for the camera. Often port 80 and port 8080, another port commonly used for HTTP, are blocked by cellular providers. Additionally, use a port above 1024, since lower ports are also frequently blocked.
2. In the installation location, the cellular signal strength will make a difference both in your ability to connect to the camera and the speed of streaming images. If you have weak signal, try adjusting the antenna location and/or type.

Caution: *Many cellular providers also "throttle" the upload speeds of devices connected to their networks. Even with good signal, it is not uncommon to see upload speeds of only 60 to 100kbps while you have download speeds in excess of 600kbps (2G) or 1000kbps (3G). The framerate of your camera in a live stream configuration will be heavily impacted by the upload speed you can attain on your provider's network.*



Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

Safety and Hazards

Do not operate the Sierra Wireless modem in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or any equipment which may be susceptible to any form of radio interference. In such areas, the Sierra Wireless modem **MUST BE POWERED OFF**. The Sierra Wireless modem can transmit signals that could interfere with this equipment.

Do not operate the Sierra Wireless modem in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the Sierra Wireless modem **MUST BE POWERED OFF**. When operating, the Sierra Wireless modem can transmit signals that could interfere with various onboard systems.

Note: Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Sierra Wireless modems may be used at this time.

The driver or operator of any vehicle should not operate the Sierra Wireless modem while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some states and provinces, operating such communications devices while in control of a vehicle is an offense.

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