Aug, 2018

IP-network Connected Cell Router Configuration In ScadaPhone

OVERVIEW:

One of the alarm-reporting methods supported by ScadaPhone is **SMS text messaging over IP-network-connected cellular modems**. The command interface for these modems is very similar to the cellular modems which connect via **RS-232 or USB serial** cables; however, due to the fundamental differences between the physical connection to the ScadaPhone host computer, ScadaPhone has separate configuration controls for **IP-Network-Connected** and **Serial-Connected** modems.

Before Starting ScadaPhone Configuration

IP Modems require some manufacturer-specific configuration steps before they are ready to function within your cellular provider's network and with ScadaPhone. If these steps are not completed successfully, ScadaPhone's IP Modem interface will not function properly.

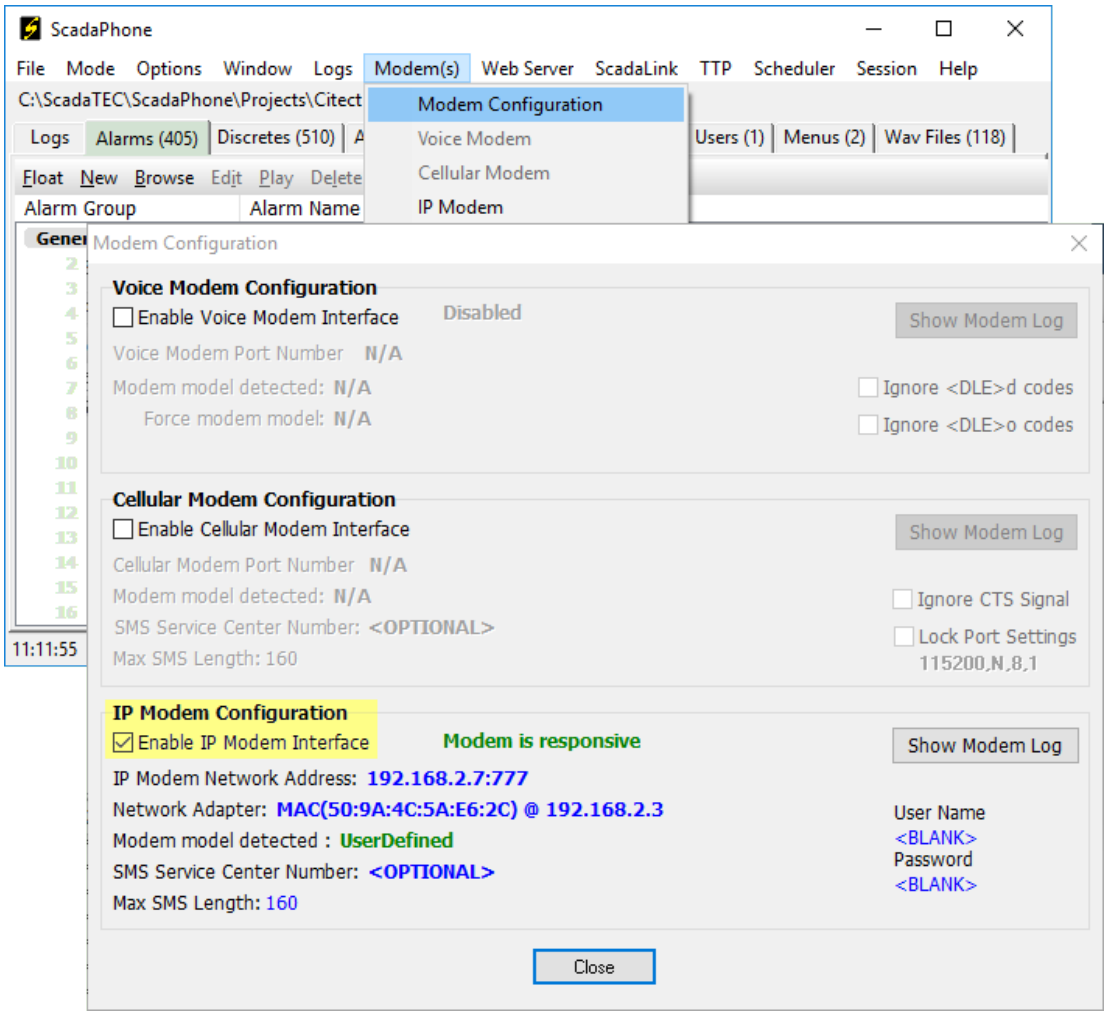
It may also be necessary to configure the modem to run in a mode which is different than the factory default. For example, the **MultiTech MTR-XXXX** has a *factory default* setting which enables **PPP** connections; however, ScadaPhone needs the MTR-XXXX to be enabled for **Telnet Radio Access** via Port **5000** (and the **PPP** mode must be ***disabled***).

To make this configuration change, you will need to open the modem's **internal setup utility** which can be accessed as a **web page interface via any HTTP browser** such as Google Chrome, Mozilla Firefox or Microsoft Edge. Typically, the modem setup interfaces are accessed by simply typing the **modem's IP address** into the web browser's address or location bar and logging into the device.

It is strongly advised that you use the modem's internal setup utility to test the modem's connectivity to the cellular network by sending a test SMS to your mobile phone. Once that is working, you can then proceed to setting up ScadaPhone's connection to the modem.

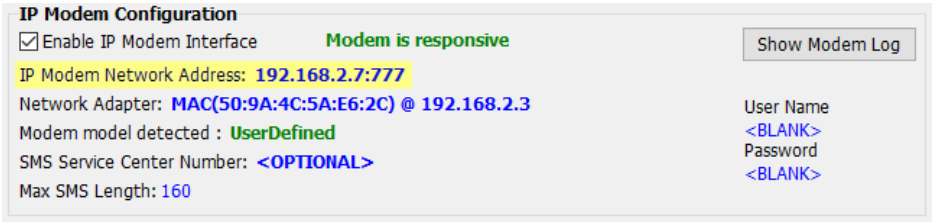
ScadaPhone Configuration

Both varieties of modem connections are configured from within ScadaPhone's **Modem Configuration** window; the Serial-Connected modem settings are contained within the **Cellular Modem Configuration** group box, the IP-Network-Connected modem settings are contained within the **IP Modem Configuration** group box:

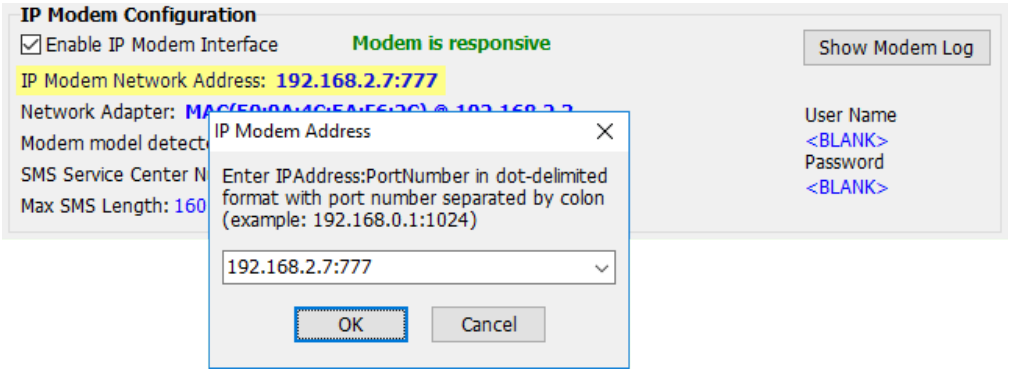


In the image above, note that the **Voice Modem** and **Cellular Modem Configuration** sections are disabled because there is no check mark in their **Enable** boxes; only the **IP Modem Configuration** section is enabled, but there is no limitation on how many modem types can be enabled concurrently.

Within the **IP Modem Configuration** group box, the user-configurable controls (with the exception of the **Enable** check box) are displayed in **blue font**; these are hyperlinks, clicking them opens the configuration window for each connection property. The connection properties are described below.



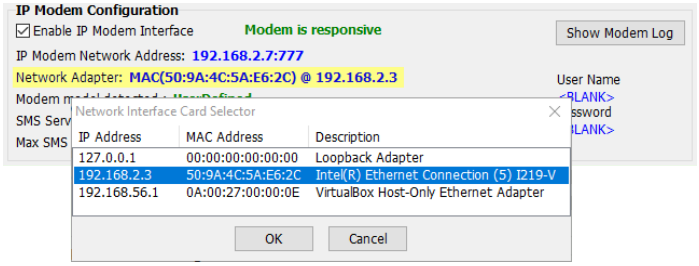
The **IP Modem Network Address** specifies the network address to which ScadaPhone will send modem control commands. Note that the **IP Modem Network Address** setting contains the **TCP port number** as a suffix delimited by a colon (**192.168.2.7:777**). Clicking the blue label opens the following window:



In most cases, the modem will be attached to the network through a router; it is strongly recommended that the modem be connected to a router port with a ***static*** **IP Address**. If the modem is connected to a router port which is assigned a ***dynamic*** **IP Address**, this setting in ScadaPhone will have to be adjusted each time the modem's IP Address changes.

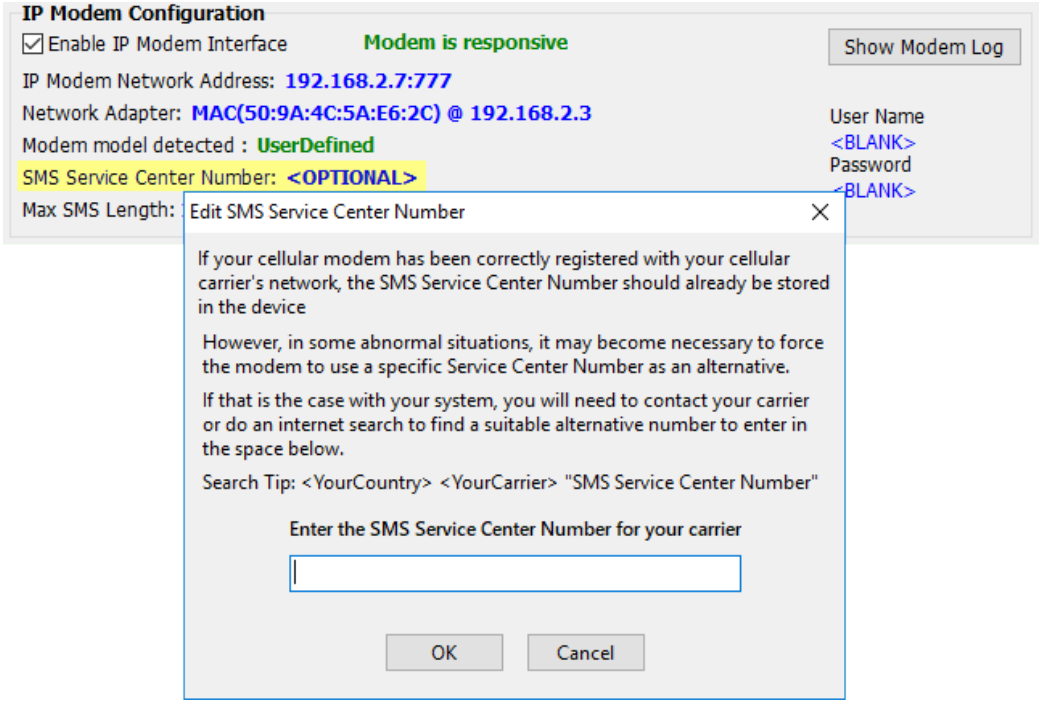
Network Adapter

The next item in the **IP Modem Configuration** is only necessary if the ScadaPhone host computer has more than one **Network Interface Card** (NIC). If the computer only has one network adapter, it will be selected automatically; if there is more than one adapter, ScadaPhone needs to be configured to use the appropriate one. The list of installed adapters can be seen when the blue label is clicked:



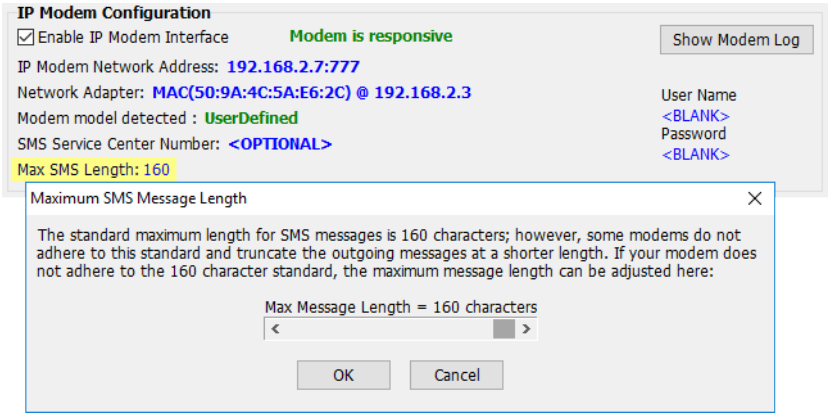
SMS Service Center Number

In most cases, the **SMS Service Center Number** setting can be left blank. As the information window in the image below indicates, it is only necessary to modify this setting if there is some sort of cellular-network configuration problem which warrants overriding the service center number stored in the modem. If you are unsure about this setting, it is best to leave it unchanged (blank):



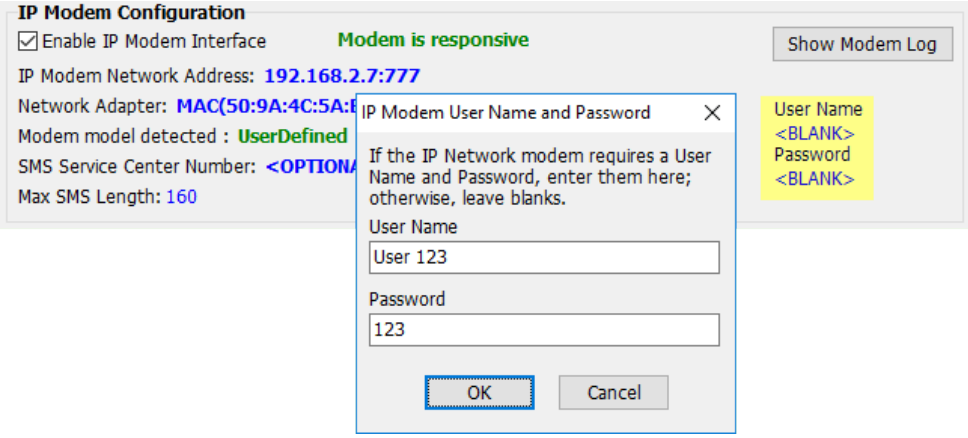
Max SMS Length

The default of **160 characters** is usually sufficient for this setting. ScadaPhone uses this measurement when constructing outgoing messages; ScadaPhone will combine multiple alarm messages into a single SMS text message if the total message length does not exceed this threshold. If your modem truncates messages at a shorter length, use this setting to avoid sending truncated messages.

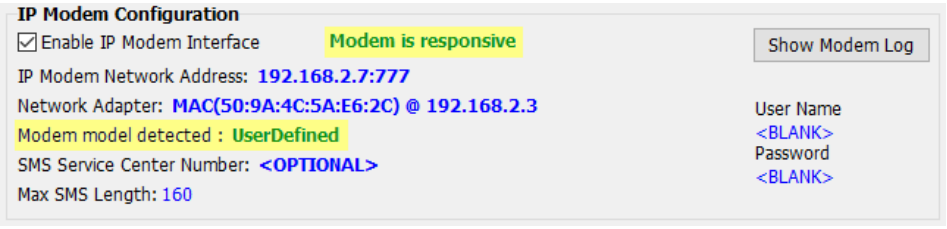


User Name / Password

Unlike their serial-connected counterparts, network-connected cellular modems have to guard against being controlled by unauthorized computers which may have access to the same network.
To accomplish this, most IP Modems have the capacity to require a **User Name** and **Password** log-in sequence (usually supported via the **Telnet** protocol). If your modem requires a log-in, the **User Name** and **Password** must be specified here; if not, these fields can be left blank.



The remainder of the controls in the **IP Modem Configuration** group box give feedback about the status of the modem connection. In the previous images, the green labels indicated that ScadaPhone had established a valid connection to a **UserDefined** modem type:

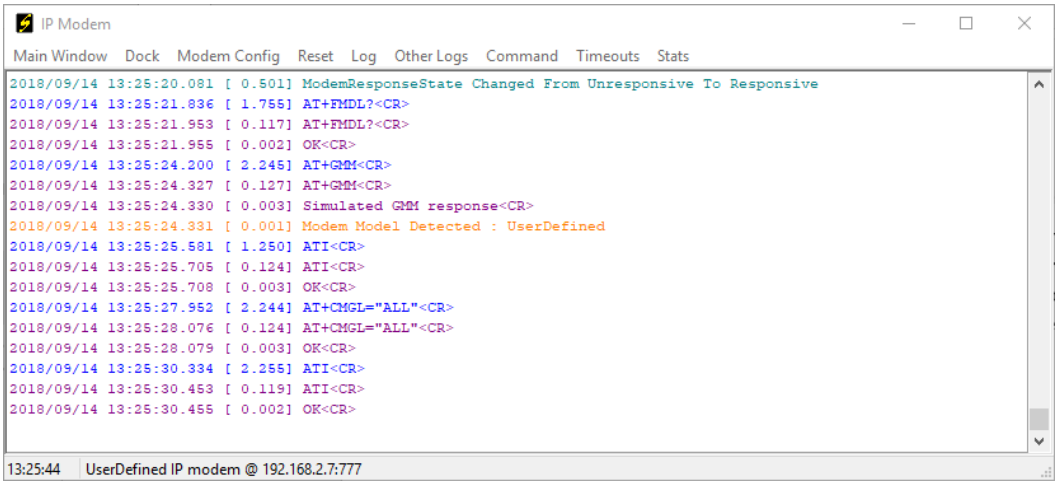


If there is a problem with the modem connection, these labels will turn red and display error messages:

If there is a modem connectivity problem, ScadaPhone will also announce: *"I.P. modem network connection error"* over the local host-computer soundcard (when in **Run Mode**). If an **IP Modem Error Tag** has been configured into ScadaPhone's optional **Watchdog Features**, an alarm can be reported via some other reporting method (aside from the non-functioning IP Modem reporting method).

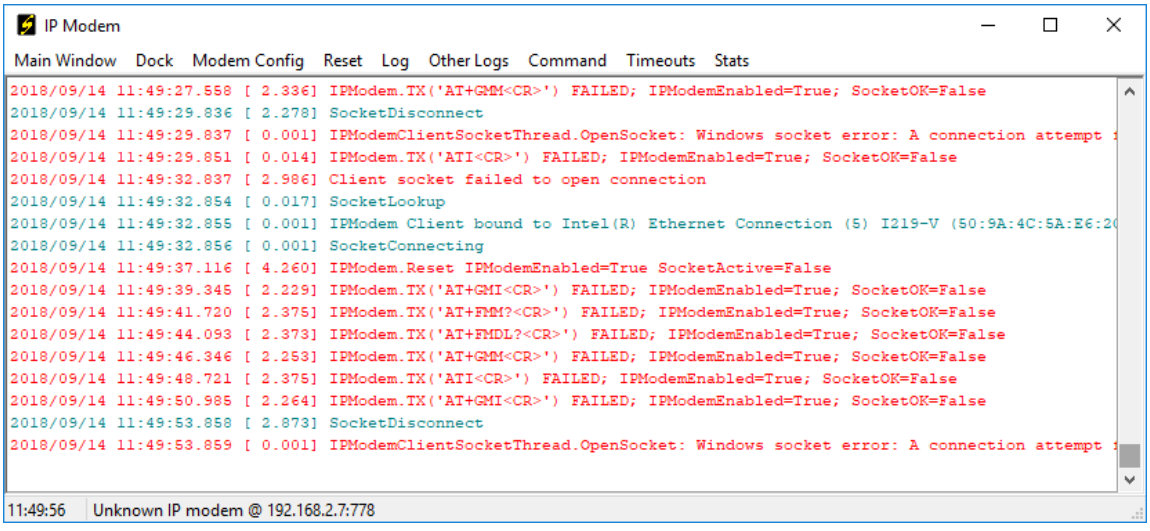
IP Modem Log

The **IP Modem Configuration** group box also has a **Show Modem Log** button. Clicking this button opens ScadaPhone's **IP Modem** window which contains a communications log which displays the command-and-response dialog between ScadaPhone and the IP Modem:



Note: that different types of logged events are color-coded for easier differentiation; the **ScadaPhone-to-Modem** command dialog is color coded blue (ScadaPhone) and purple (modem). In the example above, you can see that the blue ScadaPhone commands are followed by purple modem echoes and command responses.

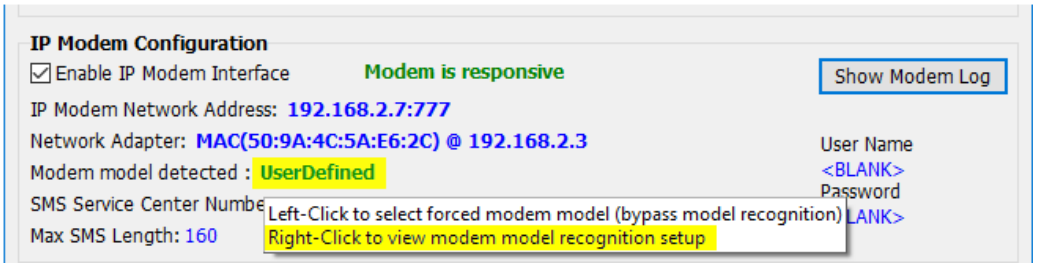
This log (in conjunction with all of the other logs maintained in each ScadaPhone project) can be very valuable when troubleshooting unexpected system behavior. This log records all modem activity for the past 30 days. If there is a communications outage with the modem, it is instantaneously noticeable by viewing the colored log:



Modem Configuration Data

ScadaPhone comes pre-configured with several known modem types, but it also extensible to accommodate new modem models as they become available. To accomplish this, ScadaPhone uses a data table which associates modem **Model Recognition Responses** with modem **Command Strings**.

To examine and modify this table, right-click the **Modem model detected** label on the **Modem Configuration** window:

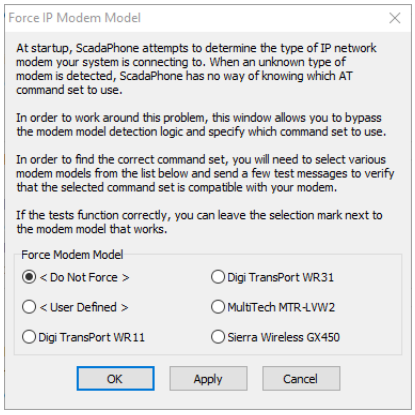


Force Modem Model

In some cases, a modem hardware upgrade may involve replacing an obsolete modem with a newer model from the same manufacturer (for example, upgrading a **2G or 3G** modem with a **4G** modem). If this is the case, it is often true that the modem's command set will be *unchanged* from previous model's command set (only the radio frequencies are changed).

In this case, the user can simply instruct ScadaPhone to ignore the model-detection responses and force the modem interface to treat the modem as though it were a specific (known) model. This is called "*forcing the modem model*." This provides an easy way to test whether or not an existing command set is compatible with a new modem. Once it has been confirmed that the new model supports the old model's commands, the **Modem Configuration Strings** can be edited so that the normal configuration process can be used.

When the **Modem Mode Detected** label on the **Modem Configuration** window is *left*-clicked, the **Force IP Modem Model** window is displayed:



This window's first option, **< Do Not Force >** is the default selection; when this is selected, the **Force Modem Model** logic will be disabled and ScadaPhone will attempt to identify the modem model via the standard modem model query commands.

Note: that this window dynamically adjusts to include all models defined in the **Modem Configuration Strings**.

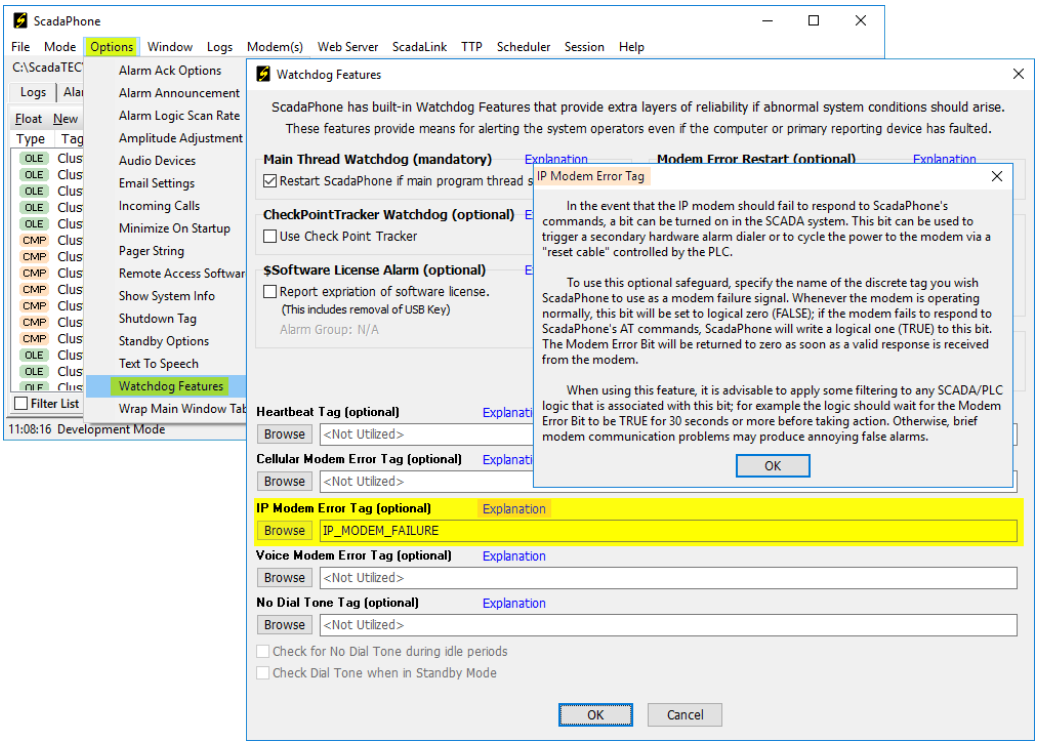
IP Modem Watchdog:

ScadaPhone supports an optional "Watchdog" signal to report any malfunction of the IP Modem interface. The IP Modem interface can go into an error state for a variety of reasons:

- The modem can fail.
- The network router may be down.
- The modem's LAN connection can be unplugged or moved to a different IP Address.
- The modem may lose radio connection with the cellular carrier.

ScadaPhone will make local audio announcements to alert the system operator of IP Modem connectivity issues; however, if there is no operator near the system console to hear the audio alerts, it is advisable to use ScadaPhone's **IP Modem Error Tag** to drive an alarm which can be reported via some alternate (i.e. non-IP-Modem) reporting method.

The **IP Modem Error Tag** must be specified in ScadaPhone's **Watchdog Features** window:



This tag can be defined as either a ScadaPhone **Holding Tag**, **ScadaLink Tag** or **TTP Tag**; if it is defined as a **ScadaLink Tag**, it's value can be communicated to the SCADA server to drive other (non-ScadaPhone) reporting methods such as a PLC-connected hardware dialer or on-screen SCADA operator alert message.