

IntelliLogger Cellular Modem configuration

Application Notes

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Overview

These notes are designed to provide a quick guide to setting up and using the IntelliLogger (logger) and the accompanying Hyperware software when using these in conjunction with an Airlink Raven-E cellular modem. Note that this application note also applies to Airlink Pinpoint-E cellular modems.

When using this configuration, users can set up the logger to connect to the Internet and send emails, send data to an FTP server, or simply connect from a computer to the logger to view its status or configure it.

Some of these concepts are difficult to understand, so this document will make the assumption that the reader is not familiar with some of the terminology used, but is somewhat familiar with general computer use.

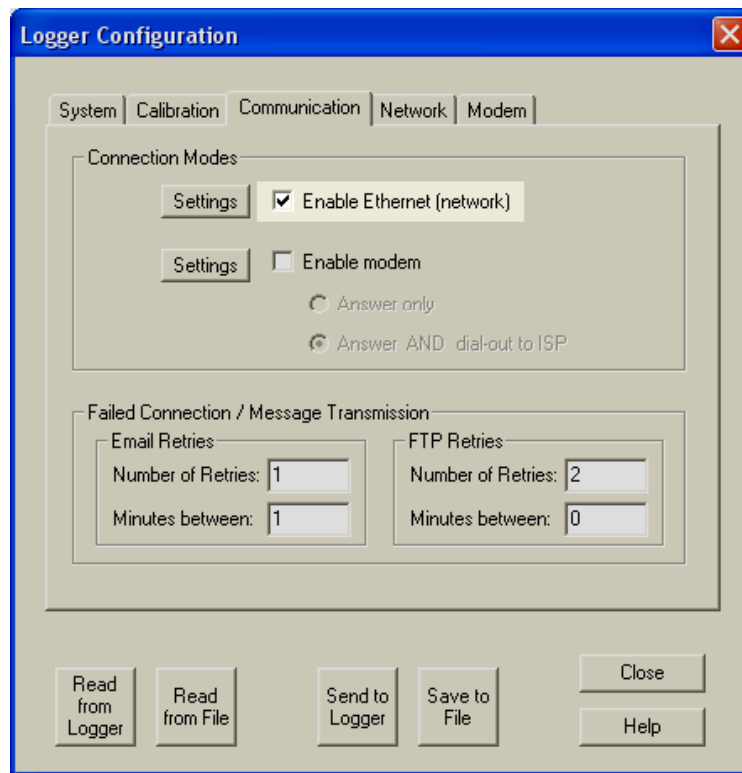
Configuring the logger for use with a Raven-E Modem

The logger must be reconfigured slightly to work with the cellular modem. The modem expects the logger to have a certain IP address to work correctly, so this must be changed if it is not already set.

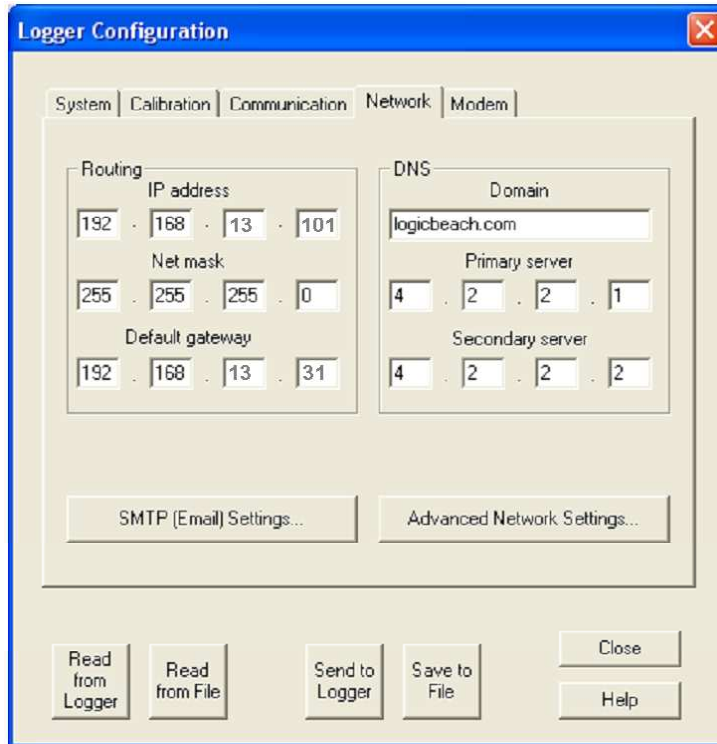
To change this, connect to the logger using your preferred **direct** connection method – this can be serial, USB or Ethernet cable. If you need help with this step, please refer to the Hyperware manual.

Before making any configuration changes to a logger, it is always advisable to ensure the logger is in a stopped state before continuing. You should do so before moving on to the next step, by either pressing the Stop button on the front of the logger, or double-clicking the stop button on the logger image.

Once connected, open the Logger Configuration Dialog and select the "Communication" tab. After ensuring the "Enable Ethernet (Network)" checkbox has been checked, switch to the "Network" Tab.



On the Network Tab page, enter all of the values for IP address, Net mask, Default gateway, Domain, Primary server and Secondary server as show in the image below.



After entering this, click the "Send to Logger" button at the bottom of the dialog to send this updated information to the logger.

You should cycle the power on the logger to force these new values to be applied.

At this point, the logger should be configured in a way that is compatible with the cellular modem. Notice that in the above settings we did not select the "Enable modem" checkbox on communications page – this is because the cellular modem behaves more like a network router than a dial-up modem. You don't need to worry about the details of this, however it is an important distinction.

Modem Setup

GPRS/EDGE APN Configuration

An APN, or Access Point Name is a special string setting that is assigned to modems to allow them to access the GPRS cellular network. These APN strings are typically unique for each cellular provider and it is not uncommon for providers to have several different APNs for different applications.

Each GPRS modem connection requires that the APN is correctly configured before a connection to the network will be permitted.

To set this, go to the GPRS page using Wireless ACE, and enter the APN in the *NETAPN field. Also, in the next field down (+CGDCONT) the APN should follow '1,IP,'

In other words, if the APN was Bingo, the settings would look like this:

```
*NETAPN      Bingo
+CGDCONT     1,IP,Bingo
```

Remember to click 'Write' on the toolbar to write these new values to the modem. The modem will also need to be reset before these values take effect.

Keep Alive Ping

Cellular providers may shut down the network connection of modems that have not communicated in a long period of time. This may mean that incoming connections to the modem may not immediately be connected. To prevent this, there is an option to use a keep alive ping, which periodically sends a test out to the Internet to verify the connection, re-establishing it if necessary.

On the "Other" page in Wireless ACE, the *IPPING setting should be set to a value of 60 to enable this feature, and *IPPINGADDR should be set to the IP address or URL of a reliable website that will be used to verify Internet connectivity.

Once every 60 seconds, a test message will be sent to the site (or IP address) specified to verify Internet connectivity if this feature is enabled.

Dynamic DNS

To enable Dynamic DNS, select the "Dynamic IP" page in Wireless ACE and specify a unique name for the modem (*MODEMNAME). This name must be globally unique to avoid conflict with other modems that may be using the same name.

Domain can be left as eairlink.com to use the default domain.

*IPMANAGER1 setting should be changed to 209.142.29.202

*IPMGRUPDATE1 should be set to a value of 60.

Once these settings are made, the modem (and therefore the logger connected to it) can be referred to using the dynamic address from the name specified. For example if the modem name specified was Loopy1, then to connect to the logger from Hyperware, you would use the following URL in place of an IP address:

Loopy1.eairlink.com

This is particularly useful because of the changing nature of dynamic IP addresses typically used by cellular providers where the IP address assigned to the modem will change periodically.

By using this Dynamic IP address method, whenever the modem detects that its IP address has changed, this will automatically be updated on the server, so that after this, anything wishing to connect will automatically be routed to the correct (updated) IP address without knowing that anything ever changed.

Configuring the modem for use with the logger

There are two IP addresses that the modem uses. One is the public IP address and the other is the private IP address.

The cellular service provider automatically assigns the public IP address. This may be a fixed (static) IP address, or more commonly, a dynamic IP address which changes periodically.

When connecting to a logger that is connected to the modem, the modem needs to know the IP address of the logger in order to forward messages to it. This address is known as the private IP address. This private IP address must be assigned in the modem configuration as shown below using the **Airlink Wireless Ace** configuration utility:

GROUPS	MODEM DATA			
	AT	Name	Value	New Value
INFO	*HOSTPRIVMODE	Use Private IP	1	
STATUS	*HOSTPRIVIP	Host Private IP	192.168.13.101	
COMMON				
Misc	*HOSTPEERIP	Modem Local IP	192.168.13.31	
Serial				
TCP	*HOSTNETMASK	Host network mask	255.255.255.0	
UDP				
DNS	*HOSTAUTH	Host Authentication Mode	0	
Dynamic IP				
PPP/Ethernet	*HOSTUID	Host User ID	ZCFzUUeLycb2ug01L+3Ikw==	
Baseband				

Note that this private IP address is the IP address that was assigned to the logger. This private IP address cannot be directly accessed from the Internet, instead the public IP address (described above) must be used to reach the logger.

Also take note on this configuration page that the Modem Local IP address is defined as 192.168.13.31 by default. This is the IP address that devices (such as the logger) inside the local area network can use to communicate with the modem. This IP address is also known as the "Default gateway" and was used when configuring the logger.

*HOSTPEERIP	Modem Local IP	192.168.13.31
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The Host network mask must also match the settings used by the logger, so this should be changed to 255.255.255.0

*HOSTNETMASK	Host network mask	255.255.255.0
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Connecting the Modem

The Airlink modem is configured to connect to the cellular network automatically and maintain this connection permanently without needing to have the logger connected.

So, the first thing that should be done is to connect the antenna to the TNC connection (labeled TNC), then connecting the power source to the modem. If using a stub antenna, this should generally be pointed upward in a vertical direction for best reception.

The PWR LED on the front panel should illuminate as soon as power is applied, then after a minute or two, the Link LED's should come on indicating a connection to the cellular network has been established.



Once you have confirmed a connection to the cellular network, you can connect the modem to the logger using the special "crossover" Ethernet cable supplied.

Note that this crossover cable is not the same as a normal Ethernet cable connecting computers to a wall socket, or a hub, the wiring is slightly different – these crossover cables are generally colored yellow (and often marked too) to highlight this difference.

Connect one end of the crossover cable to the 10/100 port on the rear of the modem, and the other end of the cable to the Ethernet port of the logger.

Logger Connections

There are basically two connections that are available between the logger and the outside world. One of these connections is the one used by the Hyperware application when it communicates over a network (including the cellular network) to talk to a logger. This uses a special network "port" numbered 4660.

Information passes over the network using our proprietary communication protocol between Hyperware and the logger and a connection is made.

The other second type of connection is a web-type connection. There is a small web server inside the logger that provides web-pages upon request to web browsers, allowing the logger to work very naturally on the Internet and permit users with little more than a web browser and the logger's address access to status information.

Finding the Logger IP Address

The only thing we need to connect to the logger is its address. Because it is part of the digital cellular network, it is also configured to be part of the Internet.

This means that we have a way of determining the IP address of the modem and therefore the logger. There is a special feature in the modem that allows us to do this, which is called Dynamic DNS. Rather than use a regular IP address to connect to the logger, instead we use a substitute, which in the case of the Airlink modems is a unique modem name followed by **.airlink.com**, so if the modem name is 123456, then the IP address equivalent would be **123456.airlink.com**

It may sound like this portion of the text is getting a little complex – and indeed it is, but suffice to say, you don't actually need to understand exactly how this mechanism works in order to use it. As long as you understand that whenever you type in the above string, the Internet will return an actual IP address in its place.

The reason for needing such an unusual mechanism in the first place is because of the dynamic nature of the Internet, where IP addresses change continually.

A Practical Connection

After the discussion above about IP addresses and ports and so on, it's time to connect up to the logger and see something happen, so let's do that.

The easiest way to do this is to connect to the Internet using your favorite browser (Internet Explorer or Firefox for example) and trying to browse to the logger now that we have it connected.

In the address bar, type the following URL:

http://123456.airlink.com:8001/

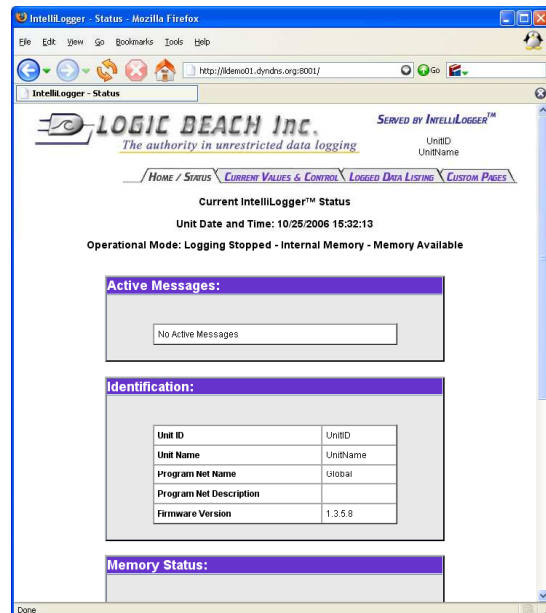
Note the colon before the 8001/

After a few seconds, you should see something similar to the following screen, displaying the status of the logger. This web page is actually being served from inside the logger and is using the HTTP connection.

By way of explanation, the http:// in the address indicate this is a http type request to the browser.

The 123456.airlink.com as was mentioned above is the equivalent of the IP address

Then the unusual aspect of the address is the 8001 following the colon, which indicates to the browser which "port" should be used when connecting to the object specified. This special port is being used because certain cellular phone providers block connectivity for certain ports, including port 80, the normal HTTP port, so this is a work-around for this restriction.

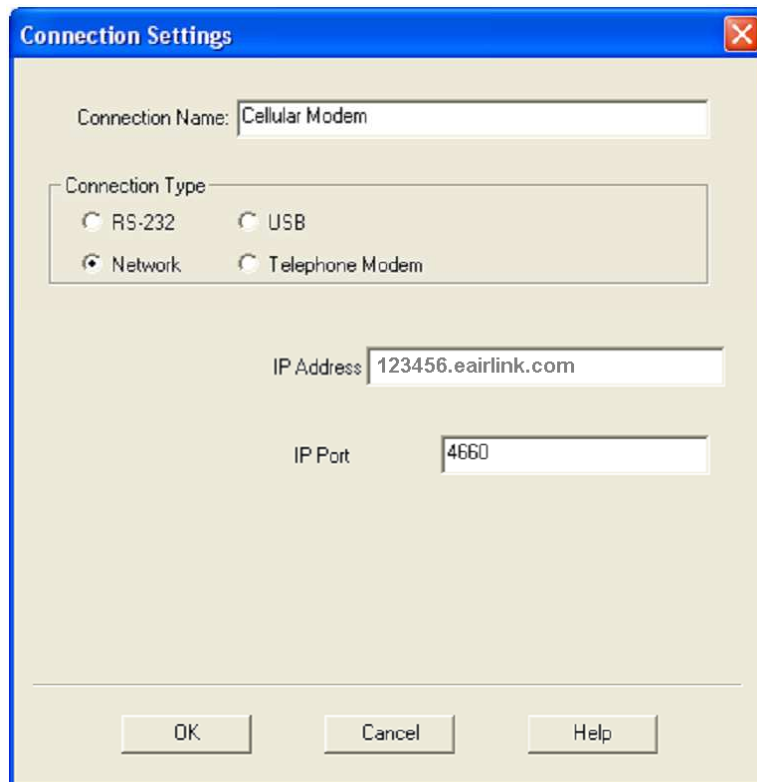


Note that if using the default HTTP port of 80 (as defined in the logger's advanced network settings) then the **:8001** suffix is not required. Using the colon followed by a port number is only required when not using the default port 80 for HTTP.

Making a Hyperware Connection

Connecting Hyperware to the logger using a cellular connection is almost trivial. From within Hyperware, open the Logger connection dialog, and select "Add" to create a new connection for the cellular modem.

Note that you can have multiple connections to the same logger if you wish, so you do not need to delete any previous hard-wired connections for the logger you may use again.



You can use whichever connection name you prefer, but the other settings should match those according to the modem name (see the Modem Setup section for more details).

Note that the IP port number shown is 4660, which, as mentioned earlier, is the special port used by Hyperware to talk to the logger.

**For the technically inclined, it is possible to reassign both this port and the HTTP port used by the logger as may be required in certain unusual situations.*

After entering these settings, click OK to save them, then select the name of the connection you just created and then click on the Connect button to establish a connection with the logger. After the connection is made, you should be able to perform all regular functions you would normally be able to do on a logger using a direct connection.

Making a GreenWater Connection

The GreenWater application that accompanies the Hyperware application can be used to view the HTTP (web) status pages in the logger in much the same way as a regular web browser would do, and in addition to this allows access to any custom web pages stored in the logger.

To connect GreenWater to the logger over the cellular connection, use the same connection string that was used in the example given for the browser, namely:

http://123456.eairlink.com:8001/

This will connect to the logger's initial status page. From here you can navigate to the other pages, including any custom web pages.

If you need help creating custom web pages, please refer to the Hyperware help manual.

Sending Emails

Once you have established a connection to the cellular network, you can begin to use some of the more advanced icons available in the logger net configuration screen. One of these icons is the email icon, which allow you to configure the logger to automatically send emails at programmable intervals that may contain recorded data.

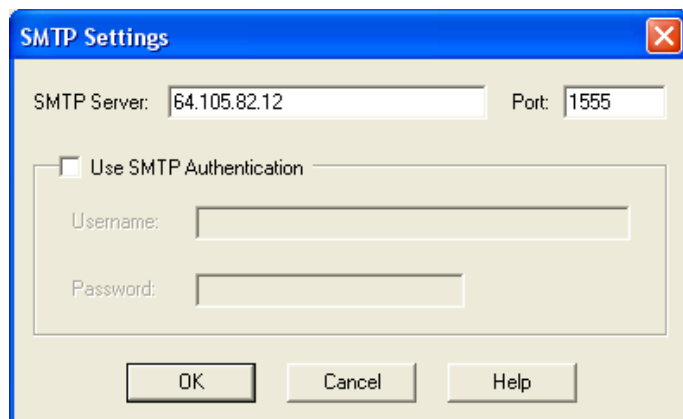
Unfortunately sending emails is not a particularly easy task; especially if this is being done automatically by a unit that does not have a fixed location. The good news is we have made this task fairly simple for users.

To allow emails to be sent, an outgoing SMTP mail server must be configured within the logger. This tells the logger which server will be responsible for sending any emails it wants to send.

To configuring the outgoing SMTP server, connect to the logger using your preferred communication method (the cellular connection if you like) and open the "Logger Configuration" dialog by double-clicking the hammer icon then select the "Network" tab.

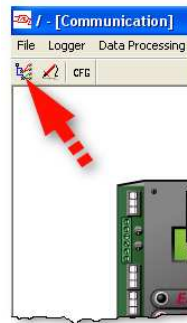
Once on the Network page, click the SMTP (Email) Settings..." button to open the "SMTP Settings" dialog. Enter the values for your email (SMTP) server as shown below (although your server's IP address will probably be different than this one):


After entering these values, click OK to save them, then click "Send to Logger" to update the configuration in the logger.



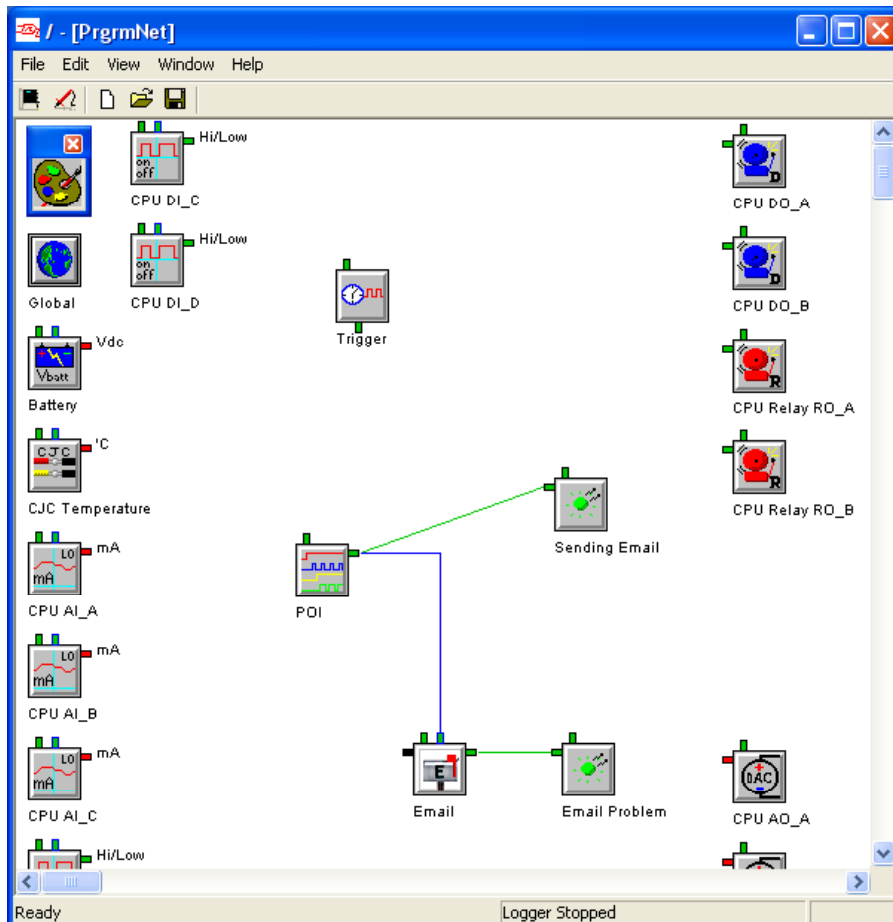
Making an Email Net

Now we can configure an email icon to test the email connection by going to the "Net Config" screen.



From here click the  check hardware toolbar button to scan the logger's hardware before continuing.

Next, drag an Email icon, a Sample Rate Clock icon and a POI icon from the tool palette, then use the two LED icons that appeared after the hardware poll to create the simple net shown here...



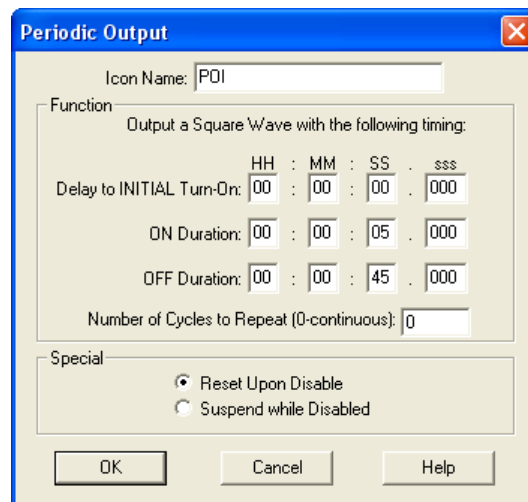
Don't worry about the Sample Rate Clock icon's output not being connected. This is fine. We're not actually using it, but the net needs there to be one to run correctly.

Configuring the Periodic Output Icon

Leave the default settings for the Sample Rate Clock (Output Trigger Pulse every one second), but change the settings for the POI as shown in this image:

This forces the output of this icon on for 5 seconds, then off for 45 seconds, or in other words, once every 50 seconds there will be an output from this icon.

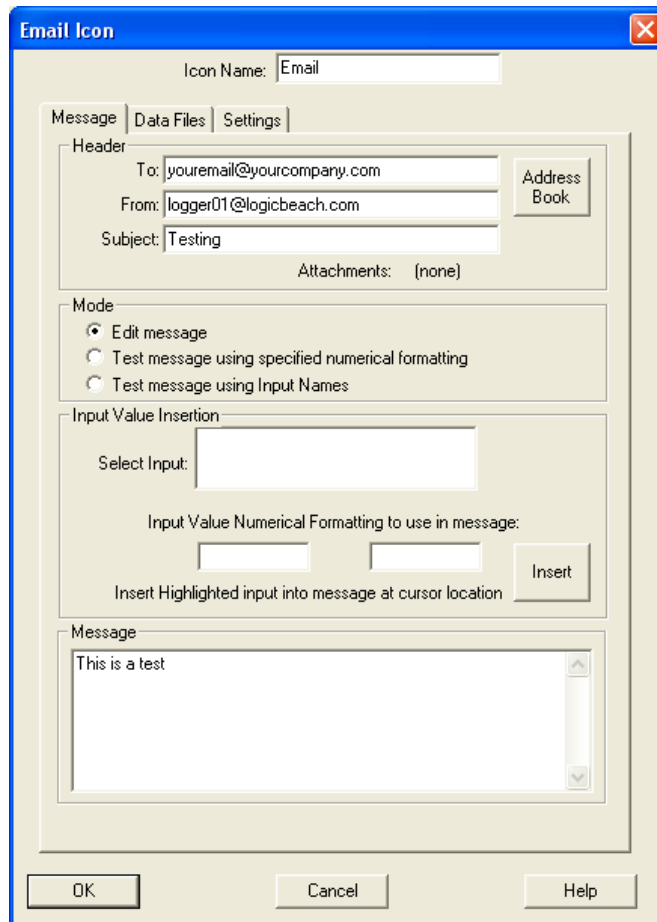
So the result of this net program will send a test email once every 50 seconds.



Configuring the Email Icon

Configure the Email icon as shown in the following image.

Note that in the To: area you should enter your own email address instead of the dummy one shown in the picture.



The 'From' email address shown is valid and can be used, or you can use a different one if you prefer.

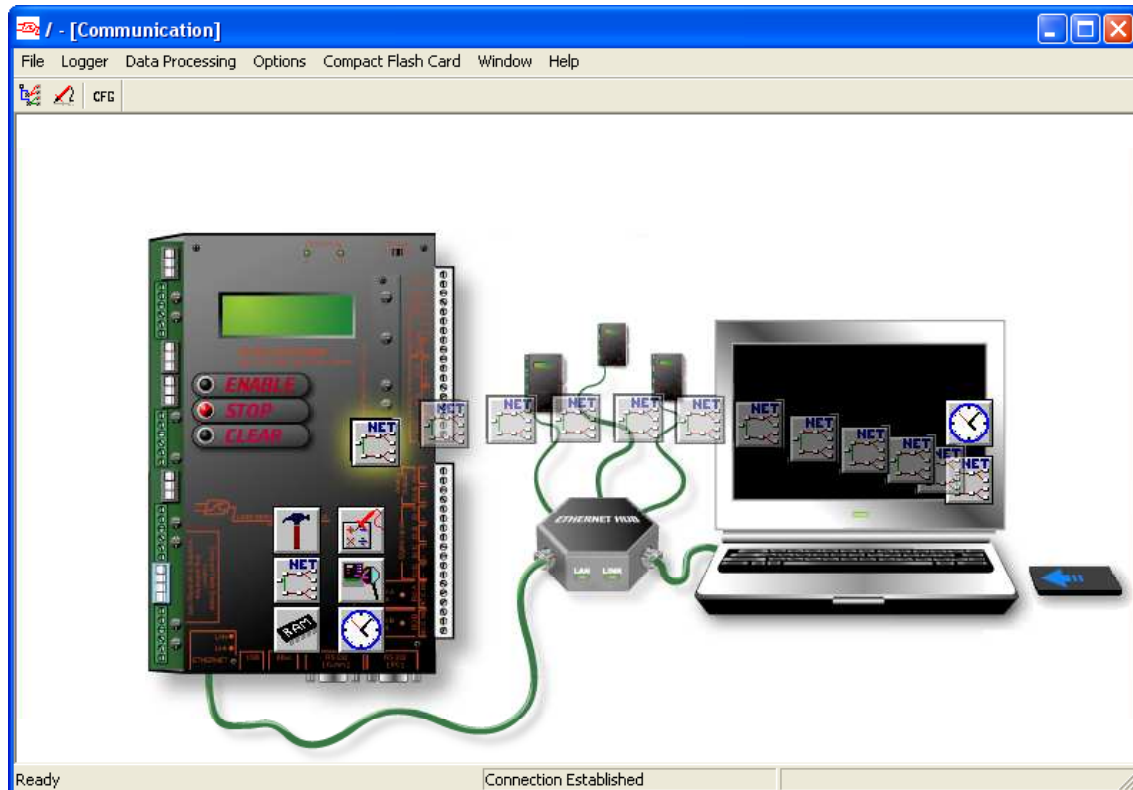
Because we are sending a simple test email, the subject and Message text simply contain dummy text as shown here, but in a real application this can be tailored to suit your needs.

In a more realistic application, the Data Files tab would typically be used to attach recorded data to these emails, but this is beyond the scope of this simple test – refer to the Hyperware Users Manual for more details.

The two LED icons do not require any configuration, other than renaming the icons.

Uploading the Net

Once this is complete, you should save the net, then switch back to the main communications screen and send this new net to the logger by dragging the net image from the computer over to the logger.



Running the Net

Now run the new net by double clicking on the ENABLE button on the logger image and answering Yes when the confirmation dialog appears.

Stopping the Net

After a minute or two you should begin receiving emails. At this point you may want to stop the logger to prevent getting more emails by double clicking on the STOP button on the logger image.

Sending FTP Data

FTP is a reliable type of data transfer that has been used across networks and on the Internet for some time. It is particularly useful for sending large amounts of data over networks.

The logger is designed to make use of this type of data transfer to send logged information when programmed to do so.

Before any data can be sent using FTP, you must ensure there is a suitable FTP server available to receive this data.

FTP servers are typically configured by IT departments within organizations and require some specialized knowledge of the network on which they are connected. Once they are configured, these FTP servers will be given an IP address describing where they are on a network, and also a port number.

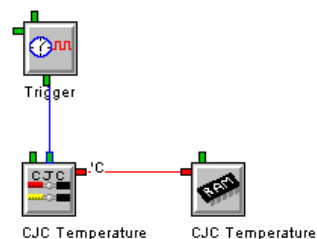
In addition to this information, you will generally need a username and password to connect to an FTP server. There may even be a specified directory or folder name to use when storing data.

These questions must be answered before attempting to set up a logger to cater for FTP, otherwise it will not work correctly.

Making a Simple Net

Before sending any data, we need to configure a net to collect data first.

We can do this by creating a very simply net from the "Net Config" screen again, click the check hardware toolbar button, just as we did when we made an Email Net earlier.



Drag a Sample Rate Clock icon and a RAM icon from the tool palette and use the CJC temperature icon that appeared after the hardware poll to create the net shown above.

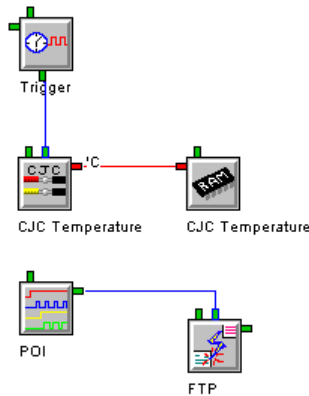
Using the default icon values, this simple net will record the temperature of the on-board CJC every second.

Adding an FTP icon

Now that we have a simple net that records data, we need to add an FTP icon to send this recorded data to the FTP server. Dragging an FTP icon from the tool palette can do this, however we also need to drag a Periodic Output Icon (POI) too so that we can control how often the FTP messages are sent.

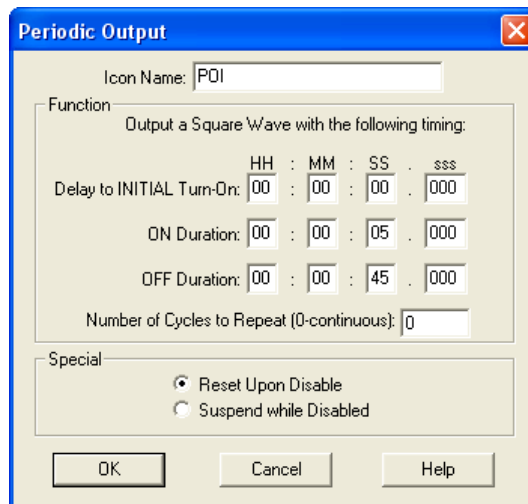
Your final net should look something like this.

We now need to configure the POI icon and the FTP icon so that they are configured correctly.



Configuring the Periodic Output Icon

We are using the Periodic Output Icon in this instance to control how often the FTP icon sends its data. Copy the settings shown below to make the FTP icon send data to the server every 50 seconds.



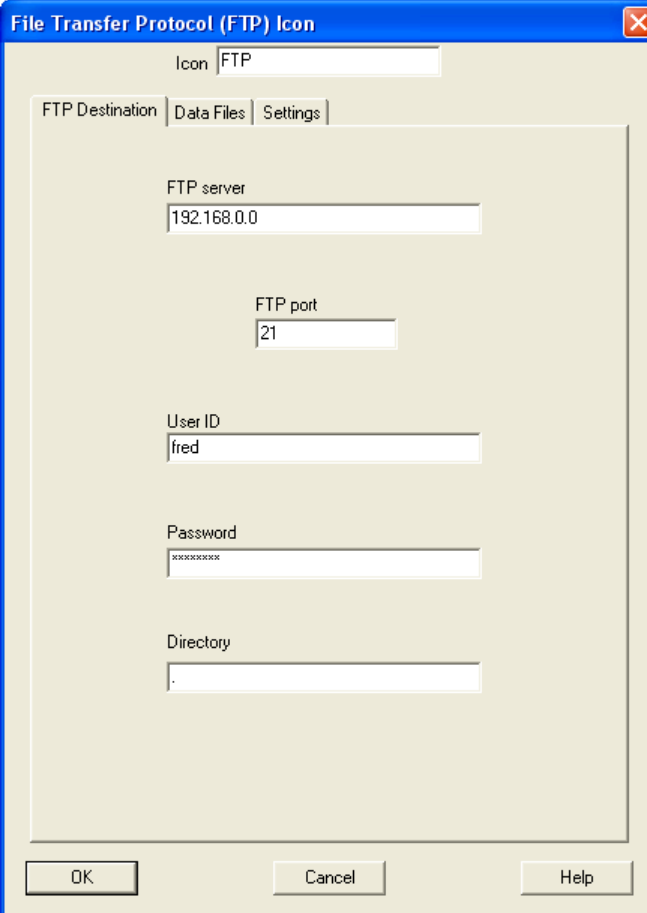
Configuring the FTP Icon

The settings on the FTP Destination tab of the FTP icon should be configured in accordance with your FTP server settings.

All of these settings are specific to how the server itself is configured and also the security login information assigned to the logger.

The names and numbers you use will probably not match those shown in this image.

You may need to consult with your IT department for specific details.

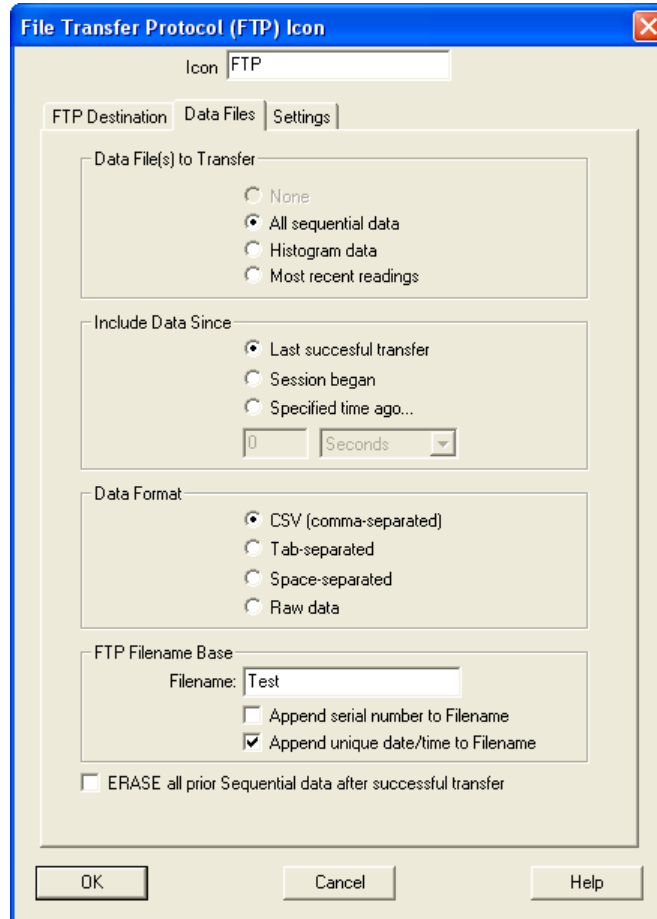


The image shows a dialog box titled "File Transfer Protocol (FTP) Icon". At the top, there is a label "Icon" followed by a text box containing "FTP". Below this, there are three tabs: "FTP Destination", "Data Files", and "Settings", with "FTP Destination" being the active tab. The main area of the dialog contains several input fields: "FTP server" with the value "192.168.0.0", "FTP port" with the value "21", "User ID" with the value "fred", "Password" with a masked value "xxxxxxxx", and "Directory" with the value ".". At the bottom of the dialog, there are three buttons: "OK", "Cancel", and "Help".

Note that the Directory entry shown here is a single period (.) indicating that the directory (folder) to use should be the default login folder.

Data Files Tab

Configure the Data Files tab as shown below. This will essentially send all recorded data since the last successful transfer, so that every 50 seconds the net will send 50 second's worth of data.

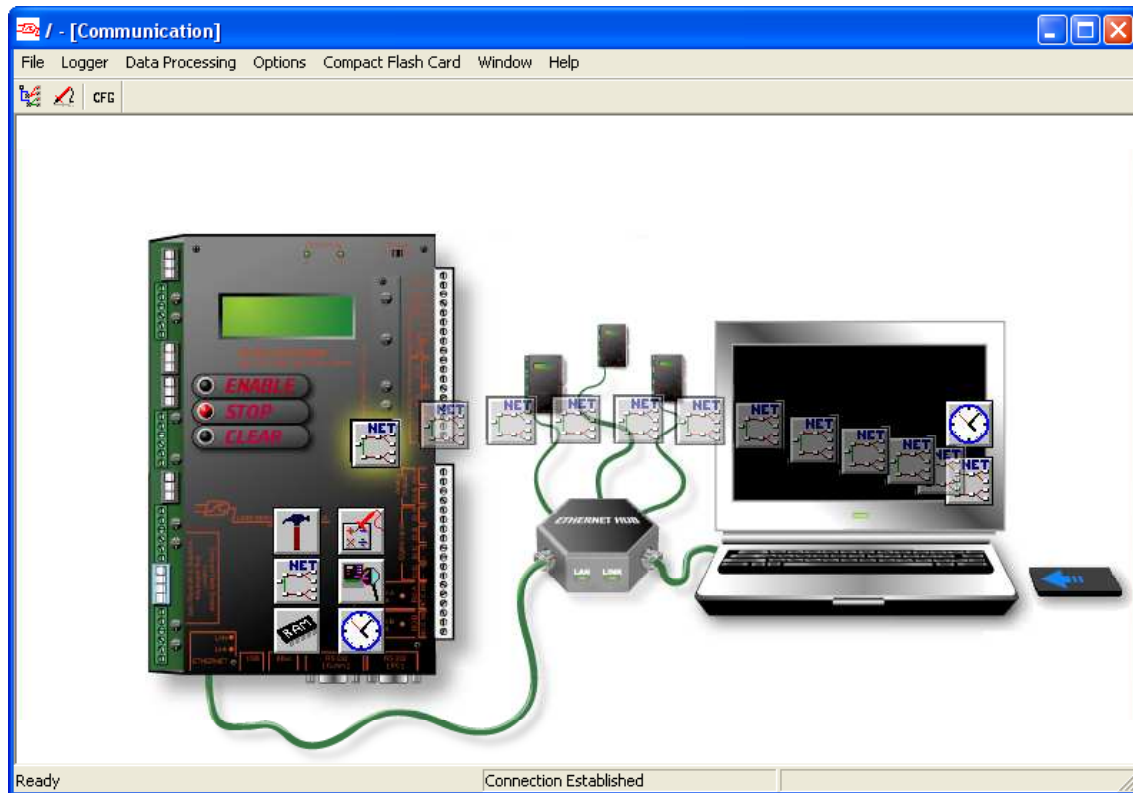


The Filename entry towards the bottom provides a prefix for the filenames that arrive. Appending the unique date/time to the Filename allows you see when the data was recorded.

The Settings tab is not important for this simple test, so can be ignored for now.

Uploading the Net

Once this is complete, you should save the net, then switch back to the main communications screen and send this new net to the logger by dragging the net image from the computer over to the logger.



Running the Net

Now run the new net by double clicking on the ENABLE button on the logger image and answering Yes when the confirmation dialog appears.

After a couple of minutes, you should see data files appearing in the incoming FTP data folder. Your IT department may be able to help you in identifying where to look for this.

Stopping the Net

At this point you may want to stop the logger to prevent getting more FTP data by double clicking on the STOP button on the logger image.

Revision History

2/13/2007	Initial Release
2/20/2007	Added Private IP address configuration details
3/13/2007	Added APN, IPPING and Dynamic IP configuration details