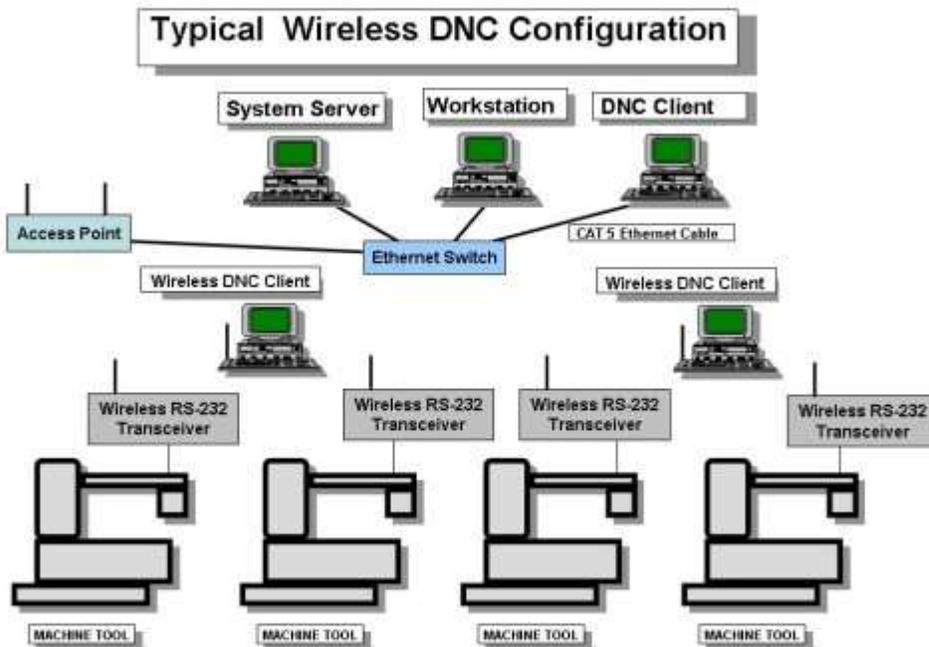




Installing a Wireless DNC System

(Other Technotes are available describing how to configure SuiteFactory and specific brands of CNC's. Contact CCI)



1 Typical Wireless DNC Configuration

The diagram, above, shows the most typical way a wireless DNC system is configured. A better way, to isolate the DNC traffic from the rest of the network, is to install a second Network Interface Card (NIC) into the computer that will be hosting the drivers for the wireless RS-232 modules and connecting the Access Point for the shop floor directly to that NIC, bypassing the LAN's Ethernet switch. In a large installation where several Access Points are required you can connect a dedicated Ethernet switch to the second NIC and connect the shop Access points to that switch. Those Access points would be given different SSID's and encryption keys than any other Access Points that might be in the area.

Not shown in the above diagram are machines that communicate via Ethernet instead of RS-232. Those machines can either be hard-wired to the network switch or part of the wireless network by configuring the wireless transceivers to be Ethernet to wireless bridges instead of RS-232 servers.

We use Moxa Nport W2150A modules. These can be configured for both RS-232 and Ethernet communications to your CNC's.

Setting up a wireless network

The steps involved in setting up the wireless network are:

1. **Install the network hardware:** Computers, NIC's and Ethernet switch. Your LAN's IP addressing scheme should use **10.0.0.0 - 10.255.255.255**, **172.16.0.0 - 172.31.255.255** or **192.168.0.0 - 192.168.255.255**. By international agreement those addresses will never be used on the internet. By using this scheme internally your network computers cannot be directly accessed by the outside world. You have full control via your internal fire-walled router and/or proxy server.
2. **Configure the Access Point(s)** before putting it (them) in place. Follow the manufacturer's instructions. Select infrastructure mode. Create a unique SSID name - never leave it as default. We recommend enabling WPA-PSK2 authentication for security. Select AES-CCMP encryption.
3. **Install the Access Point(s)** in a safe location where 115vac power is available, within 300 feet of and where possible in direct line of sight to the wireless RS-232 modules. If you need a longer range or have walls in the way, more powerful antennas are available to extend the range. Alternatively, you can use multiple Access Points. Keep the Access Points away from sources of interference such as AC busses, welders, plasma machines, motors and portable telephones.
If supplying 115vac is a problem, you can get Access Points that support POE (Power Over Ethernet) and an adapter that will supply the necessary power over the Ethernet cable from where it plugs into your switch or computer so long as that cable does not exceed 100 feet.
4. **Install the driver** for the wireless RS-232 modules on the computer(s) that will be running the SuiteDNC communications engine.
5. **Configure each wireless RS-232/Ethernet Bridge module** following the instructions below. Use the SSID and security settings that you configured in your Access Point. For RS-232 assign a unique COM port value for each unit. We recommend starting at COM5 so that there will be little chance of overlapping existing ports on the computer(s).
6. **Put the wireless RS-232/Ethernet Bridge modules in place.** Power them on. The signal strength bars indicator on the Moxa will show you whether you have an adequate signal. If the signal is weak then try moving either the module to another location, move the Access Point or get a more powerful antenna on your Access Point or module.
7. **Attach the supplied RS-232 or Ethernet cables** from the modules to the CNC communications port.
8. **Install and configure SuiteFactory.**

2 Setting up a MOXA Wireless Device Server

This applies to MOXA NPort device W2150A

2.1 First time setup

This can be done in advance on any PC or laptop with an Ethernet port.

1. **Download the latest driver manager, Device Search Utility (DSU) software and firmware, if necessary, from www.moxausa.com.**

Go to Support and Service/Download Center. Select the Moxa product from the pull-down list (NPort W2150A). Click Go. Download the latest firmware, driver manager and search utility.

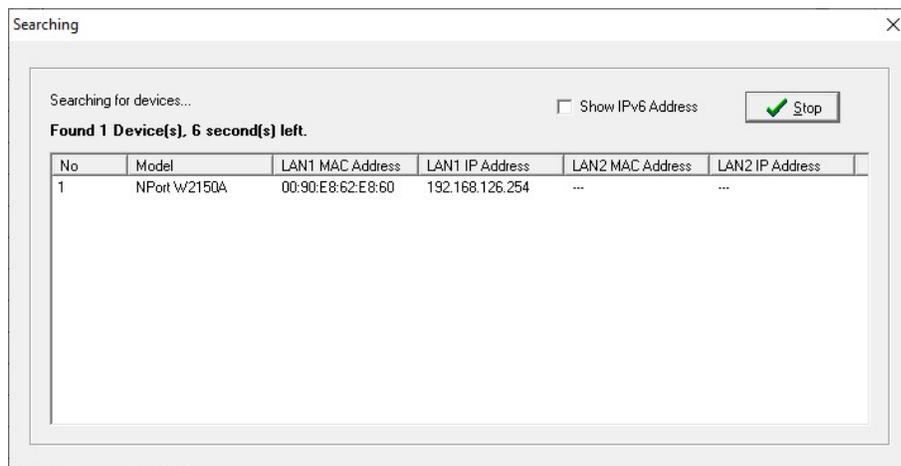
2. Unzip the firmware .rom file and save it in an easily accessible folder.
3. Unzip and install the Moxa DSU – the Moxa Nport Search Utility.
4. Save the Moxa Nport Windows Driver Manager zip file for later.
5. Set up your PC's Network Configuration

Temporarily configure your PC's Ethernet TCP/IP settings to conform to the MOXA's default Ethernet IP which is 192.168.126.254. You will have to set the IP settings for static and make the IP 192.168.126.10 for example. If you already have a static IP on your PC, you can permanently add the example IP 192.168.126.10 as an alternate in the Windows network configuration IP4 advance properties menu.

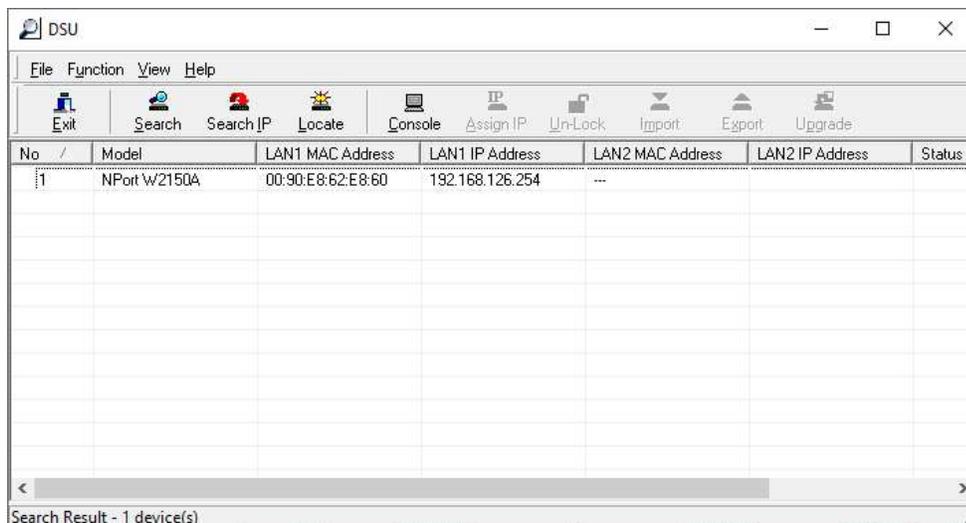
6. Attach Moxa device

Connect your NPort device directly to your PC's Ethernet port using the supplied CAT5 crossover cable. Plug the power module in and turn on power. Wait for the Ready LED to turn from red to green. You will also hear the Moxa ready "beep beep" signal.

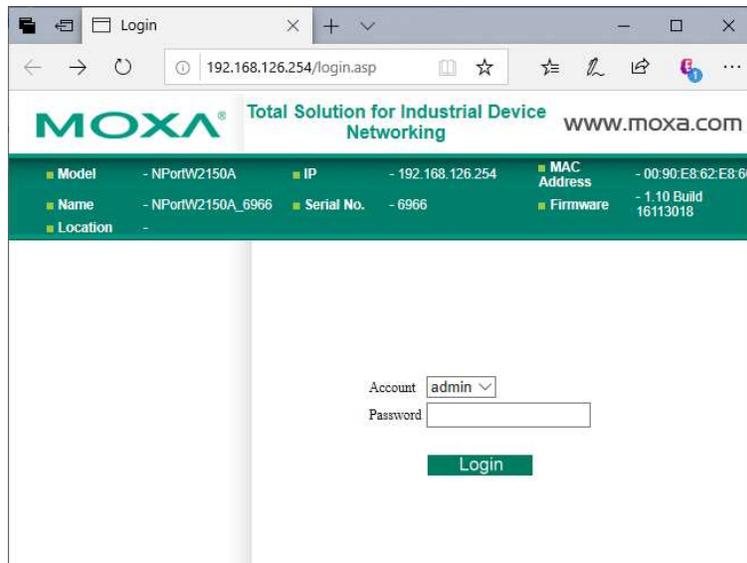
Startup DSU, the Moxa Nport Search Utility. Click on Search and you will get the following.



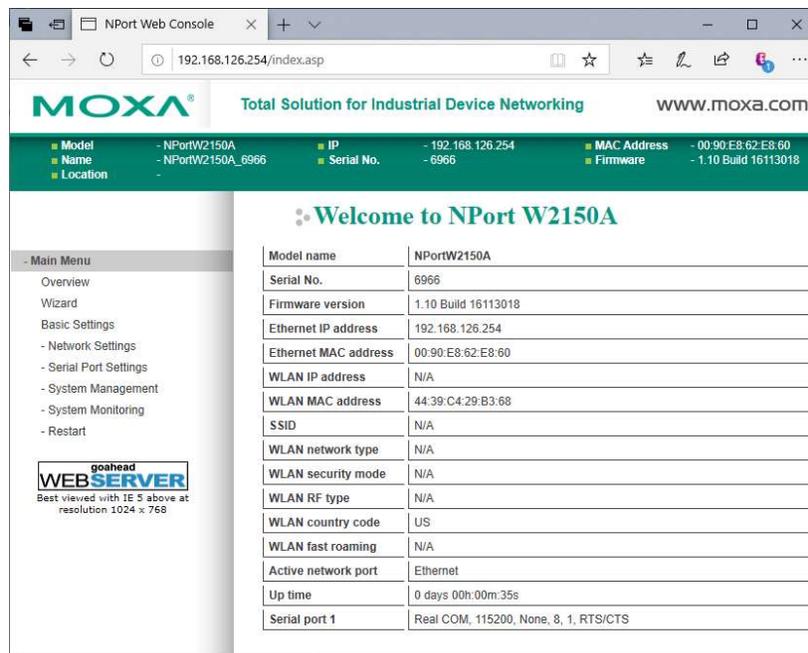
When the search process stops, the following appears.



Highlight the NPort unit listed and click Console. The login screen showing user admin appears.



Older Moxa units had no default password. Newer ones have the password, “moxa”. If that doesn’t work, check the Quick Installation Guide that comes with the Moxa. Click Login. The following “Overview” screen opens:



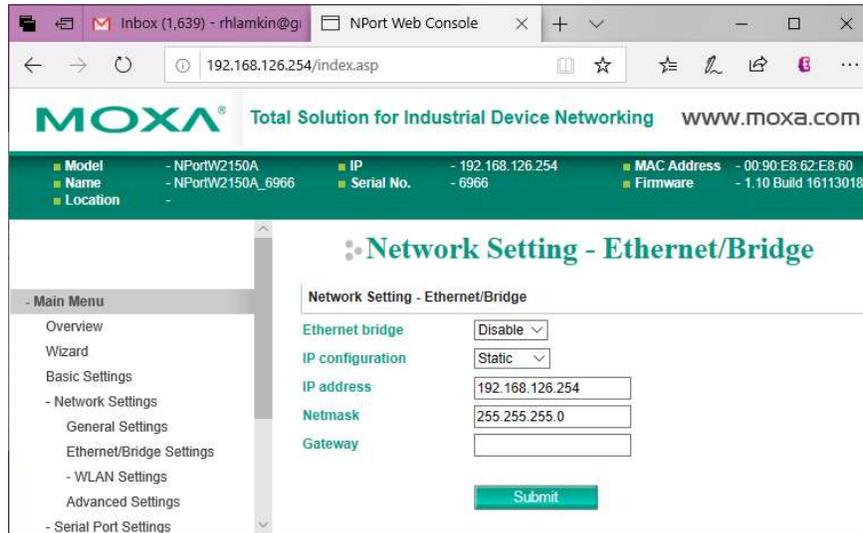
7. Firmware Upgrade

Check that the firmware version as show on the Overview screen is up to date. If not, select System Management/Maintenance/Firmware Upgrade. Carefully follow the instructions using the .rom file downloaded from Moxa's website.

For Ethernet/Bridge settings, jump to 2.4.

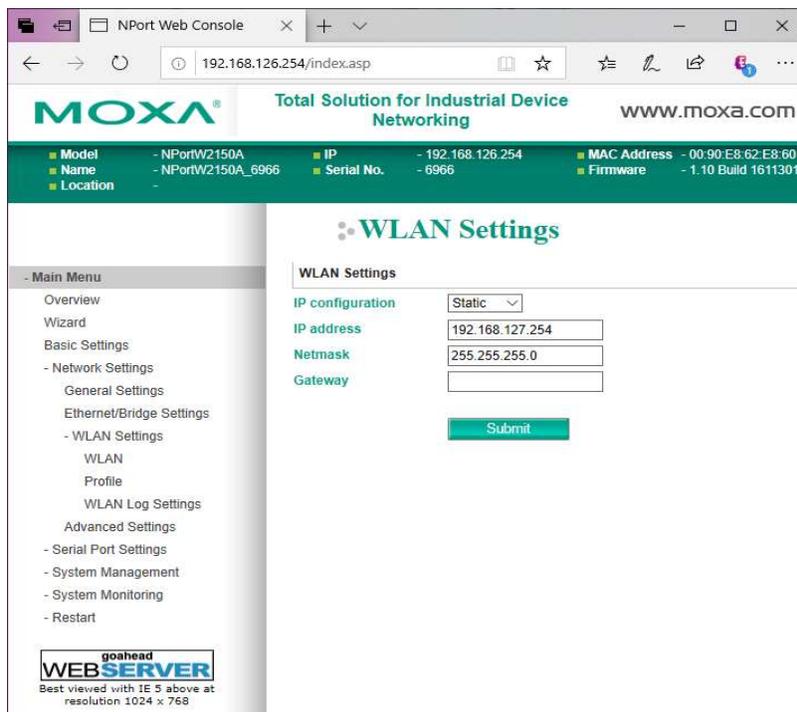
2.2 Settings for RS-232 Connections

Select Ethernet/Bridge Settings from the Main Menu.



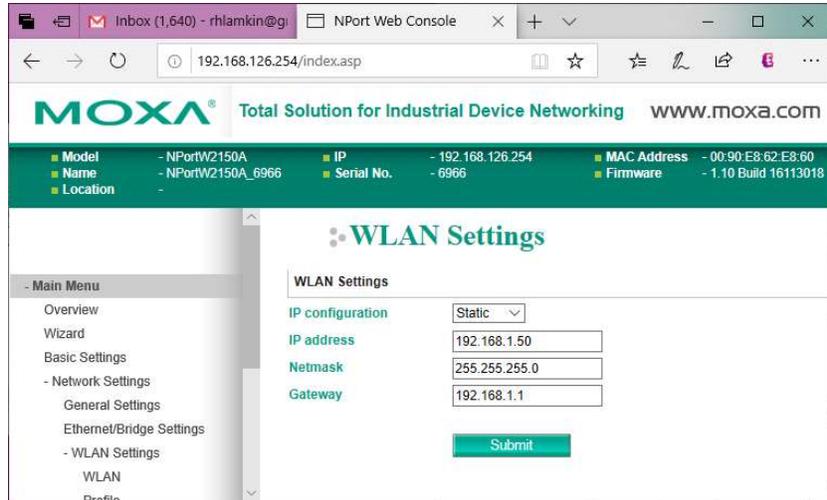
The factory default settings are shown above with Ethernet Bridge disabled. Make no changes.

Click on Network Settings/WLAN Settings/WLAN to get the following:



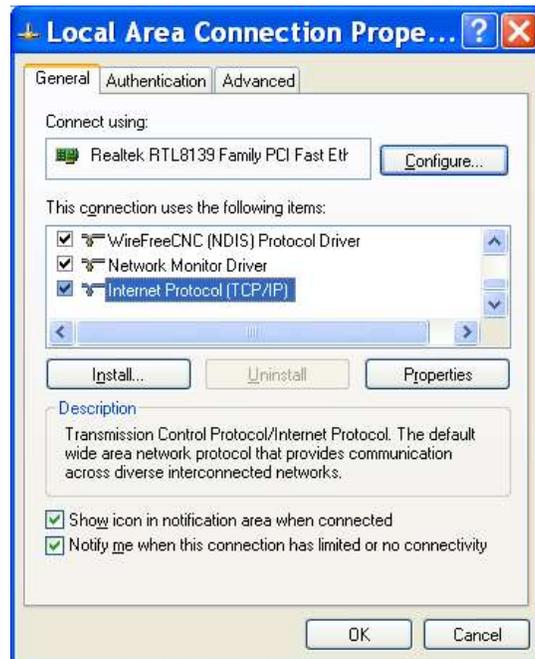
NOTE! The IP configuration should be set to “Static” because the COM port assignment is mapped to the IP address of the MOXA unit in the Windows Registry of the computer where the MOXA drivers are installed. If you use DHCP and the IP lease ends and the unit is re-assigned a different IP address, the results will not be good. Either MOXA units will not be found with the assigned COM port, or worse, the COM ports will be assigned to different units on different machines. If you must use DHCP you will have to make sure the lease never runs out or is a very long time, like 99 years.

Change the IP address to match your Local Area Network’s scheme. Our network uses 192.168.1.x. Make sure the Netmask is correct. Enter your Gateway address.



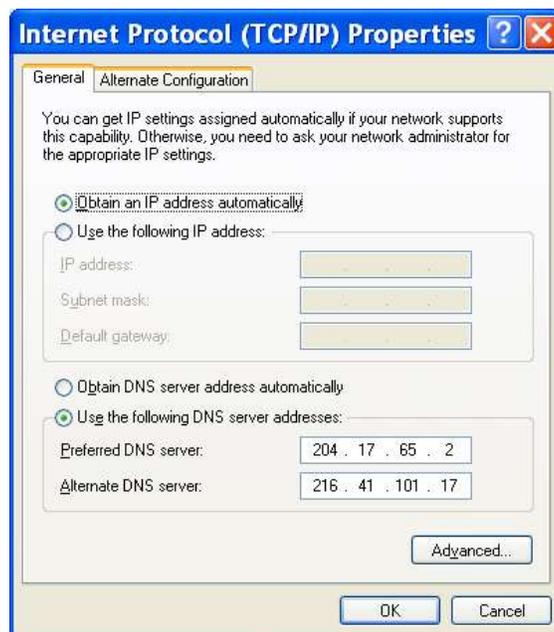
Click Submit. Wait until the WLAN Settings screen reappears after a few seconds.

Hint! If you do not want to assign IP addresses from your company’s available addresses, you can assign an alias IP address to the server(s) that will be hosting the COM ports and use a new unique scheme for your wireless devices. In Windows aliases are assigned via the “Alternate Configuration” tab of Internet Protocol (TCP/IP) Local Area Connection Properties:

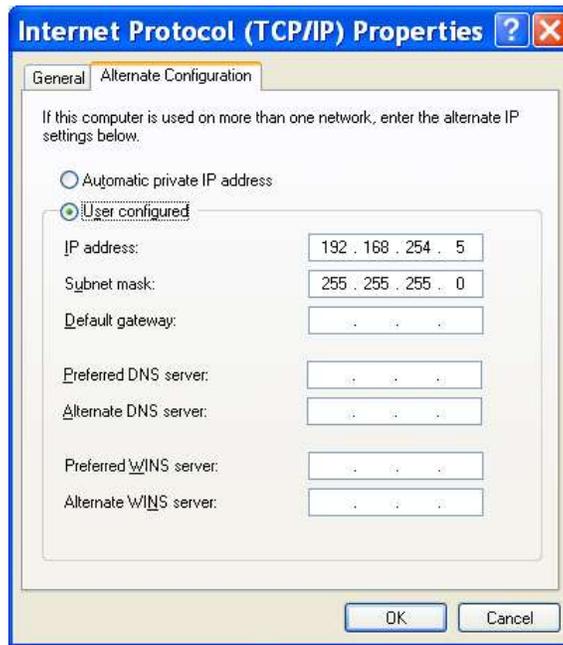


Click Properties

The General tab shows that in this LAN IP addresses are assigned automatically via DHCP.



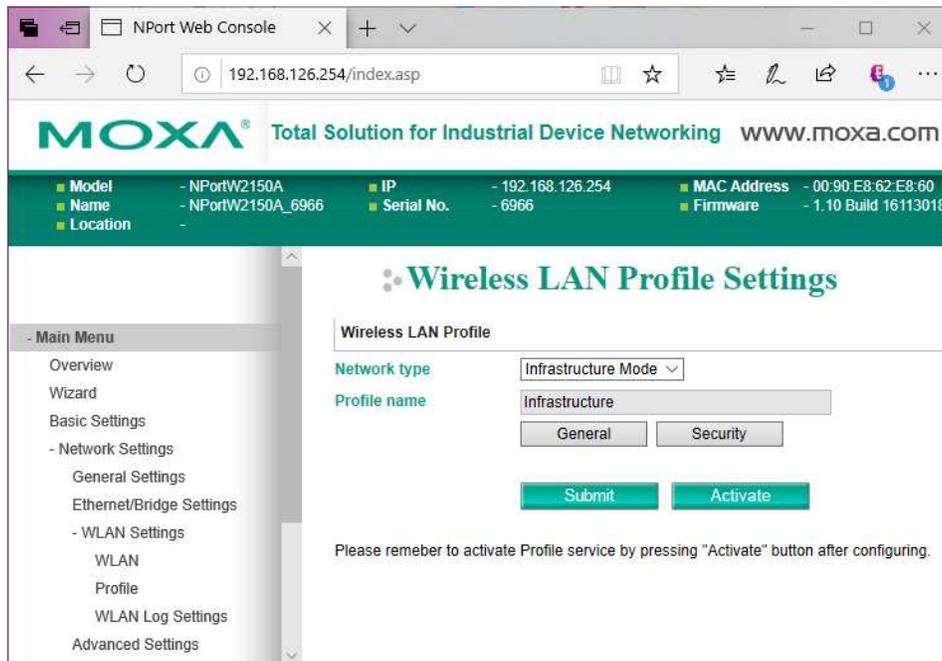
To set an alias click on the Alternate Configuration tab.



This screen shot shows an example of an alias IP address.

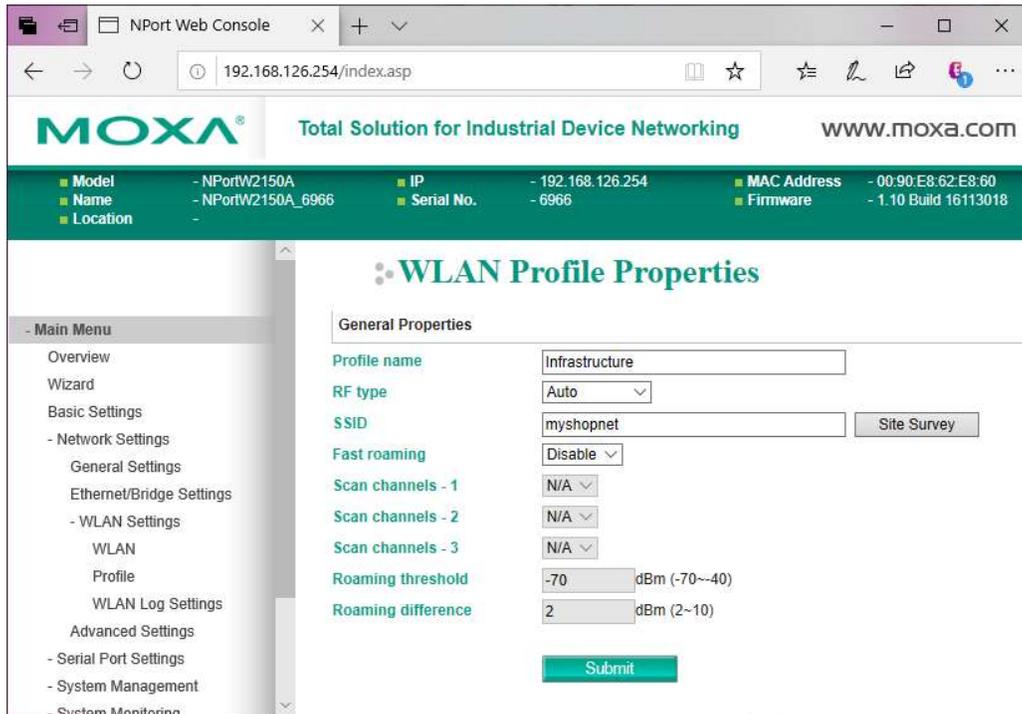
END OF HINT!

Now select Network Settings/WLAN Settings/Profile from the Main Menu.



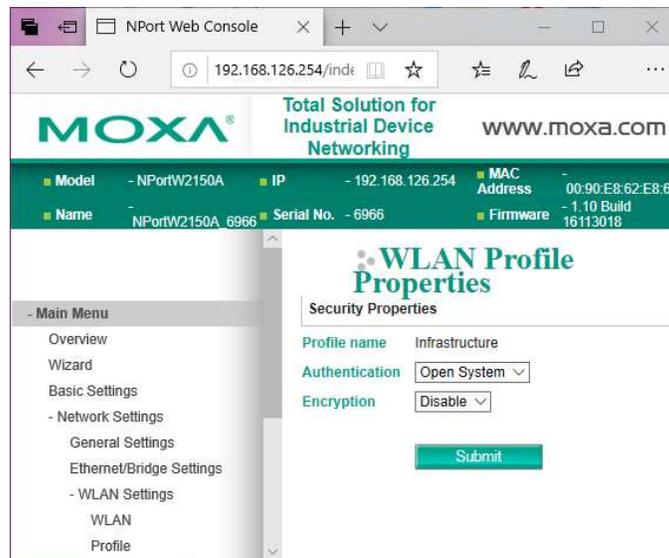
Set up as above with Network Type = Infrastructure Mode. You can change the Profile name if you wish. Click Submit if you made any change.

Click on General.

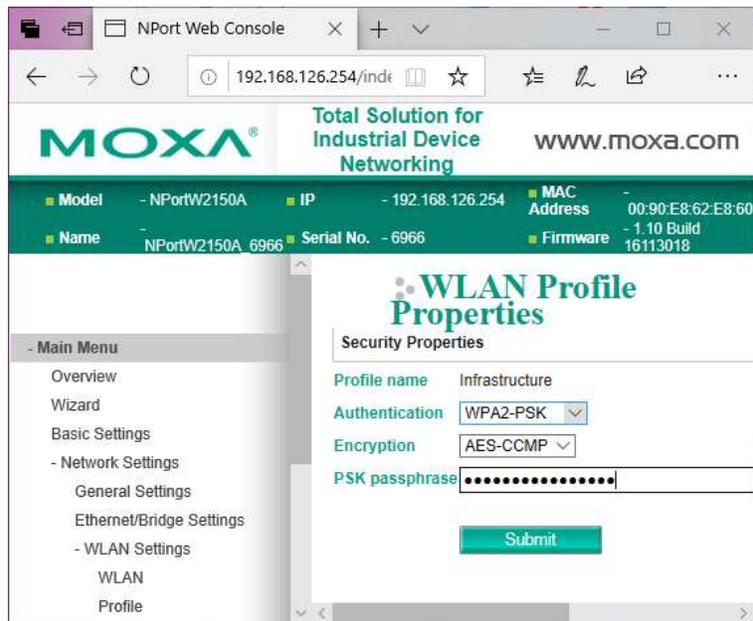


Set up as above, entering the SSID of your wireless network. You can click on Site Survey to find your SSID if you are in range or you can manually enter it. Click Submit. After a few seconds, the **previous screen (WLAN Profile Settings)** will appear.

Click on Security and get this screen:

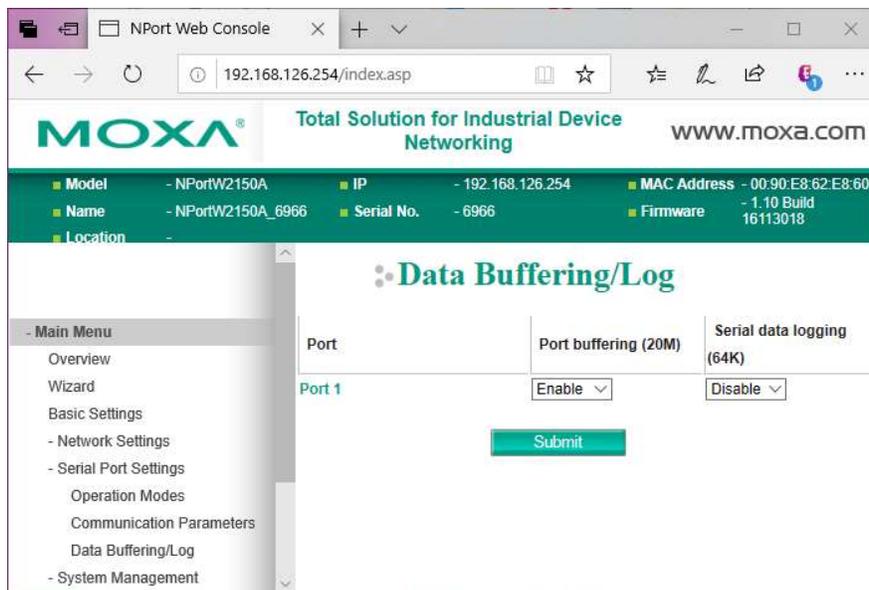


There are several choices on how to configure wireless security. You must set the MOXA units to match the method used by your Access Point. The following depicts the most secure type, WPA2-PSK.



Configure security to match your wireless network's Access Point's settings. Click Submit and after a few seconds the **previous screen (WLAN Profile Settings)** will reappear.

Next from the Main Menu, select Serial Port Settings/Data Buffering/Log.



Enable Port buffering (20M). Click Submit. Wait a few seconds until the above screen reappears.

Unplug the power supply and the CAT5 crossover cable. Reapply the power. Notice that the WLAN LED light starts to blink slowly on and off for perhaps 30 seconds. If you properly configured the SSID and other settings and are within range of your wireless Access Point/Router, then you will see the signal strength bars appear on the left of the Moxa box and the WLAN LED will remain on.

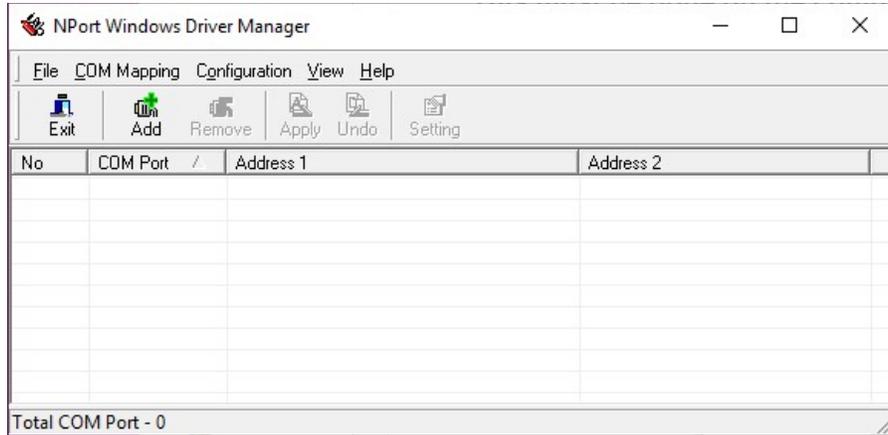
Note – If you want to start over again from factory settings or change the unit to an Ethernet/Bridge connection, use a paper clip to push the reset button located next to the antenna connector. Hold until the Ready LED turns RED.

You are now ready to assign COM ports and deploy this unit.

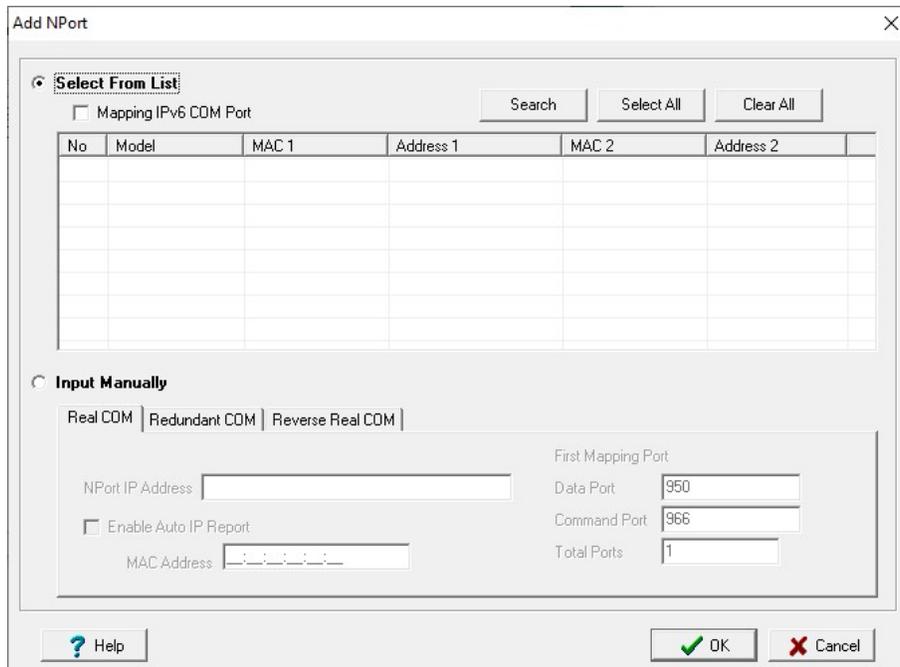
2.3 Configuring COM Ports

This must be done on the computer(s) where SuiteFactory's Communications Engine will be running and in range of the Wireless Access Point to which it will attach.

Unzip and install Moxa's Nport Windows Driver Manager and start it. You get the following screen. If there were Moxa COM ports previously configured, they will show up here too.

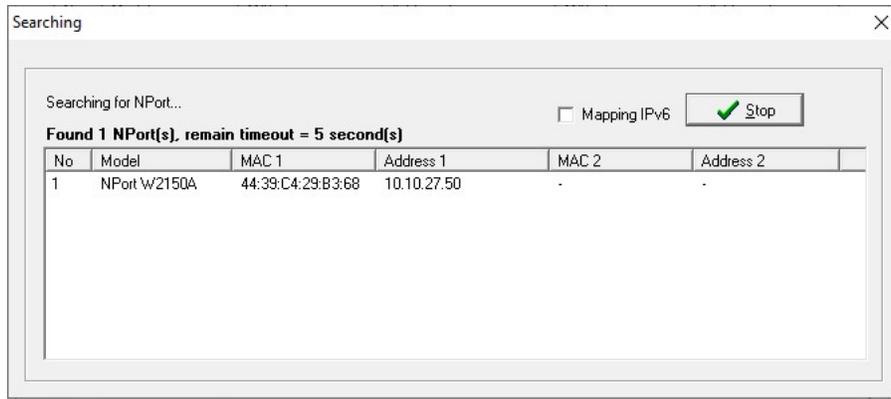


Click on Add. The Add Nport screen appears:

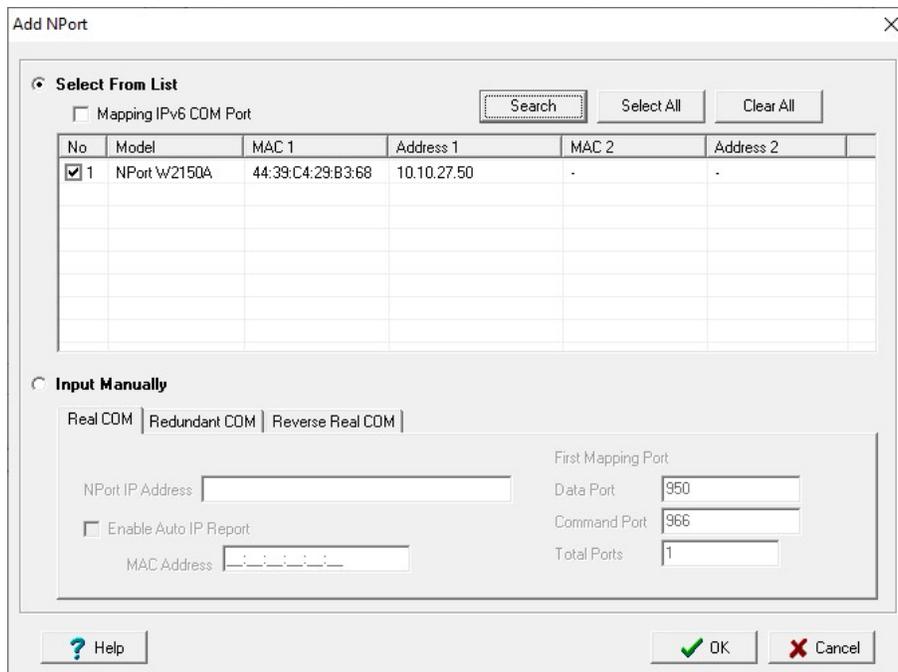


Click on Search.

A “Searching” box will appear looking for all Moxa units on line:



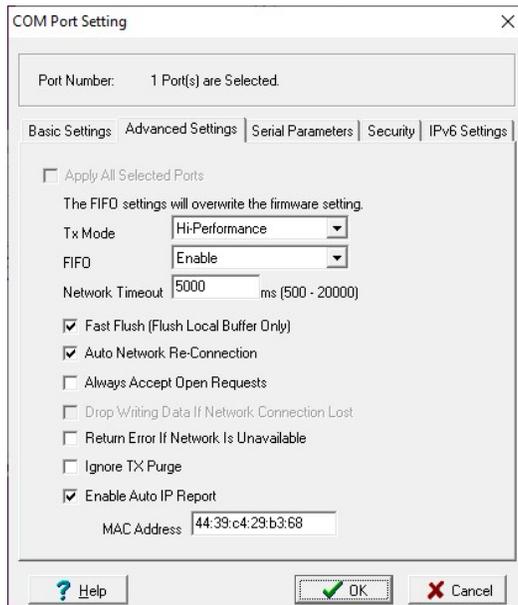
The screen will automatically disappear placing the information about the found Moxa’s in the Add screen:



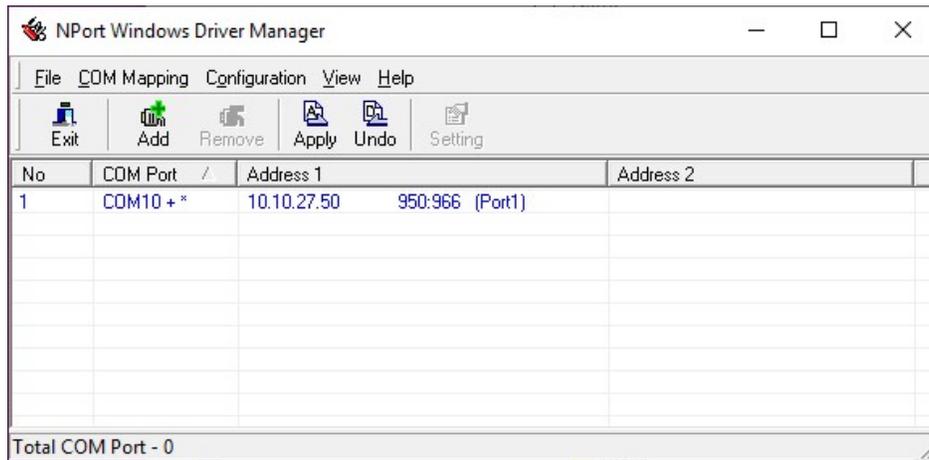
Click OK. You will get a screen like the following with the “Information” dialog asking whether to activate the COM Port now.



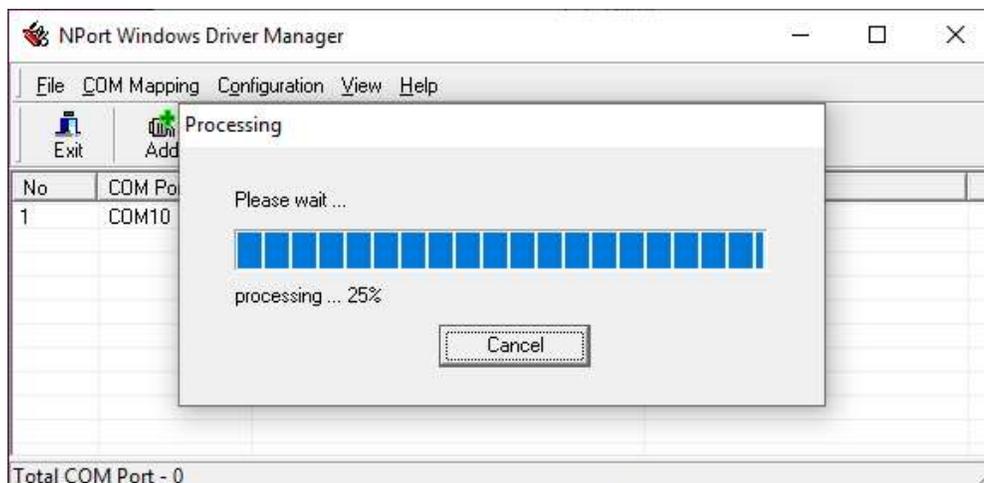
Answer No. The COM port values that appear are the next available ones on your computer but not necessarily the ones you wish to assign. Note! Blue text and the + sign(s) next to the COM port(s) means that those ports have not been permanently assigned yet.



Click OK.



Note that the blue text and the + sign next to the COM# means that the changes have not yet been made permanently. Click Apply. Answer Yes to the dialog box regarding closing the ports.



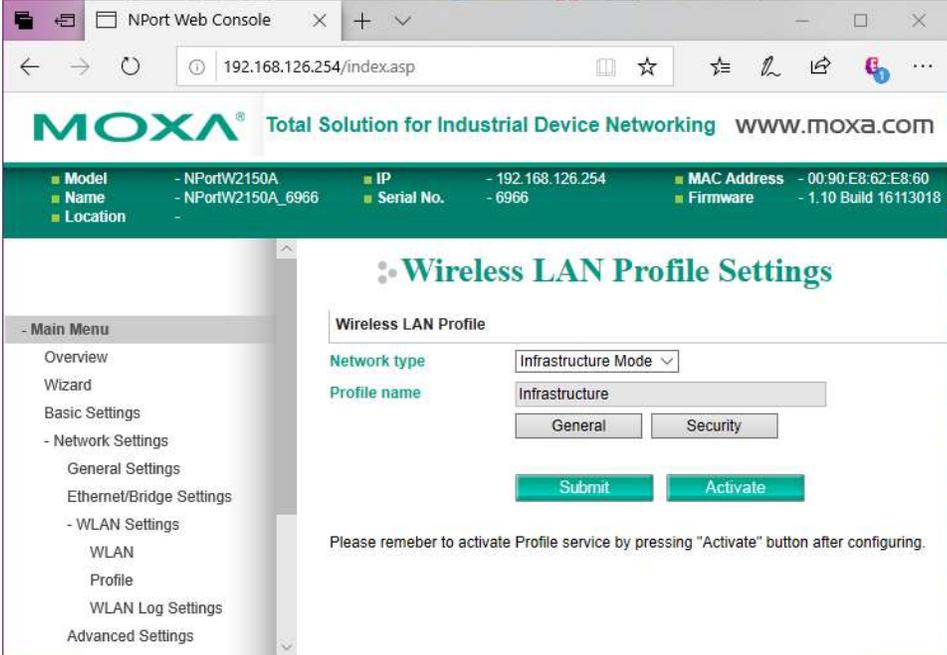
2.4 Setting up a Moxa Wireless Device Server as an Ethernet Bridge

For use with Ethernet connected CNC's

If this is a new box, continue below. If you are repurposing one that was previously set up for RS-232 communications, reset the box back to factory defaults by using a paperclip to push in the reset button located under the small hole next to the antenna connector. Hold until the Ready LED turns RED.

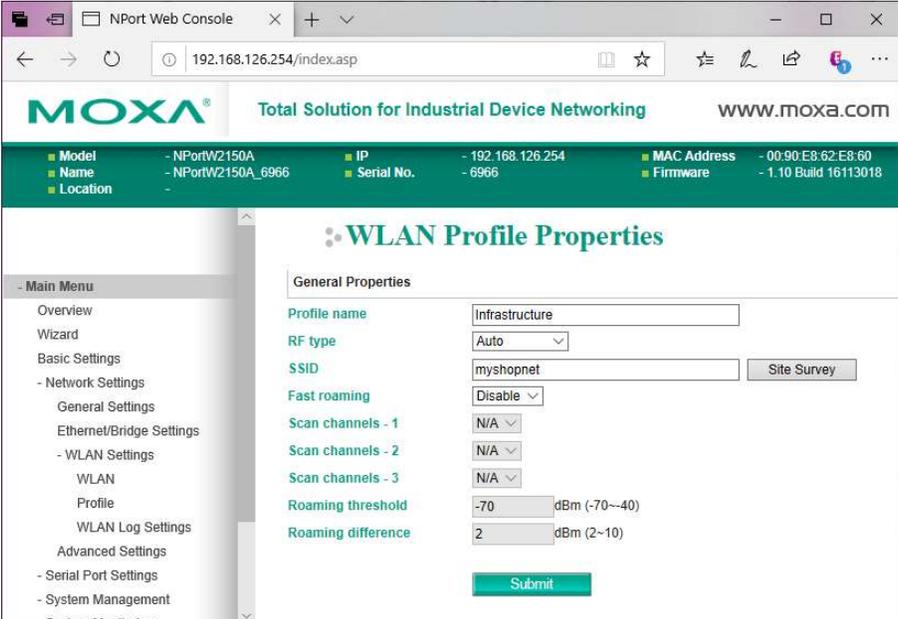
Perform the steps, as necessary, in paragraph 2.1, above. Login to the Console screen.

Select Network Settings/WLAN Settings/Profile



The screenshot shows the Moxa NPort Web Console interface. The browser address bar displays "192.168.126.254/index.asp". The page header includes the Moxa logo and the text "Total Solution for Industrial Device Networking" and "www.moxa.com". A status bar at the top lists device information: Model (NPortW2150A), Name (NPortW2150A_6966), Location (-), IP (192.168.126.254), Serial No. (6966), MAC Address (00:90:E8:62:E8:60), and Firmware (1.10 Build 16113018). The main content area is titled "Wireless LAN Profile Settings". On the left is a "Main Menu" with options: Overview, Wizard, Basic Settings, Network Settings (General Settings, Ethernet/Bridge Settings), WLAN Settings (WLAN, Profile, WLAN Log Settings), and Advanced Settings. The "Wireless LAN Profile" section includes a "Network type" dropdown set to "Infrastructure Mode", a "Profile name" text field containing "Infrastructure", and two tabs: "General" and "Security". Below these are "Submit" and "Activate" buttons. A note at the bottom states: "Please remember to activate Profile service by pressing 'Activate' button after configuring."

Select General

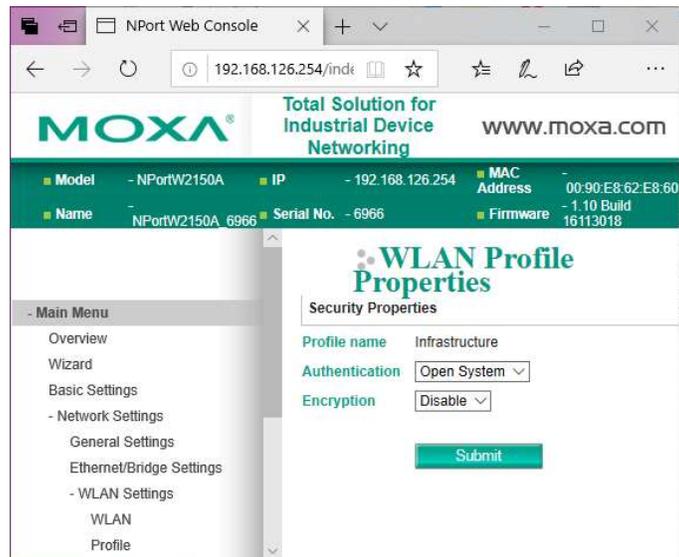


The screenshot shows the Moxa NPort Web Console interface, specifically the "WLAN Profile Properties" page. The browser address bar displays "192.168.126.254/index.asp". The page header and status bar are identical to the previous screenshot. The "Main Menu" on the left is the same. The "WLAN Profile Properties" section is titled "General Properties" and includes the following fields: "Profile name" (Infrastructure), "RF type" (Auto), "\$SID" (myshopnet) with a "Site Survey" button, "Fast roaming" (Disable), "Scan channels - 1" (N/A), "Scan channels - 2" (N/A), "Scan channels - 3" (N/A), "Roaming threshold" (-70 dBm (-70~-40)), and "Roaming difference" (2 dBm (2~10)). A "Submit" button is located at the bottom of the form.

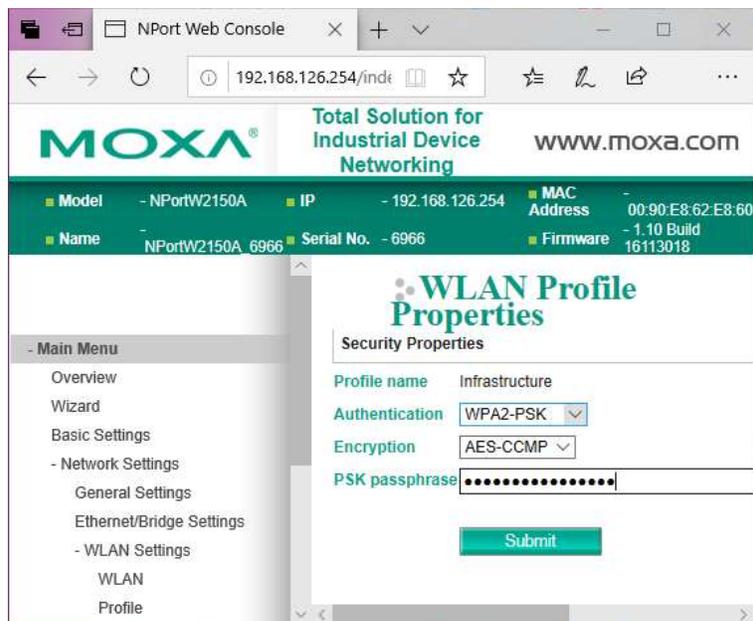
Configure as above, entering the SSID of your wireless network. You can click on Site Survey to find your SSID if you are in range or you can manually enter it.

Click Submit. After a few seconds, the **previous screen (WLAN Profile Settings)** will appear.

Click on Security and get this screen:

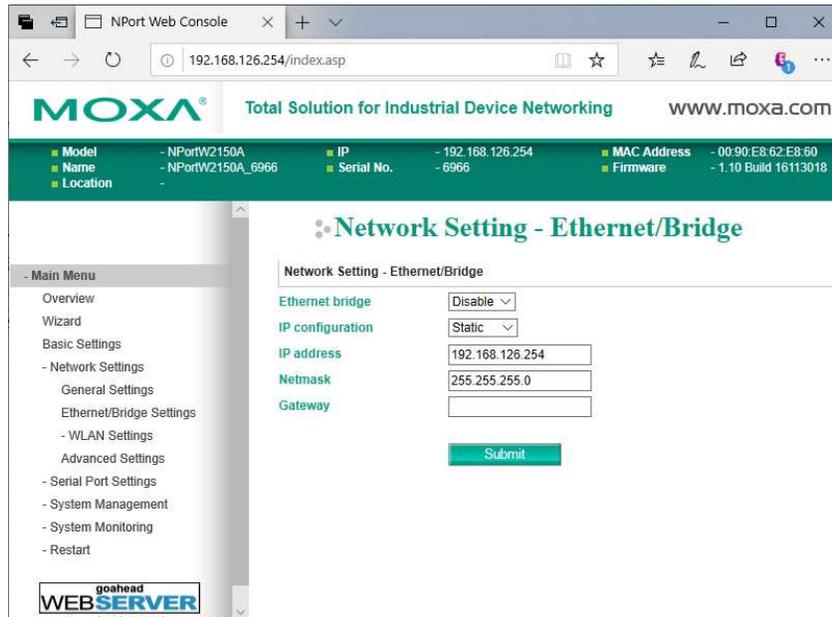


There are several methods for wireless security. You must set the MOXA units to match the method used by your Access Point. The following depicts the most secure type, WPA2-PSK.



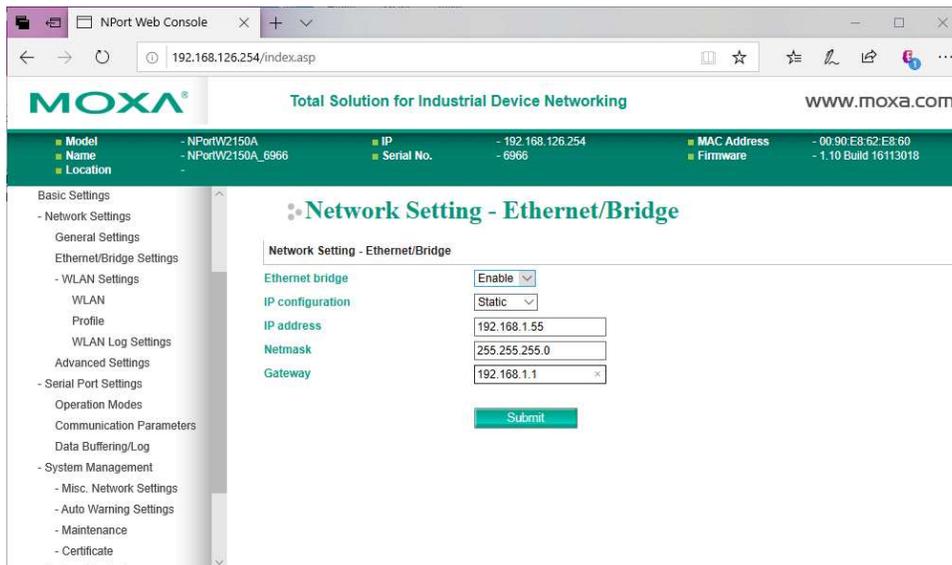
Configure security to match your wireless network's Access Point's settings. Click Submit and after a few seconds the **previous screen (WLAN Profile Settings)** will reappear.

Select Network Settings/Ethernet/Bridge Settings from the Main menu.



Change the Ethernet bridge setting to Enable.

Change the IP address to match your Local Area Network's scheme. Our network uses 192.168.1.x. Make sure the Netmask is correct. Enter your Gateway address, if any.



Click Submit. Click OK to do a System Reboot. When the Moxa box restarts the notice that the WLAN LED light starts to blink slowly on and off for perhaps 30 seconds. If you properly configured the SSID and other settings, and are within range of your wireless Access Point/Router, then you will see the signal strength bars appear on the left of the Moxa box and the WLAN LED will remain on.

This box is now ready to be deployed on the shop floor for an Ethernet communicating CNC

Note – If you want to start over again from factory settings or change the unit to an Ethernet/Bridge connection, use a paper clip to push the reset button located next to the antenna connector. Hold until the Ready LED turns RED.

Appendix A

3 Hardware Installation with the Wireless External Kit

Installing a wireless RS-232 device server externally is pretty straightforward. Decide where you are going to mount it. It must be within 5 feet of the RS-232 port on the side of the CNC cabinet. Clean the surface of the cabinet where the device server is to be mounted with alcohol or other non oily degreaser, attach the dual lock fasteners to the device server and press onto the side of the cabinet. Attach the antenna, the RS-232 cable, the power supply, make it neat and that's it.

The External Kit consists of the following items:

1. 1 - 5' cat5e shielded patch cable
 2. 1 – 9 pin modular adapter (plugs into the wireless RS-232 device server)
 3. 1 – 25 or 9 pin modular adapter (plugs into the CNC's RS-232 port)
 4. 8 – 7/8" Dual Lock fasteners (no. 7 in the picture below) for attaching the device server to the CNC cabinet
 5. 3 – Self-adhesive tie mounts
 6. Cable ties for use with the tie mounts.
1. Attach the antenna that was supplied with the wireless device server.
 2. Attach 4 pairs of the dual lock discs to the back of the RS-232 wireless device server to stick it to the side of the CNC cabinet within 5 feet of the RS-232 port. (Note! The picture below shows a 2-port device server. Yours is most likely a single port version.)



3. Attach the cat5e shielded cable with the adapters designated for the particular CNC to the device servers 9 pin Dsub plug to the CNC's RS-232 connector.
4. Plug the power supply module into a clean source of 115 vac power and plug the cord end into the wireless device server. (Alternatively, you can supply anywhere between 12 and 48 vdc via the green auxiliary connector on top of the device server. Take care to observe the polarity)
5. Use the tie mounts and cable ties to make the installation neat.

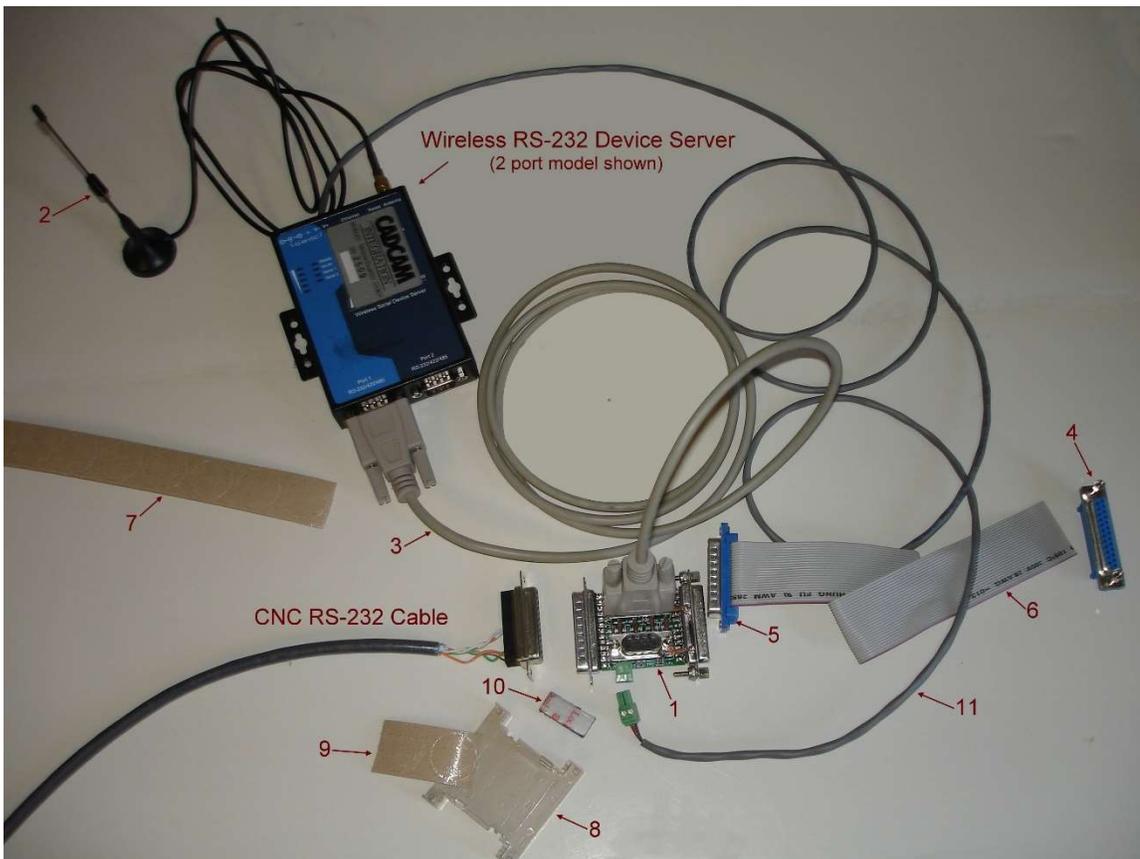
4 Appendix B Hardware Installation with the Wireless Internal Kit

The purpose of the wireless internal kit is to provide the means to install a wireless RS-232 device server inside a CNC cabinet with the added benefit of not losing the ability to use the CNC's RS-232 port with a laptop or other RS-232 device.

It consists of the following items:

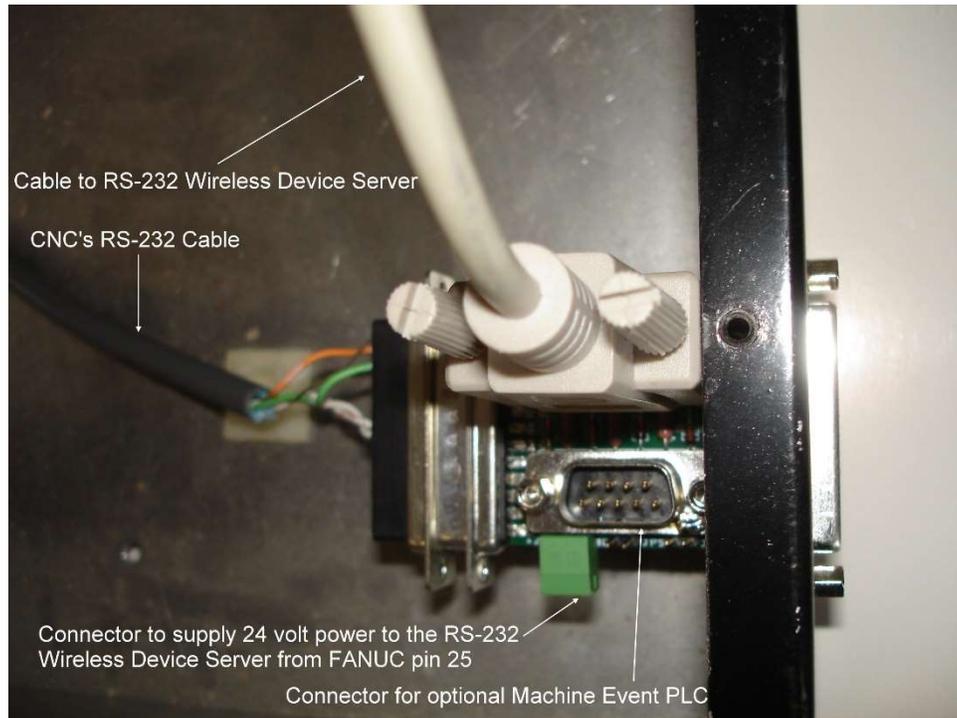
1. Internal Adapter PC board with standoffs and self-locking nuts
2. External Antenna with magnetic base and 4' cable
3. 6' DB9F – DB9F cable assembly to connect the wireless RS-232 device server to the Internal Adapter PC board
4. 1 DB25F IDC connector *
5. 1 DB25M IDC connector (Attached to item 6) *
6. 1' 25 conductor flat ribbon cable *
7. Dual Lock fasteners for mounting the wireless RS-232 device server to the CNC cabinet
8. Plastic Cover *
9. Dual Lock fasteners for mounting the Plastic cover to the CNC cabinet *
10. Dual Lock fastener for mounting the Internal Adapter PC board to the Plastic Cover *
11. Power Cable assembly for supplying 24volts from FANUC CNC's to the wireless RS-232 device server

* Not needed if the internal adapter PC board can be attached directly to the CNC cabinet

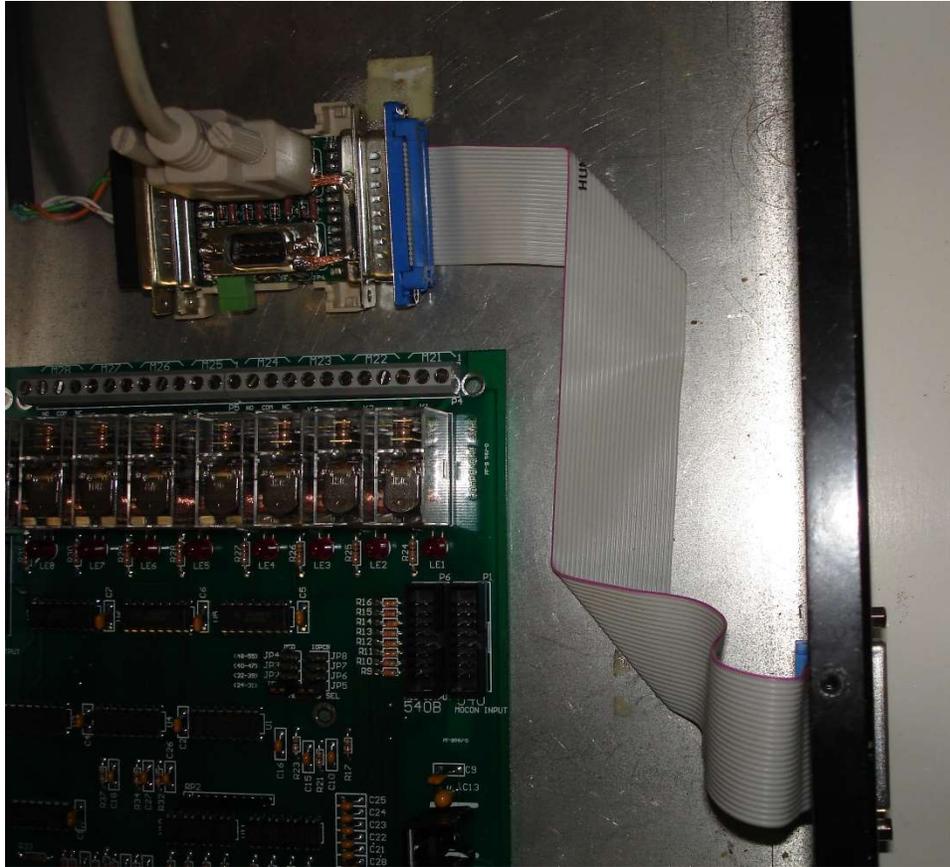


4.1 Installation Instructions

1. Shut down CNC power and the machine main power.
2. Carefully remove the CNC's RS-232 DB25 connector from the side of the cabinet and bring it inside. This might take some effort if the wide part of the connector is outside the cabinet.
3. If there is room, using the hex standoffs and self-locking nuts supplied, attach the internal adapter PC board (1) directly to the side of the CNC cabinet where you removed the CNC's RS-232 cable. There must be enough space to accommodate the cable to the RS-232 wireless device server. It must be oriented with the 25 pin DSUB socket side out. If the CNC's connector is a plug (FADAL'S and some older Okuma's, for example) DO NOT TURN THE MODULE AROUND. USE A PAIR OF GENDER CHANGERS INSTEAD.

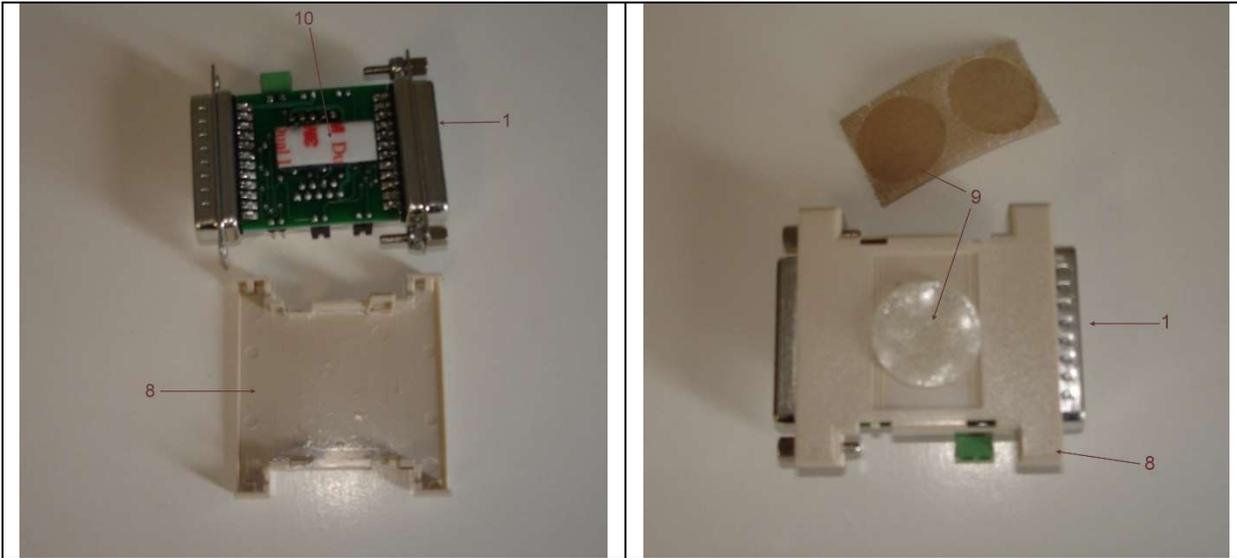


4. If there is no room, then use the ribbon cable and 25 PIN IDC connectors that are supplied (items 4, 5, 6, 8, 9 and 10) as shown below, for example.

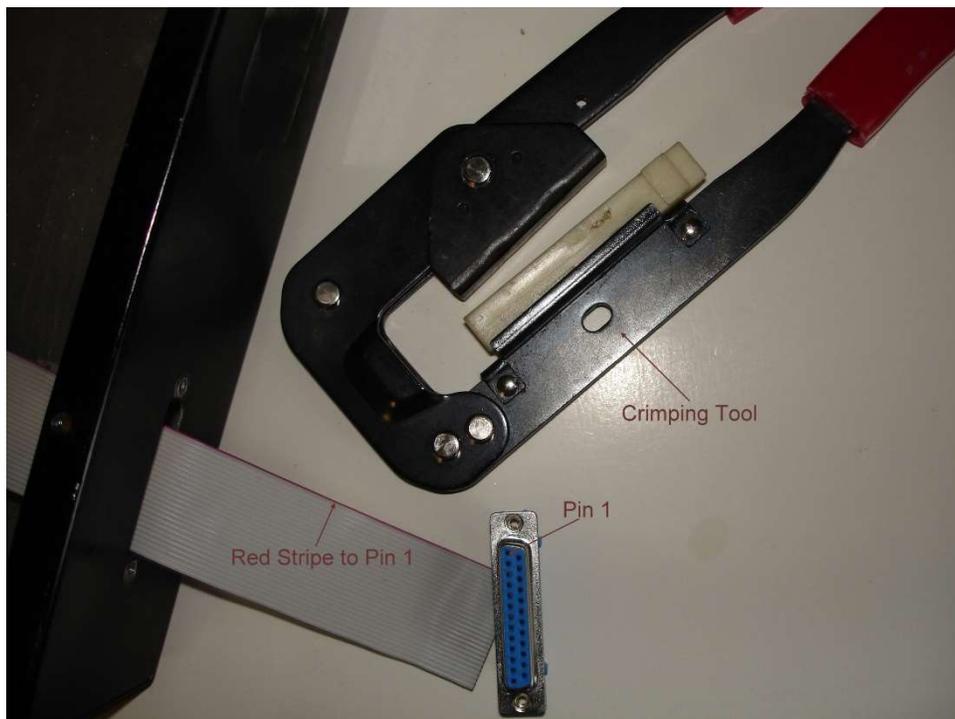


Details:

- Using the small piece of dual lock fastener (10), attach the Internal Adapter PC board (1) to the plastic cover (8). On the back side of the cover attach a pair of the dual lock discs to stick it to the back of the CNC cabinet. Note! Make sure the surface on the CNC cabinet is clean. Alcohol works well for removing oil.



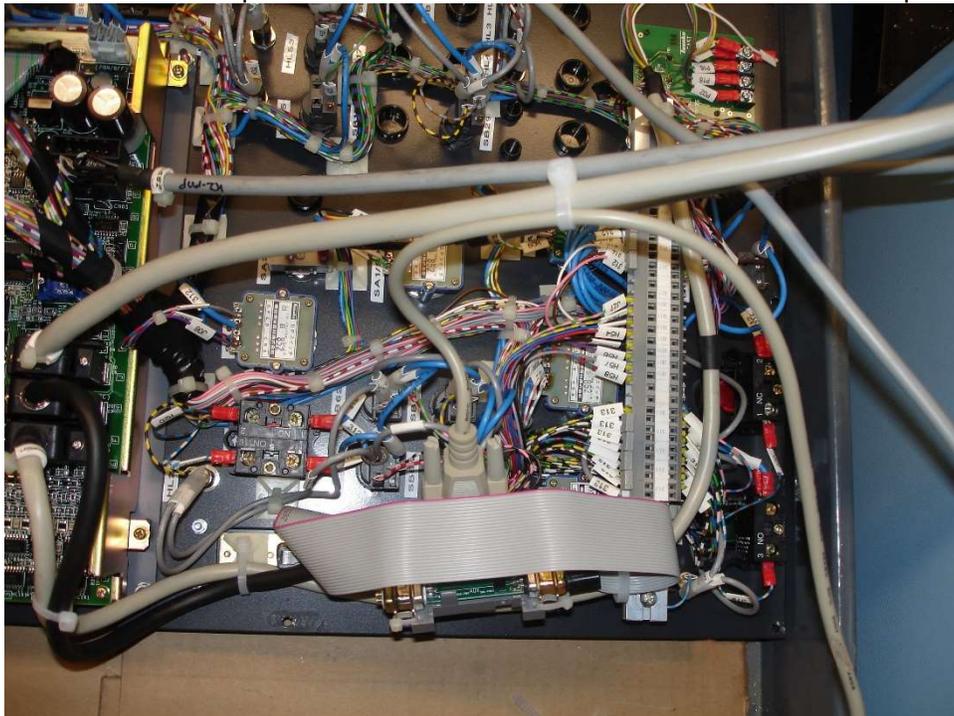
- The 1 foot ribbon cable is supplied with only the 25 pin DSUB plug attached. This leaves the other end free to feed through the connector hole on the cabinet if the 25 pin DSUB socket connector must be attached from the outside. You could crimp on the connector using a small vise or better use a crimping tool which can be ordered.



- Attach 4 pairs of the dual lock discs to the back of the RS-232 wireless device server to stick it to the back of the CNC cabinet. Note! Make sure the surface on the CNC cabinet is clean. Alcohol works well for removing oil.



There will be situations where there is just no free cabinet space to stick the modules to. You will have to improvise as shown in the photo below where the adapter module is wire tied to the back of the CNC's control panel.



8. Feed the cable from the magnetic mount antenna from outside of the cabinet through a 3/8-inch hole which can be sealed with silicone caulk. Attach to the wireless RS-232 device server. NOTE! If the CNC's control panel is plastic and the wireless signal from the access point is strong, then it might not be necessary to put the antenna outside. You can try mounting it upside down on the inside of the cabinet at the top.

The photo below shows a complete internal setup for a FANUC CNC where 24volt power is supplied on pin 25 of the CNC's RS-232 connector. For other CNC's the power must be supplied via the AC power module that comes with the wireless device server or you can supply anywhere between 12 and 48 volts from the CNC. The photo also shows an optional Machine Event PLC attached to the bottom 9 pin DSUB plug on the Internal Adapter Module.

