Technical Support document:

DX940e router configuration for a SCADA application over 4G LTE wireless connection.

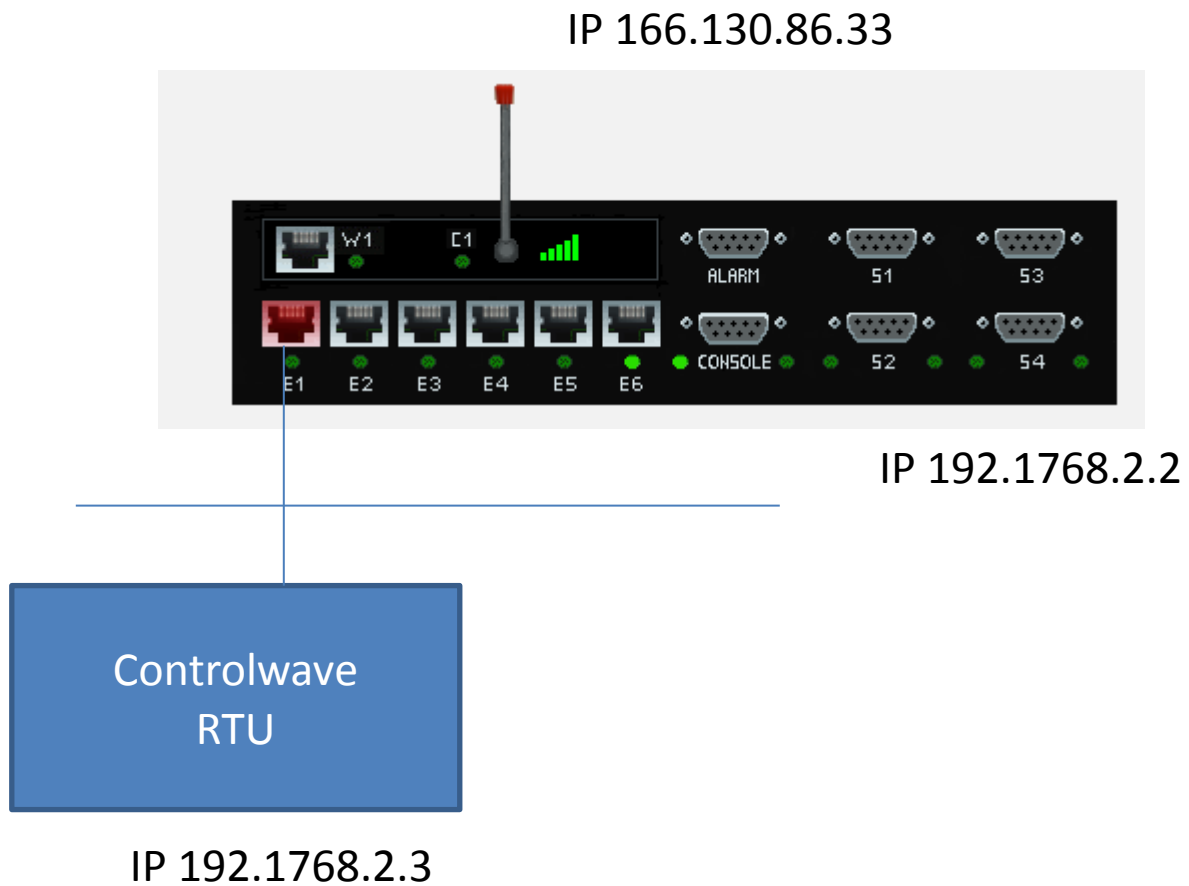## Topics

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Overview

This example steps through the various configuration screens to setup an Ethernet port for a SCADA type application on a DX940e for use in an application where a remote SCADA Master based system requires access to equipment attached to the DX940e over a 4G LTE wireless connection.

IP 166.130.86.33

IP 192.1768.2.2

Controlwave RTU

IP 192.1768.2.3

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Accessing the DX940e Configuration system

The initial access to DX940e configuration system can be accessed by direct connection to the units console connection, or via an IP based connection using Telnet or SSH. Access to the WEB interface can be achieved using a WEB browser. If this is a new unit the factory default IP address is 192.168.1.2. Please also note that all ports on a factory default setting will be disabled with the exception of the **highest** Ethernet port number. So for a DX940e connect your PC initially to E6.

If you can't access the DX940e via the Ethernet port, because its address is unknown, then the IP address can be reset via the Console port BOOT application. Using a PC Terminal application such as Putty or TeraTerm and connect to the dedicated CONSOLE port (38,400 bps, no parity, 8 data bits and 1 stop bit) using a standard DB9 cross over cable (supplied with the equipment) and holding down the SPACE bar after a DX940e power cycle.

> *GarrettCom, Inc.*
> *MNS-DX ROM version 3.1.7 (Y12) 200/128*
>
> **** Hold down SPACE to stop boot process ****
>
> *Starting boot menu...*
>
> *Boot Menu*
> *---------*
>
> *1: View System Information*
> *2: Assign System IP Address*
> *3: Install Initial Software Image from FTP Server*
> *4: Install Initial Software Image via TFTP*
> *5: Install Initial Software Image via XMODEM*
> *6: Load Temporary Image from FTP Server*
> *7: Load Temporary Image via TFTP*
> *8: Load Temporary Image via XMODEM*
> *9: Restore System to Factory Defaults*
> *b: Boot*
>
> *MNS-DX>*

Simply use Option 2: to define the initial IP address, then Option b: to boot. You could also use option "9" to reset all configurations to factory default and the initial IP address of the DX940e would be 192.168.1.2.

Once IP addresses have been assigned one can access to the configuration system, this section covers WEB access.

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Once the address is defined then launch a HTTPS: session to the address that was defined. For this example we are using 192.168.2.2 Mask 255.255.255.0.

Please note that only SECURE access methods are enabled by default, so we need to use HTTPS for WEB access, SSH or Direct console for CLI access.
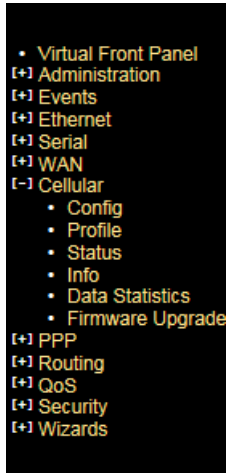

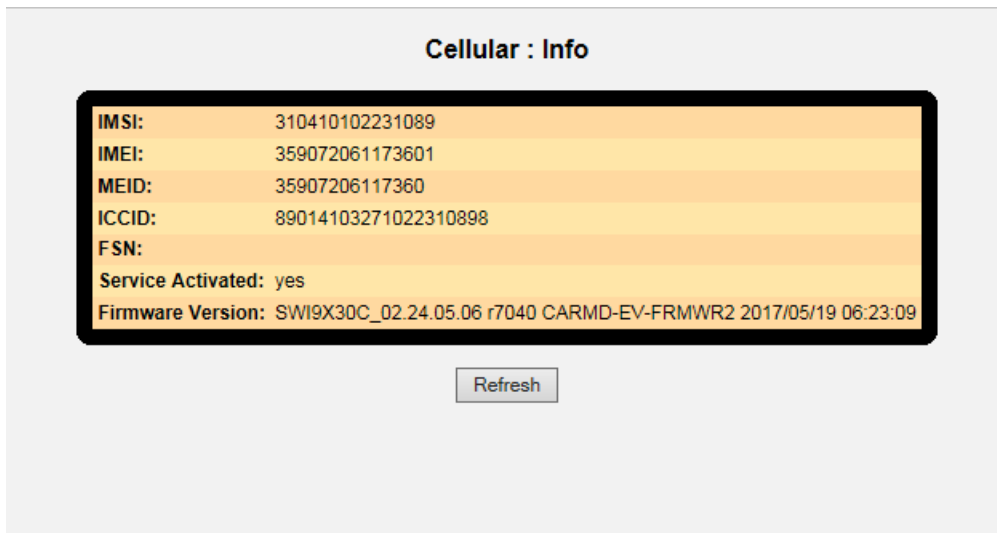Default passwords for ADMIN access is "manager/manager"
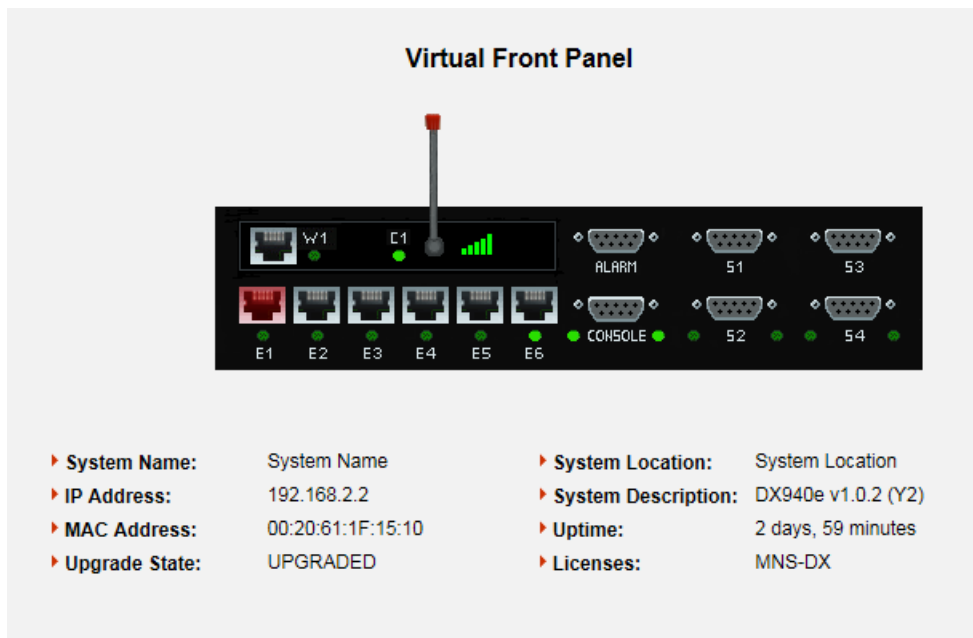
Initial Virtual Front Panel Web screen showing various system level information including software version etc.

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Cellular Interface Configuration

So we select the Cellular sub-menu

Use the Info tab to display the all important numbers you will need to register this device with the carrier

Cellular : Info

IMSI:	310410102231089
IMEI:	359072061173601
MEID:	35907206117360
ICCID:	89014103271022310898
FSN:	
Service Activated:	yes
Firmware Version:	SWI9X30C_02.24.05.06 r7040 CARMD-EV-FRMWR2 2017/05/19 06:23:09

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To start configuring the Cellular Interface select the tab Config

Here we simply Admin enable the cellular interface. The profile is preconfigured for either AT&T or Verizon. For AT&T we use the profile2 and Verizon Profile3, in this example its AT&T.

If this is a Verizon Private Network then we can create a new Profile, in this case Profile 3 and fill in the APN etc. Note the cellular interface needs to be Admin Disabled when modifying a profile.

All being well we can look and the Cellular Interface Status, and this should look similar to this.

Cellular : Status

Oper Status	Reg State	Modem State	Signal Strength	Service Indication	Roaming	Home Network	MCC	MNC	Conn. UpTime
Up	Registered	CONNECTED	Excellent	HSDPA+ and HSUPA	no	AT&T	310	410	347

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Ethernet Interface Settings
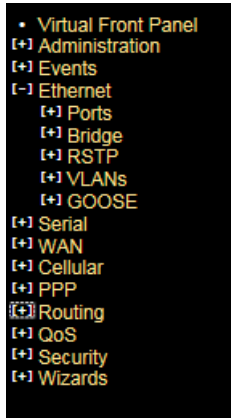
All of the Ethernet Ports are bridged together by default so we can use any port for the connection to the SCADA RTU. Likely we are using port 6 to configure the unit via the Web Interface GUI so we can use Port 1 for the RTU

Also by default all Ethernet ports are ADMIN DISBALED except for port 6. So we need to enable the port we want to use, in this case E1, this is also where you can change Media Negotiation. Sometimes you can run across some older RTU's that do not support Auto Negotiation and so you would hard set the media type to suit the device.

Ethernet : Ports : Settings

Port ID	Port Name	Media Type	Flow Control	FEFI	Admin Status
E1	Ethernet-01	Autoneg	Disabled	Disabled	Enabled
E2	Ethernet-02	Autoneg	Disabled	Disabled	Disabled
E3	Ethernet-03	Autoneg	Disabled	Disabled	Disabled
E4	Ethernet-04	Autoneg	Disabled	Disabled	Disabled
E5	Ethernet-05	Autoneg	Disabled	Disabled	Disabled
E6	Ethernet-06	Autoneg	Disabled	Disabled	Enabled

Reset Settings   Apply Settings

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IP addresses and Routing

We had previously set the IP address of the DX940e to 192.168.2.2/24 but it can be changed from within this sub-menu.

In this simple setup we don't have to use a routing discovery protocol like RIP, BGP or OSPF but we could. If we are not using a routing discovery protocol we do need at minimum need to add a default gateway entry in the static routing table. We do this by adding this entry, the next hop is the far end Cellular IP address, in the routing table IP address table above we can see the address we need to use, in this case 166.130.86.34

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Port Forwarding

To allow a connection from the Cellular Interface to the inside Ethernet ports we use something called Port Forwarding. It can be found within Routing/NAT tabs.
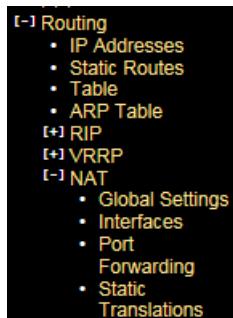
In this example we are going to select the Cell Interface, the Private Address is the address we are going to assign to the SCADA RTU, so the Ethernet ports we previously set the IP address to 192.168.2.2, so the next address .3 we will use for the RTU. We then have to select the Protocol type, either TCP or UDP, and then the associated Port numbers used in the SCADA application.

SCADA Host Connection

So to make the SCADA Host connect we simply launch a UDP session to the Wireless IP address of the DX940e using the port number "1234". So in this case UDP 166.130.86.33 port 1234. The DX940e with the port forwarding we change this address to the internal address 192.168.2.3 port 1234 and the RTU should then be connected to the Host.

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RTU Configuration

In this case we set the RTU IP address to 192.168.2.3 listening on UDP Port 1234. Please also ensure that the default gateway of the RTU is pointing to the DX940e, so in this case the IP address of the Ethernet ports 192.168.2.2

Saving Configurations

Please make sure you SAVE the configurations we have made by hitting the "SAVE" ICON at the bottom right of the WEB screen, the button is highlighted when there are configurations that have not been saved.

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