Overview
The Honeywell X-Series paperless recorder is a perfect solution for remote data logging and viewing of process data. When the recorder is interfaced to a Honeywell XYR 3000 Ethernet modem, it can be used for acquiring data via a wireless Wi-Fi network.

The Honeywell OneWireless R200 network provides Wi-Fi and also, ISA100.11a field sensor wireless network support. In this application, XYR 6000 wireless field transmitters communicate their measured data to a R200 system via a Multinode and Wireless Device Manager (WDM). A Field Device Access Point (FDAP) is used as a field data router for one of the transmitters. The X-Series paperless recorder is connected to an XYR 3000 modem for remotely gathering data from the R200 system via the Wi-Fi network. Modbus TCP is the protocol used for the specific data transfers.

Equipment Needed
1. Wireless Device Manager (WDMS)
2. Multinode (WNMS)
3. Field Device Access Point (FDAP1)
4. XYR 6000 Transmitters (STUW700 or other wireless model)
5. Provisioning Device (HP iPAQ or Dolphin 9700)
6. X-Series Paperless Recorder (Multitrend or Minitrend)
7. XYR 3000 Ethernet Modem and 2.4 GHz antenna (401E)
8. Laptop or Desktop PC
9. Power supplies, Ethernet cables and Ethernet switch (optional)
Connecting and Configuring R200 Infrastructure Devices and XYR 6000 Transmitters

1. Connect the Multinode to a power supply.
2. Connect the WDM to a power supply.
3. Connect the FDAP to a power supply (note we will not be using the FDAP Ethernet connection – the FDAP will be used as a field router).
4. Insert your provisioning device into its docking cradle, and connect the USB cable to the WDM USB port. Power on your provisioning device and run the Provisioning Device software tool.
5. Power-up all devices including the XYR 6000 transmitters.
6. Connect the PC to the Multinode WAN1 Ethernet cable and configure your PC’s local area network (LAN) settings IP address to: 192.168.254.5 Set Network Mask to: 255.255.255.0
7. Open the Web browser on the PC and type the URL for the Multinode in the address bar.  
   Note: default address is https://192.168.254.254  
   Note: for some Multinode versions the IP address may be 192.168.15.1
8. On the Multinode Configuration Tool Page, type the default Username CryptoOfficer and the Password CryptoFIPS, review terms and conditions, check-off box, and click on Sign In.

9. Configure the various Multinode selections. Within the System Configuration WAN menu, change the IP Address to 192.168.0.30. This will match the default IP address subnet of the WDM FDN port. Note that once you apply this modified IP address setting, you will need to go back to your PC network settings and modify your LAN IP address. Recommend setting your PC to 192.168.0.5.
10. Configure the following Multinode settings.

![Multinode Settings](image1.png)

11. Configure Access Point Security settings. Enter a Passphrase security code for the Wi-Fi radio (802.11i), and remember this passphrase for future reference.

![Security Settings](image2.png)
12. Apply all changes, and close out the Multinode Configuration Tool and exit the browser.
13. Remove the Multinode Ethernet connection from the PC.
14. Connect the Multinode WAN1 Ethernet cable to the Wireless Device Manager (WDM) FDN port (note that the connection can also be made through an Ethernet switch, thus allowing easy PC access to the Multinode Ethernet port, for future Multinode configuration changes).
15. Connect the PC to the WDM PCN and configure your PC’s local area network settings IP address to: 192.168.1.5
16. Open the Web browser on the PC and type the URL for the WDM in the address bar.
   Note: default address is https://192.168.1.1
17. Type the User ID and Password, and then click Login.
   Note: default User ID: administrator
default Password: password
18. On the Selection Panel, select the WDM icon and then open the right hand-side property panel. Click on Provisioning, and transfer provisioning keys to your provisioning device. Once complete, remove the provisioning device from the cradle, and individually provision the Multinode, FDAP and XYR 6000 transmitters.
19. Once all devices have joined the network, on the Selection Panel, expand the WDM icon and select Modbus.
20. Open the Property Panel on the right hand side and expand **Configuration**.

21. Under **Interface**, select **Modbus TCP Interface** and set the **Modbus TCP Options TCP Port** to match the paperless recorder port setting (default typically at 502). **Byte Order** should be specified as **BigEndian**. Save changes by clicking on the **Apply Changed Values** icon at the top of the Property Panel.
22. Close **Configuration** and open **Holding Register Table**. These registers are used to configure data from inputs of field devices and their diagnostic status.

For this example, channel 1 temperature PV values and battery voltage levels from two individual transmitters will be assigned to registers 2 thru 8:

- Register 2 will hold transmitter tag HON1112090011 battery voltage value.
- Register 4 will hold transmitter tag HON1112090011 channel 1 PV value.
- Register 6 will hold transmitter tag HON1112090013 battery voltage value.
- Register 8 will hold transmitter tag HON1112090013 channel 1 PV value.

Enter the following text into the **Holding Register Attribute** table:

Register 2:     HON1112090011.V_POWER
Register 4:     HON1112090011.CH01_AI.PV.VALUE
Register 6:     HON1112090013.V_POWER
Register 8:     HON1112090013.CH01_AI.PV.VALUE

**Note:** Transmitter parameters are defined to registers with respective device tag names and channel names

23. Save changes by clicking on the **Apply Changed Values** icon at the top of the Property Panel.
**XYR 3000 Wireless Ethernet Modem 401-E Configuration**

In this application, the XYR 3000 Model 401-E is used in a client/bridge configuration as a transparent Ethernet link to the paperless recorder.

1. Connect the Ethernet cable between your PC and the XYR 3000 Model 401-E.
2. Set the factory default dipswitch on the bottom of the 401-E to the **SETUP** position.
3. Power-up your PC and the 401-E.
4. Configure your PC Network settings Local Area Network IP address to 192.168.0.5 with a subnet mask of 255.255.255.0.
5. Open the PC Web browser and enter the 401-E default IP address 192.168.0.1XX where XX is the last two digits of the serial number of the 401-E (found on the back of the 401-E).

   **Note:** The 401-E built-in web server can only be accessed using Explorer version 7 or greater.

6. When you first connect your Web browser will issue a warning – proceed to the configuration web page.
7. Enter the defaults for
   - **Username:** user
   - **Password:** user
8. Select **Network** in the right-hand pane of XYR 3000 web configuration screen and set **Operating Mode** to **Client**, **Device Mode** to **Bridge**, and ensure wireless and wired (Ethernet) interface ports have the same IP address (device is operating as a bridge). Set **Radio Encryption** to **WPA2** to match Multinode setting, and **Save Changes**.
9. Select **Security** and enter the **WPA Passphrase** that was used in configuring the Multinode passphrase.

10. Select **Radio** and set configuration as shown below.
11. Set XYR 3000 default dipswitch on the bottom of the 401-E to the **RUN** position.

12. Click on Save Changes and Reset. The webpage will display a message indicating that details are being written to flash. Wait for the XYR 3000 to reboot before removing power.

13. Remove the Ethernet cable that is connected between the XYR 3000 and the PC from your PC, and re-connect to the X-Series Multitrend recorder Ethernet port.

14. Re-connect your PC to the WDM PCN and configure your PC’s local area network settings IP address to: **192.168.1.5**

15. Open the Web browser on the PC and type the URL for the WDM in the address bar.
   
   Note: default address is [https://192.168.1.1](https://192.168.1.1)

16. Type the **User ID** and **Password**, and then click **Login**.
   
   Note: default User ID: *administrator*
   
   default Password: *password*

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**X-Series Multitrend SX Paperless Recorder Configuration**

In this application, the X-Series Multitrend SX paperless recorder is set up as a Modbus Master using the TCP protocol for communications with the WDM. This requires setting up the recorder in three specific areas of the recorder’s configuration – Communication, Pens and the Screen for displaying the data.

**Communications Configuration for Recorder**

1. For the first step, the TCP/IP setting for the recorder needs to be established so it resides on the same network as the WDM, in this example we are using an address of **192.168.0.2** (Note: the recorder’s IP address must be unique from the other devices on the network). This is set by going to **Edit Setup>Comms>TCP/IP Settings**; the TCP/IP Settings screen is shown below and the IP Address is entered on this screen. We have also set this to be a **Static IP** address to prevent the address from being changed.
2. The next step is to set up the Recorder as a Modbus Master talking with the WDM. This is accessed from the **Comms>Services** screen shown above. Select **Master** to configure the recorder as the Modbus Master. Select one of the Slave devices to configure the settings needed to communicate with the WDM. In this example, **Slave 1** was chosen. On this screen you would also set the polling rate for the recorder to update the recorder data, 5 sec. was used.

![Modbus Configuration Screen](image)

3. Setting up the Slave device requires knowing a couple of pieces of information from the WDM (Slave 1). This includes a **Modbus ID** (if available, otherwise give it a unique ID between 1 and 255), the **IP Address** of the WDM (this was set to 192.168.1.1) in the WDM, the **Protocol** (for the WDM, this is **Big Endian** which for the recorder means **Modbus FPLB**). The recorder configuration screen for this is shown below.

![Slave Configuration Screen](image)

4. The next step is to set up the actual communications transaction that will get the data from the WDM and bring it into the recorder. This is done by selecting the **Transaction** button. As part of the reading the Modbus registers, more than one Modbus parameter can be read at a time, the recorder allows you to do this as either reading a number of consecutive registers or you could read each parameter individually. Transaction 1 was set up to read 4 consecutive registers, while Transactions 2, 3, 4 and 5 are reading the same 4 registers but doing this individually. The first is more efficient from a communications perspective; however, both are shown in the example to demonstrate how you might read registers that are not consecutive.

![Transaction Configuration Screen](image)
5. To set up the transaction, you need to know something about the parameter being read by the recorder. These include the following:

- **Direction** of the message, is it an **Input** (IN) to the recorder or an **Output** (OUT) being sent from the recorder. This is an Input to the recorder so it is set to “In”

- **Command** - (Coil Status, Input Status, Holding Register, Input Register); this will depend on what is being read and how it was set up in the WDM. This was set up in the WDM configuration as a “Holding Register”.

- **Data Type** – (Signed 16 bit Integer, Unsigned 16 bit Integer, IEEE Float); this depends on the type of data being read and whether it is an Integer value or IEEE Floating point value. The data being read is an IEEE float so it is set to “IEEE float”

- **Decimal Starting Address** – this configuration item is determined by the Modbus address of the register where the value being read is located. If you go back to the Modbus Holding Register Table shown on the browser window for the WDM (See step 7 under the WDM Configuration section above), you will see that the first parameter of interest was set up in Register 2 of the WDM even though it could have been set up for Register 0. Register 2 was selected because the first addressable register for the recorder is Register 1.

- **No. of Items** – this number is determined by how many items you will be accessing from consecutive Modbus registers. In this example, we are getting data values from 4 consecutive WDM Modbus registers (Battery Voltage XMTR 11, PV XMTR 11, Battery Voltage XMTR 13, PV XMTR 13). The recorder defines these as SCV (Slave Comms Values) and uses this terminology when assigning them to a Pen for graphing. The numbers come from the Slave Number, the Transaction Number and the Item. For this example, the Slave is **Slave 1**, the Transaction is **Transaction 1**, and there are 4 items, **Items 1, 2, 3, and 4**; so for our four values that will be assigned to the Pens in the recorder, these parameters will be:

  - SCV[1,1,1] - Battery Voltage XMTR 11
  - SCV[1,1,2] - PV XMTR 11
  - SCV[1,1,3] - Battery Voltage XMTR 13
  - SCV[1,1,4] - PV XMTR 13

**Assigning Communication Values to Pens**

1. Once the Modbus communications functions are set up, the next step is to assign these values to individual Pens for display and recording purposes. To set up a Pen, select **Menu>Configure>Setup>Edit>Pens**; you should see the screen displayed below.
2. Select the desired Pen to configure; you can display one Communications Value per Pen so for our example, you will need to set up 4 different pens. We selected Pens 57, 58, 59 and 60, which are virtual pens in the recorder, but you can select whichever is best for your recorder. Enable the Pen, configure a specific Tag Name if desired. Pen Description, for doing communications values either Full Maths or Math Scripting is required (requires Credits), set the Scale units, enable Logging and set any Alarms or other Pen related parameters in the Pen set up function. The Edits Math function is where you enter the SCV values discussed above; the expression SCV[1,1,1] is entered, which causes the Battery Voltage for XMTR 11 to be displayed on this pen.

3. Repeat the other 3 pen set ups to assign those SCV values to the other pens. The Edit Maths expression for these other pens will be:
   - **Pen 58** - SCV[1,1,2] - PV XMTR 11
   - **Pen 59** - SCV[1,1,3] - Battery Voltage XMTR 13
   - **Pen 60** - SCV[1,1,4] - PV XMTR 13

4. The final step is to set up the display screen for the Pens. For this, select **Menu>Configure>Layout>Edit>Screens>Screen n (n = 1, 2, 3, etc.).** Select the parameters for how you want the display to look; these include Type, Orientation, Scale Pointers or Bars and the Pen numbers to be displayed. Once configured, you can go to the programmed screen and see the results. In this example, the PV and Battery voltage for the two transmitters is being displayed and recorded in the Multitrend Recorder as shown in the screen below.