AMI Training: Hardware Troubleshooting 101 and Field Tool Training

May 14th, 2024

Powering Business Worldwide

Speaker Introductions

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So…your meter isn’t working like it’s supposed to…

…you’re missing reads…

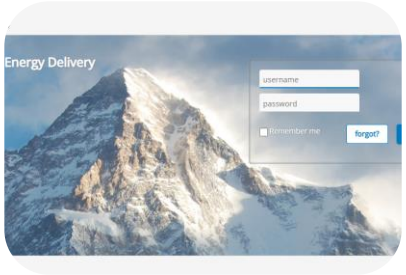
…billing is tomorrow…

What do you do?

Step 1: Don’t Panic

Troubleshooting Toolkit

Field Tool



Yukon

Network Communications

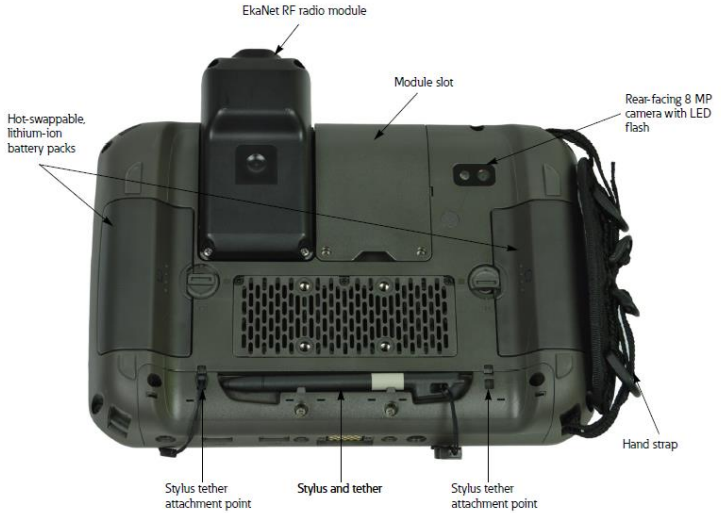
Visual Cues

Frequently Asked Questions:

- Why is this meter not reading?
  - Is there an issue with the device?
  - Is there an outage?
- Why am I seeing this Infrastructure Warning?
  - Why is this gateway disconnected?
- This water node was installed this morning. Why is it not in Yukon?
- Others?

Field Tool/Network Runner

Network Scout – Yuma Tablet



Direct RF Communication To Nodes Using Field Tool

Gateway

Relay

Electric Meter

Water Node

Gas Node

LCR

Network Runner Uses

- Gateway Commissioning (Required)
- Water and Gas Node Commissioning (Required)
- Field Troubleshooting
  - Electric Meters
  - Load Control Receivers
  - Water/Gas Nodes
  - Infrastructure – Gateways and Relays

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Gateway Commissioning Procedure

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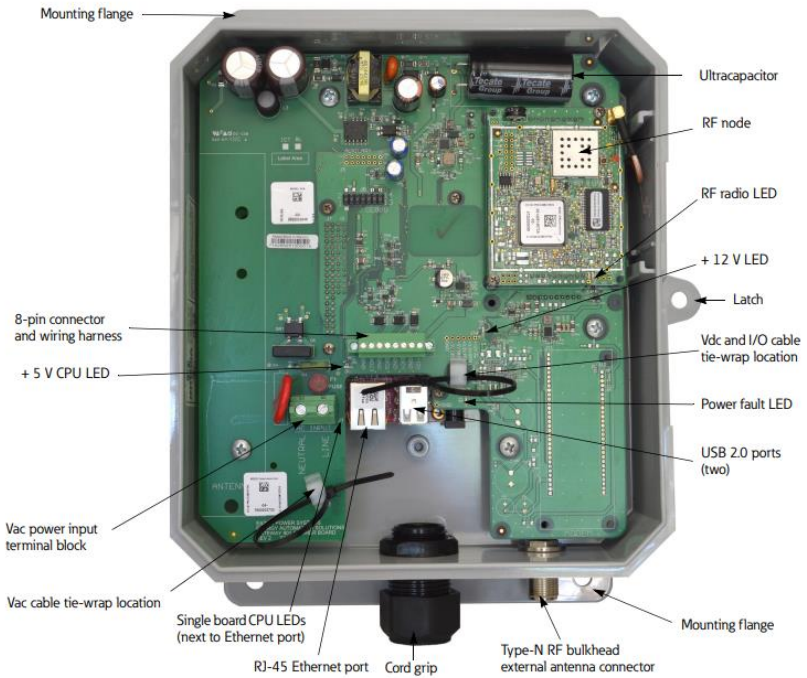
Gateway 801

Figure 4. Gateway 801 radio frequency gateway



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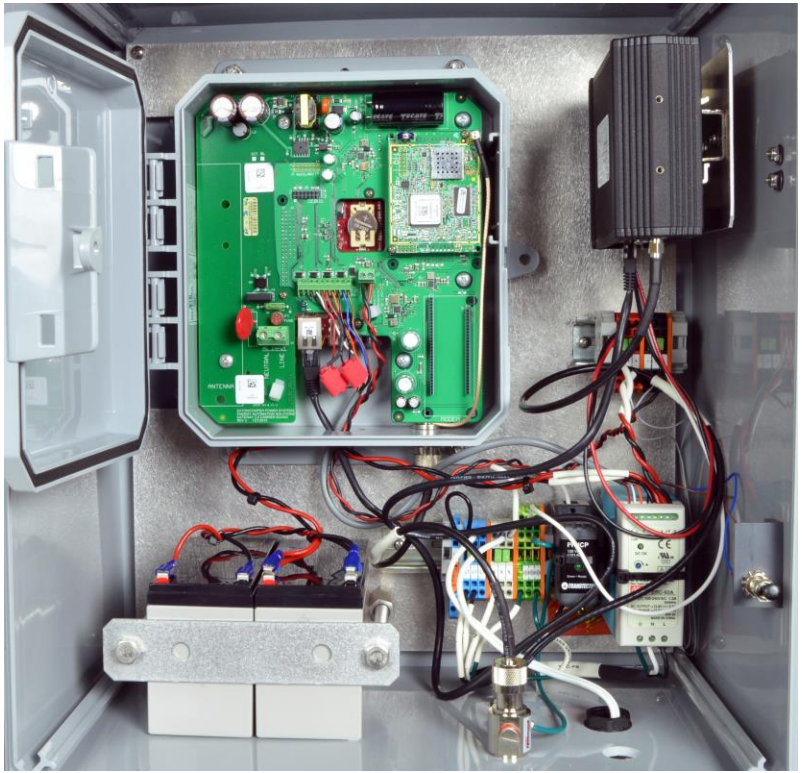
Gateway, Backhaul, and Enclosure



Typical Gateway Installation

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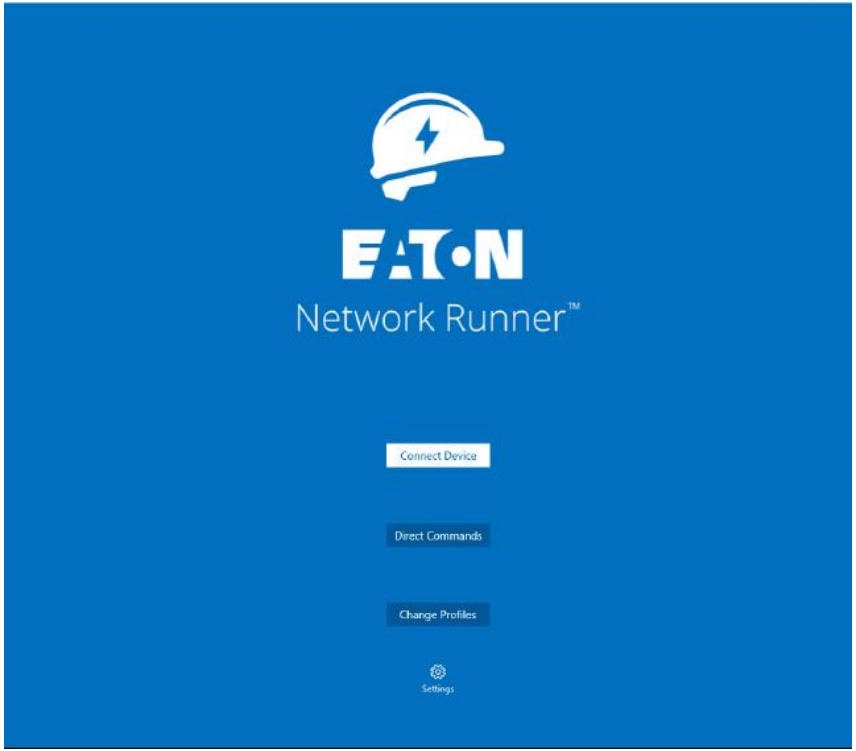
Gateway Commissioning: Required

- **Required** process when a new gateway is installed
- Obtain IP settings and configure gateway to these settings using field tool

Gateway Commissioning Procedure

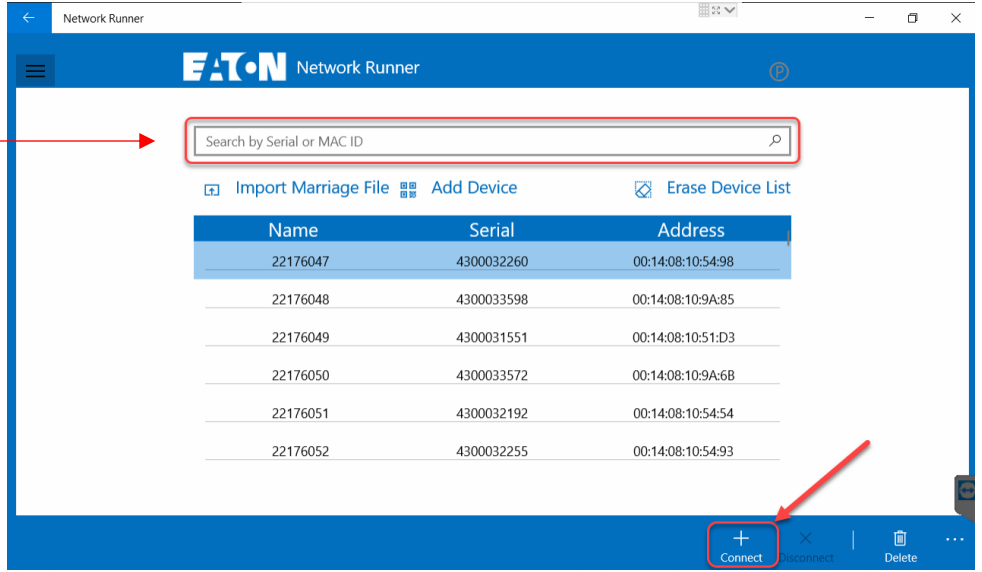
- Open the Network Runner program
- **Connect Device**



Gateway Commissioning Procedure

- Locate MAC Address on device with QR Code

Manually Type the MAC Address in the Search Window, if device is in the list, it will auto-populate

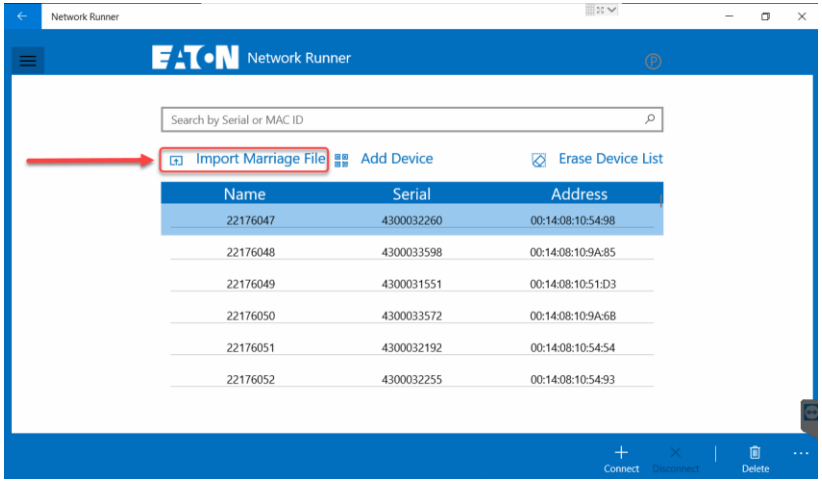


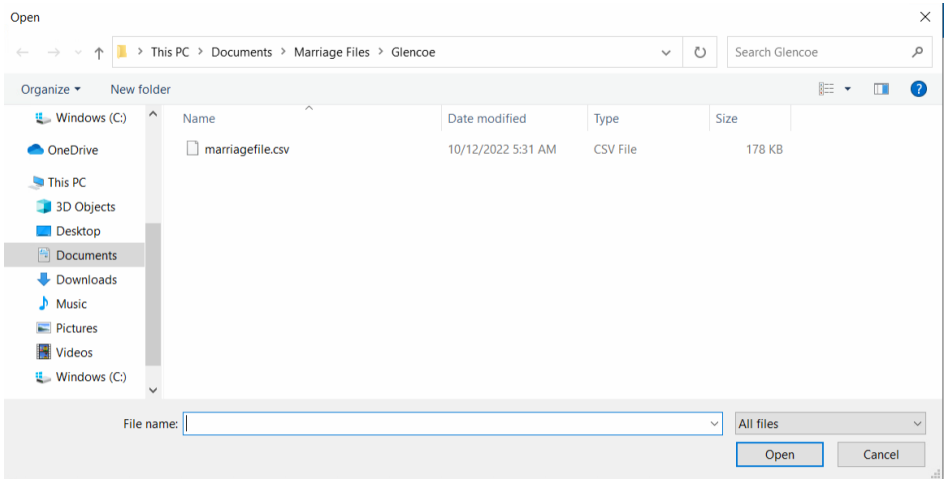
- Click/Select +Connect Button

Gateway Commissioning Procedure

- Click/Select Import Marriage file:

  A Marriage file is generated from EATON which lists all the RF Node Serial Numbers with their MAC Addresses for your Network/Project. Once imported the list will be populated and displayed as below:

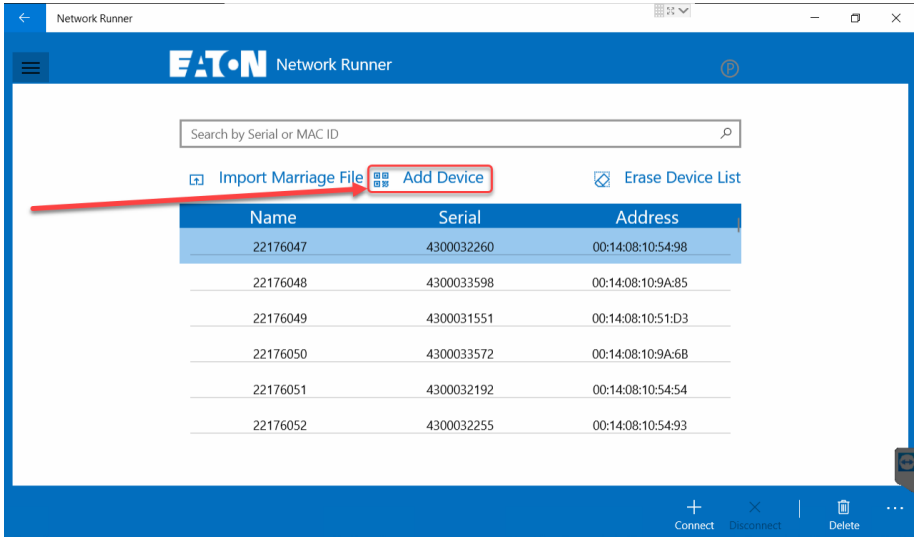




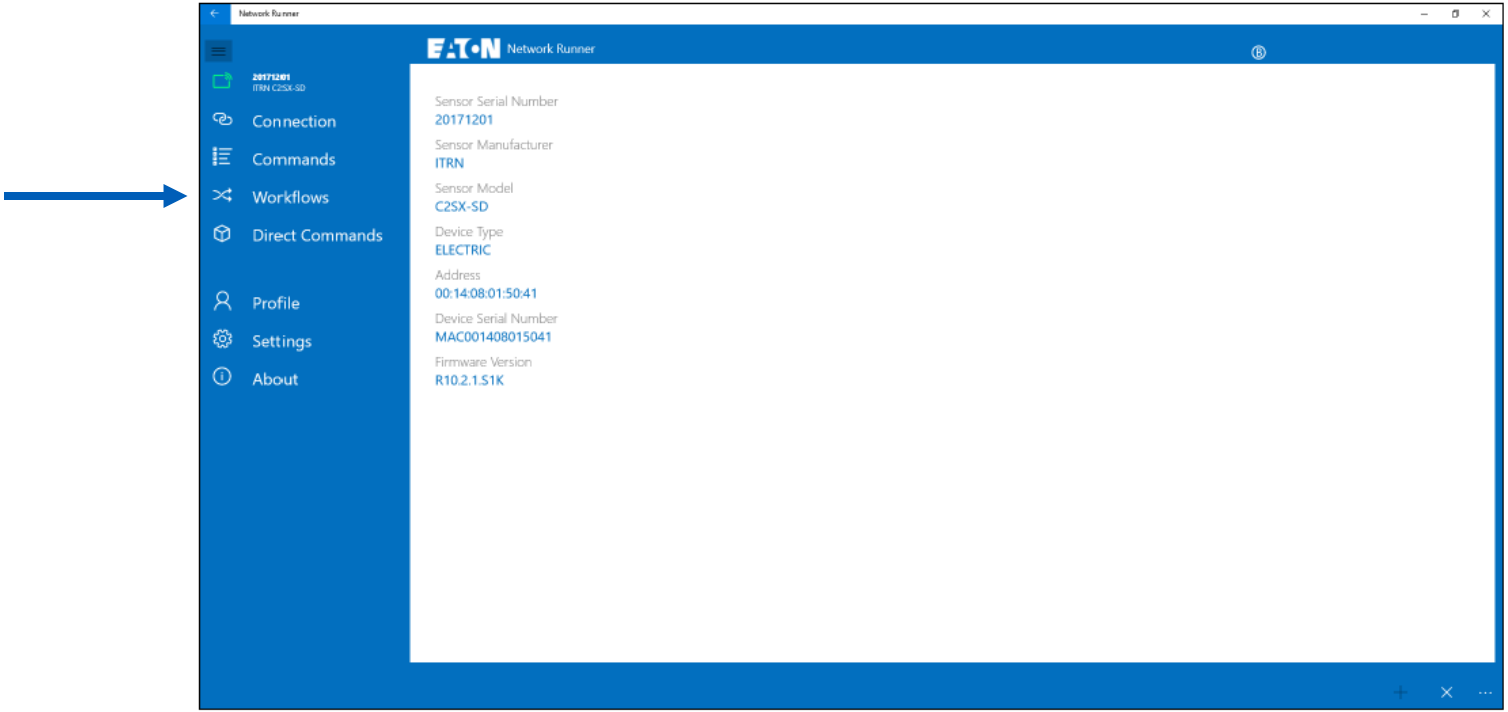
Gateway Commissioning Procedure

- Click Select Add Device

  Camera Application opens. Use rear camera to scan QR Code and import MAC Address.



Gateway Commissioning Procedure



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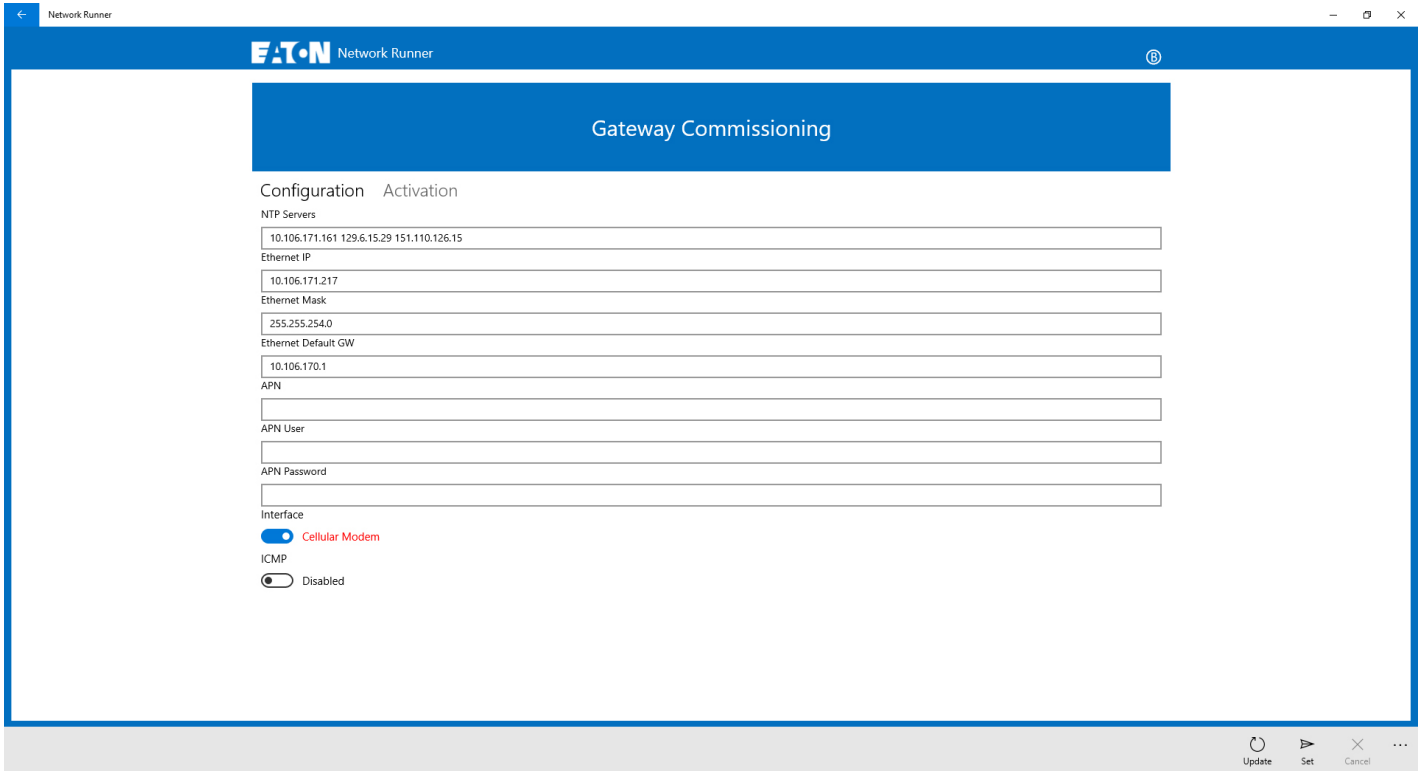
Gateway Commissioning Procedure



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Let’s Practice!

Exercise 1: Gateway Commissioning

1. Connect to a gateway using the field tool
   - Use either the camera or QR app reader to capture the MAC address
2. Capture the current IP settings on the gateway

Gateway Troubleshooting

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Common Gateway Questions and Issues

1. Gateway is Disconnected in Yukon
2. Gateway is Connected in Yukon, but it shows that there are 0 (or very few) devices connected
   - Read Rate has also decreased
3. Others?

1. Gateway is Disconnected in Yukon

Use Field Tool to attempt to communicate directly to the gateway in the field

- If NO-Cycle Power (*capacitor wait times) then attempt to communicate again using Field Tool.
    - If NO-Node is defective, request RMA from EATON.
- If YES-then communications are established, this tells us that the RF module & Node are working and communicating
    - Stand 25 feet away from gateway and attempt communications again
    - Check backhaul and connectivity

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2. Gateway is Connected in Yukon

Use Field Tool to attempt to communicate directly to the gateway in the field

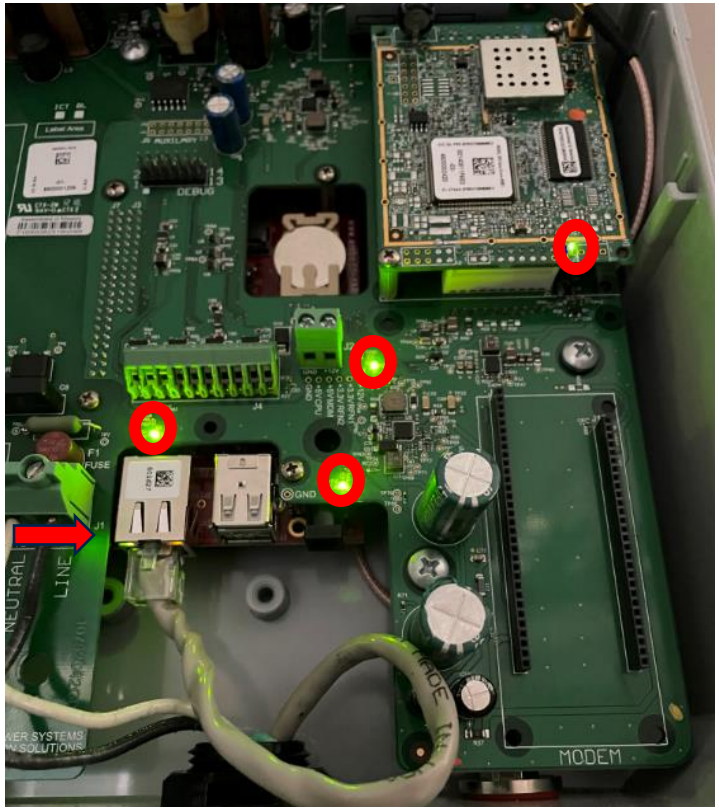
- If NO-Cycle Power (*capacitor wait times) then attempt to communicate again using Field Tool.
    - If NO-Node is defective, request RMA from EATON.
- If YES-then communications are established, this tells us that the RF module & Node are working and communicating
    - Stand 25 feet away from gateway and attempt communications again – could be antenna

Gateway Lights

Confirm Lights on Radio Board

1. Flashing Red Light (Bad)
2. Flashing/Solid Green (Good)
3. Flashing Blue Light (Good)

- Radio LED
- 12 V Carrier Board LED
- 5 V CPU & Modem LED
- Processor Board LED
- Ethernet Port



Bonus Exercise: Gateway Troubleshooting

- What are the lights on the PSEC gateway?

Water/Gas Node Overview

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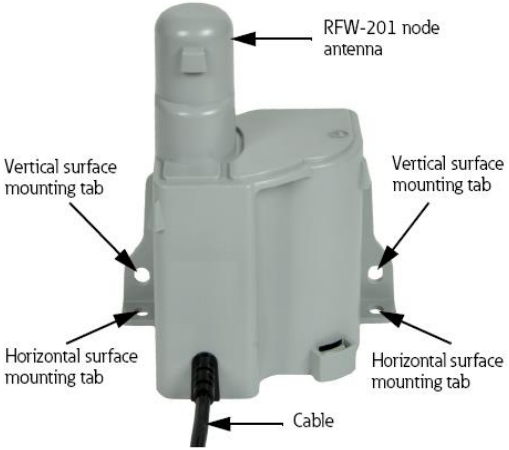
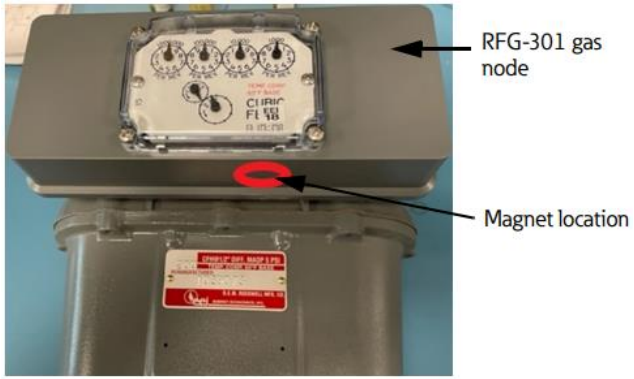
Water/Gas Node Overview

- Supported on the RF Network
  - Captures data from the water/gas register
  - Communicates to Yukon through electric meters, relays, and LCR's (Default Reporting: Every 24 hours)
  - Battery Life: ~8 years (w/ default reporting)
- Field Replaceable Battery
  - If no communication after 30 days, reverts to ship mode
- Flexible Installation (Water Node)





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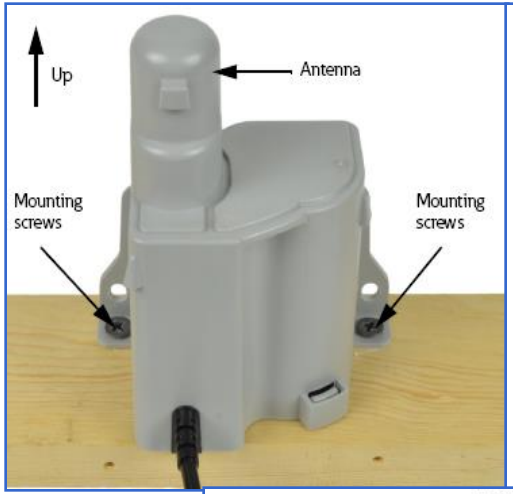
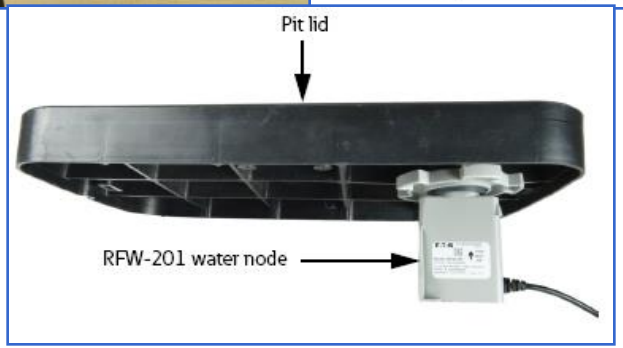
Water Node Mounting Options

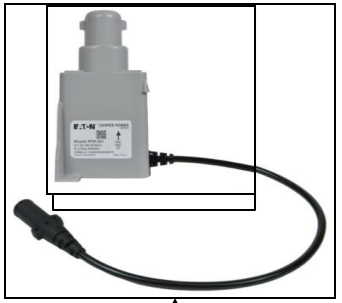
- Wall-mount
  - Recommend as high as possible in basements, typically near floor joists
- Surface-mount
  - Mount on top of a surface
- Pipe-mount
  - Wire tie it on to pipe in basement as high as possible
- Pit-mount
  - Stake-mount
  - Lid Lock Kit
    - Through lid
    - In lid
      - Both support optional spacer





Connector Option

- Gel Cap Connector (used for Sensus Connections)
  - Can be used with burial pods as well
  - Universal Support
- Itron-Nicor Connection
  - "Plug-n-Play" Quick Connection



Itron-Nicor Connection

Water/Gas Node Commissioning Process

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Water Node Commissioning

- Water nodes arrive in ship mode to conserve battery life
- Commissioning: pairs water node with water meter register/encoder
  - Wakes up battery and takes node out of ship mode

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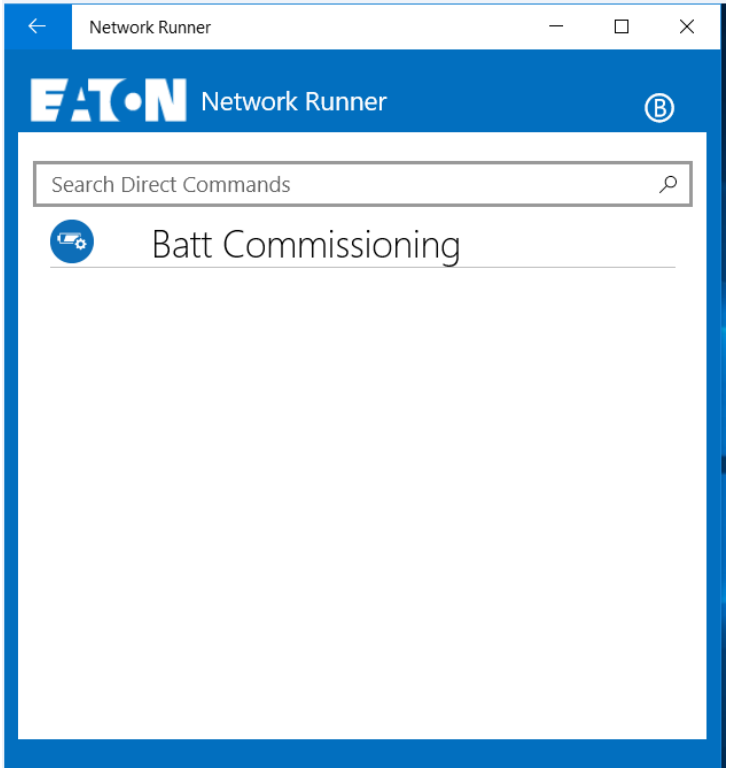
Water/Gas Node Commissioning Process

- Start the Network Runner application by selecting the “hardhat” icon.
- The Network Runner landing page is displayed.
- Select the **Direct Commands** button

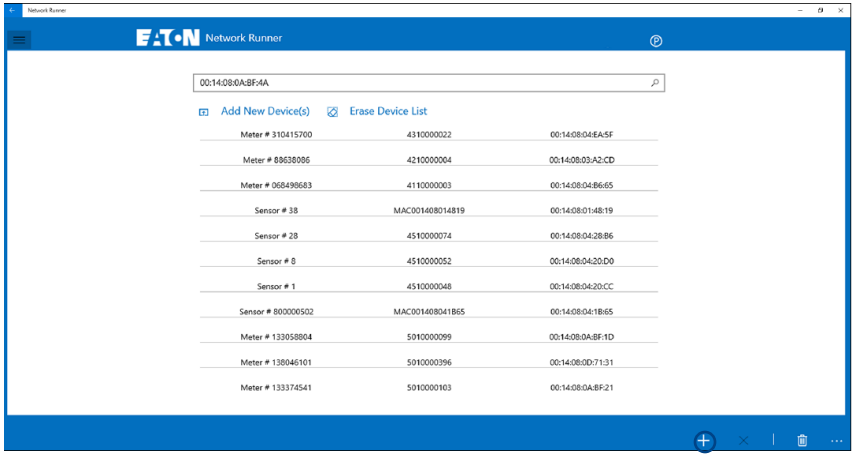
Water/Gas Node Commissioning Process

- Select the **Batt Commissioning** command.



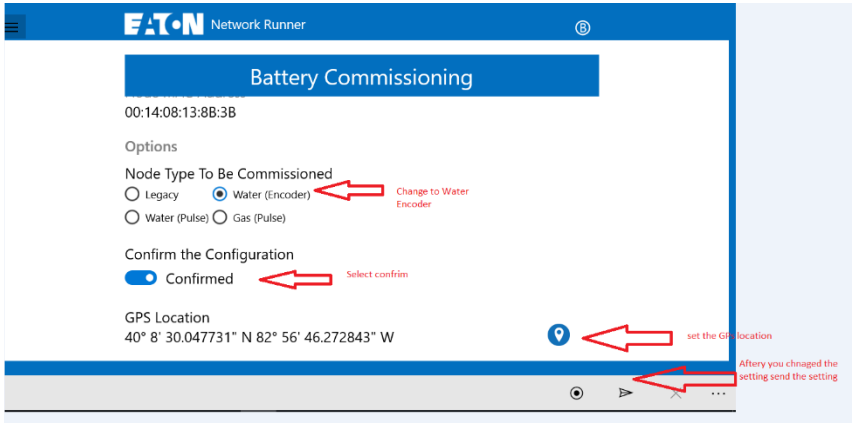
Water/Gas Node Commissioning Process

- Enter the serial number of the node
  - Serial Number – Marriage File
  - QR Code Reader – MAC Address
- Select the **Set Target** (circle) button at the bottom right corner.



Water/Gas Node Commissioning Process

- RFW-201 Water Encoder
- Select node type under **Node Type To Be Commissioned**.
- Change the toggle switch to **Confirmed**.
- To set a GPS location for the node, select the blue GPS coordinates button.
- When you have completed these steps, place your **magnet** on the bottom of the node to activate the battery
- Select the **Start** (triangle) button.



Water/Gas Node Commissioning Process

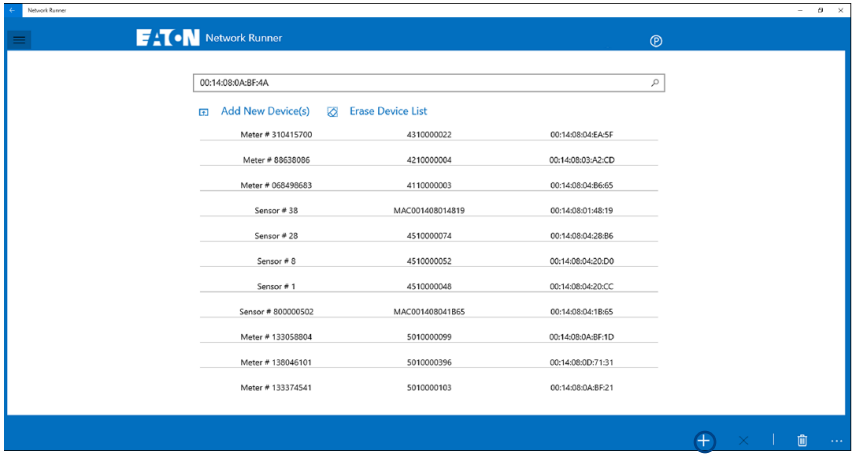
- If the process is successfully proceeding, the **P** or **B** icon in the top right corner of screen will turn green for a few moments.
- Upon a successful commission, you will see a Complete! Message
- Optional: verify that the battery is no longer in ship mode and the serial number for the node is correct.
  - Best practice for first few nodes that are commissioned

Optional: Check Ship Mode

- Start the Network Runner application by selecting the “hardhat” icon.
- The Network Runner landing page is displayed.
- Select the **Connect Device** button

Optional: Check Ship Mode

- Enter the serial number of the node.
- Select the **Connect** (+) button at the bottom right corner.
- If the process is successfully proceeding, the **P** or **B** icon in the top right corner of screen will turn green for a few moments.
- Upon a successful commission, you will see a Complete! message



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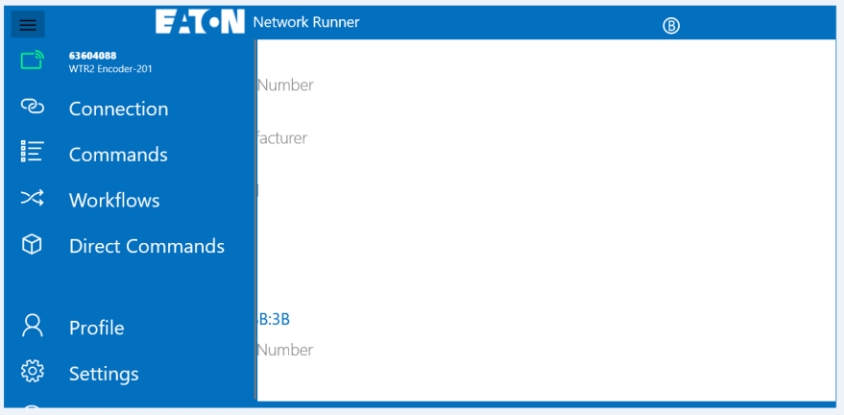
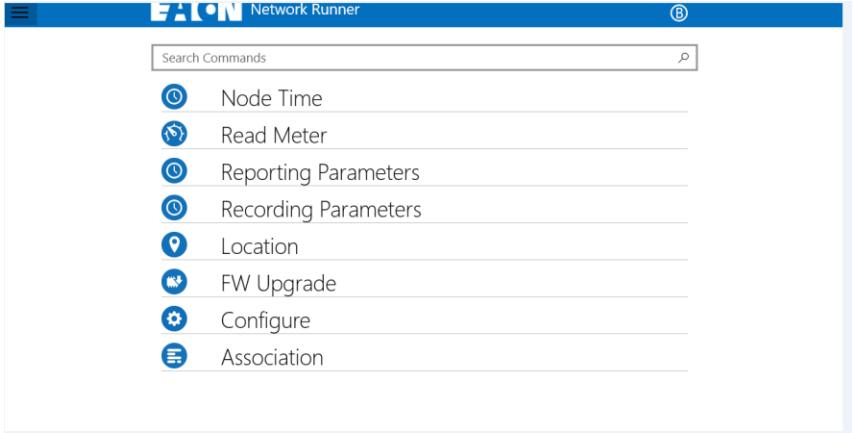
Optional: Check Ship Mode

- Once connection is established, navigate to the **menu** button in the top left corner and select **Commands**.



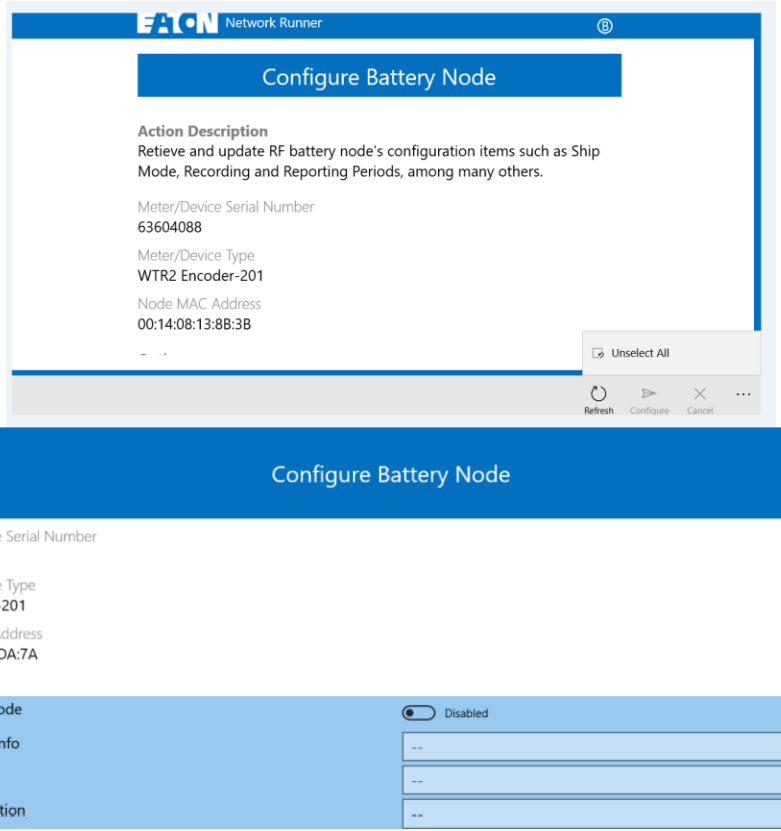
Optional: Check Ship Mode

- Select **Configure**



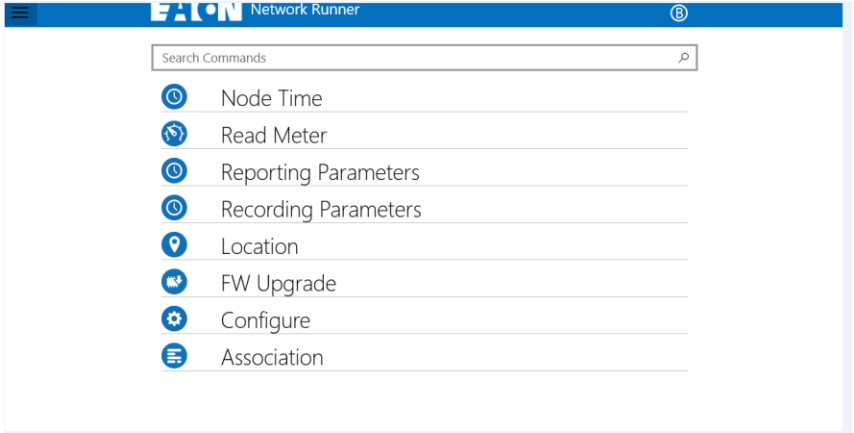
Optional: Check Ship Mode

- Select Refresh
- Verify that the serial number is correct, and the node is no longer in ship mode.
- Make sure ship mode is **Disabled** and serial number is updated
- Optional: verify a meter reading
  - Best practice for first few nodes that are commissioned



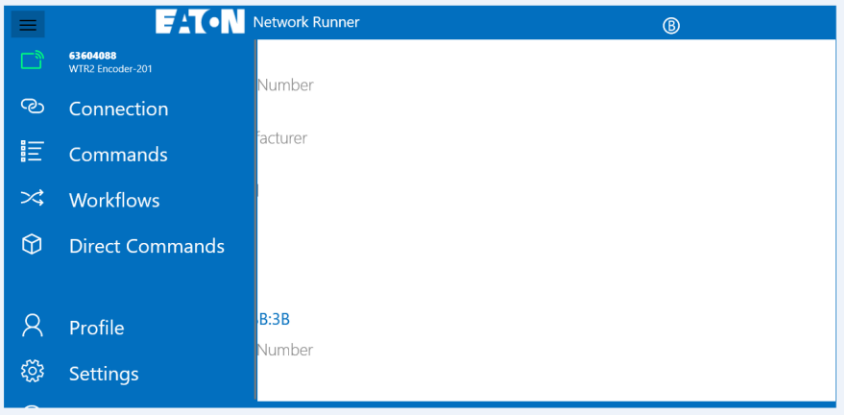
Optional: Read Meter

- Select **Read Meter**



Optional: Read Meter

- Navigate to the **menu** button in the top left corner and select **Commands**.



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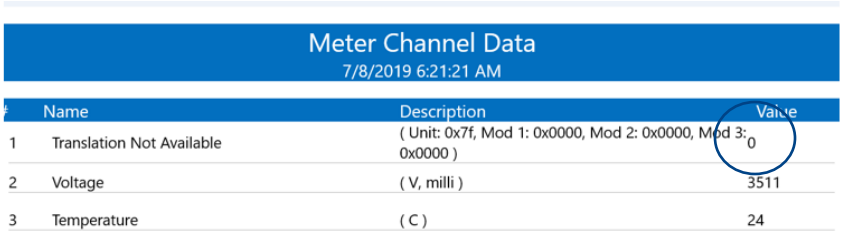
Optional: Read Meter

- The circled reading should equal reading on meter register

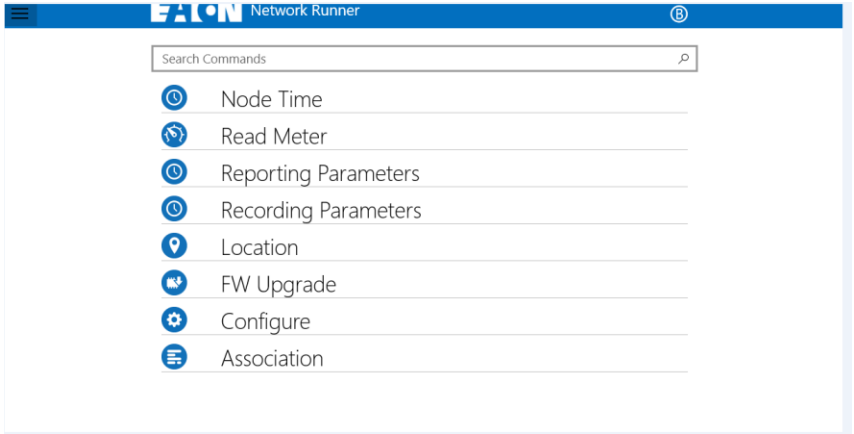


Meter Channel Data
7/8/2019 6:21:21 AM

#	Name	Description	Value
1	Translation Not Available	(Unit: 0x7f, Mod 1: 0x0000, Mod 2: 0x0000, Mod 3: 0x0000)	0
2	Voltage	(V, milli)	3511
3	Temperature	(C)	24

Water Node Commands

- **Read meter**
- Reporting & Recording parameters
- **Location**
- Firmware upgrade
- Configure
- **RSSI***
- Association



Let’s Practice!

Exercise 2: Water Node Commissioning

1. Connect to a water node
2. Perform the water commissioning process
3. Read the water node
4. Verify that the device is not in ship mode
5. Put device back into ship mode

Water Node Best Practices and Troubleshooting

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Water Deployment Best Practices

- Water Commissioning Process
  - Verify node serial number and ship mode is disabled
  - Capture a meter reading
- Install nodes in areas with nearby electric meters, relays, or LCR's
- Install water node as high as possible
- Do NOT force connector if quick connector is supplied
- Ensure node antenna is upright
- Ensure node is securely fastened on pit lid
- Bring your magnet

Common Water Node Questions and Issues

- Why is this water node not reporting in Yukon?
- Others?

Water Node Troubleshooting Checklist

- If a water node isn't reporting in Yukon:
  - Can you connect using the field tool?
    - If yes, can you capture a meter read and does it match the water meter?
    - If yes, is the water meter in ship mode?
    - If no, see below
  - Can you connect to electric meter nearby?
    - What is RSSI Signal Strength?
  - Is the node upright and connected to the register?
  - If the node is in a basement, is it in the highest location possible?

Water Node Troubleshooting - Yukon

Point Name ↑	Attribute	Value/State	Date/Time	Point Type	Point Offset
Battery End Of Life	Battery End Of Life	False !	01/01/2010 12:00:00	Status	90
Battery Voltage	Battery Voltage	3.670 Volts	05/12/2024 02:00:00	Analog	5

< 3.0V; Very Low Battery
3.0 – 3.2V; Low Battery

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Water Node Troubleshooting - Yukon

Home / Support

☆ Support

Support Pages

Battery Node Analysis
Database Migration
Device Definitions
Error Codes
Event Log
File Export History
Localization Helper
Log Explorer
Manage Indexes
Route Usage
System Health
System Info
System Performance Metrics
Third Party Libraries
Thread Dump

Manuals

Yukon Manuals (Portal)
Yukon 9.4 What's New
Yukon9.4AMIUserManual
Yukon9.4DRUserManual

Contact Customer Support

Email: EAS-Support@Eaton.com

Phone: 1-800-815-2258
Hours: Mon-Fri 8:00 AM to 4:30 PM Central

Support Website
Energy Automation Solutions RMA

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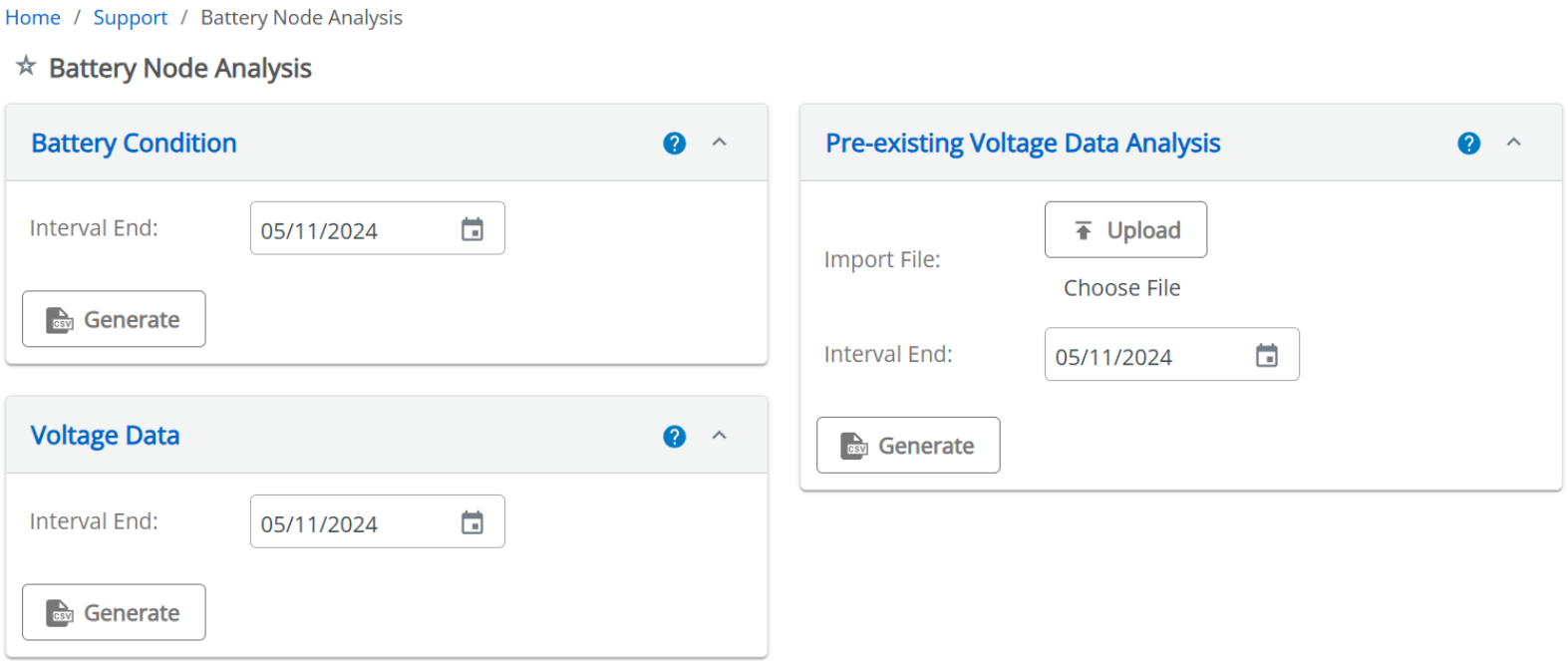
Water Node Troubleshooting - Yukon



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Water Node Troubleshooting - Yukon

Device Name	Meter Number	Serial Number	Device Type	Depletion Category	High Sleeping Current Indicator	Most Recent Reading	UOM	Date	Time
[redacted]			RFW-201	Normal	FALSE	3.696	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.691	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.696	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.698	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.692	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.694	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.68	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.691	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.692	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.678	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.691	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.68	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.687	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.676	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.683	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.674	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.689	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.683	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.689	volts	5/12/2024	0:00
			RFW-201	Normal	FALSE	3.694	volts	5/12/2024	0:00

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Electric Meter: Field Tool Commands and Troubleshooting

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METERING/LCR COMMANDS

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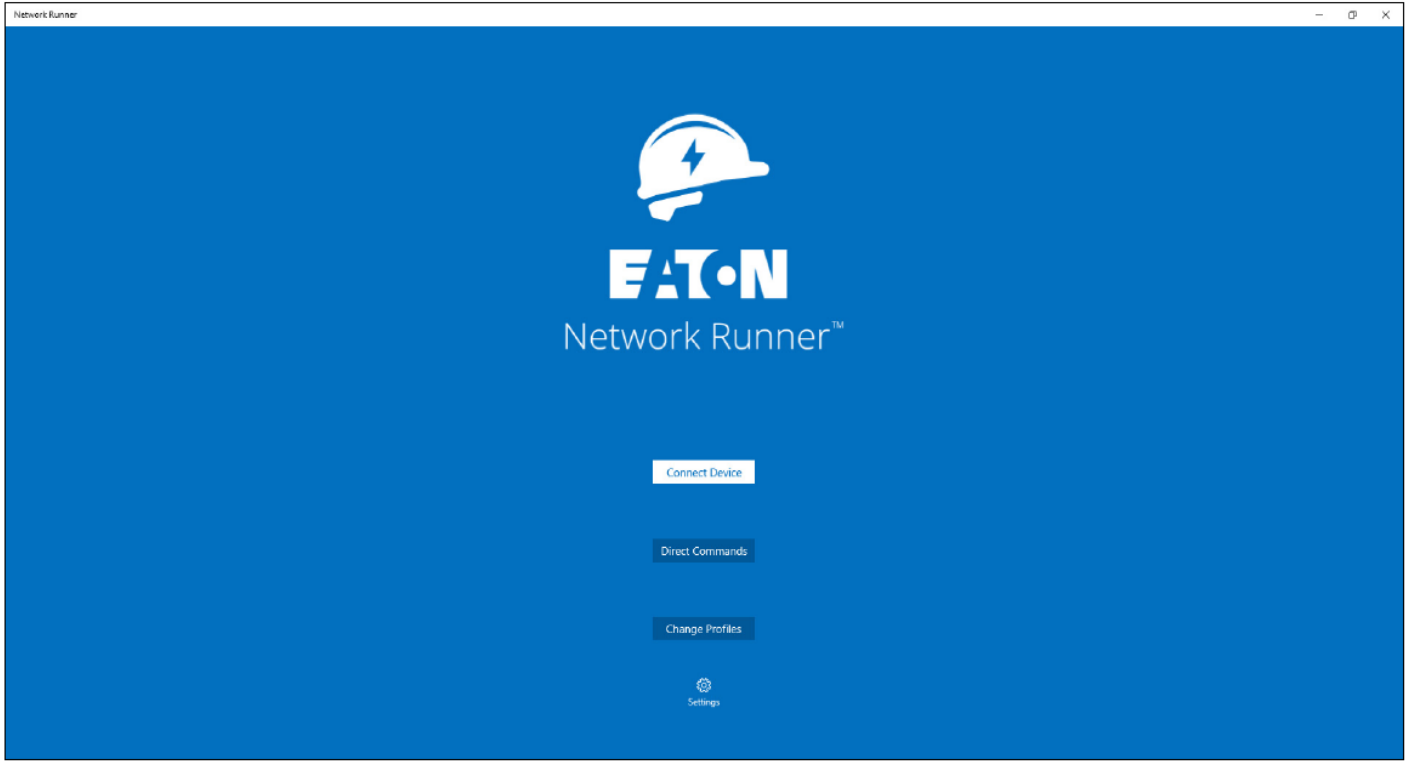
No Configuration Required at Installation



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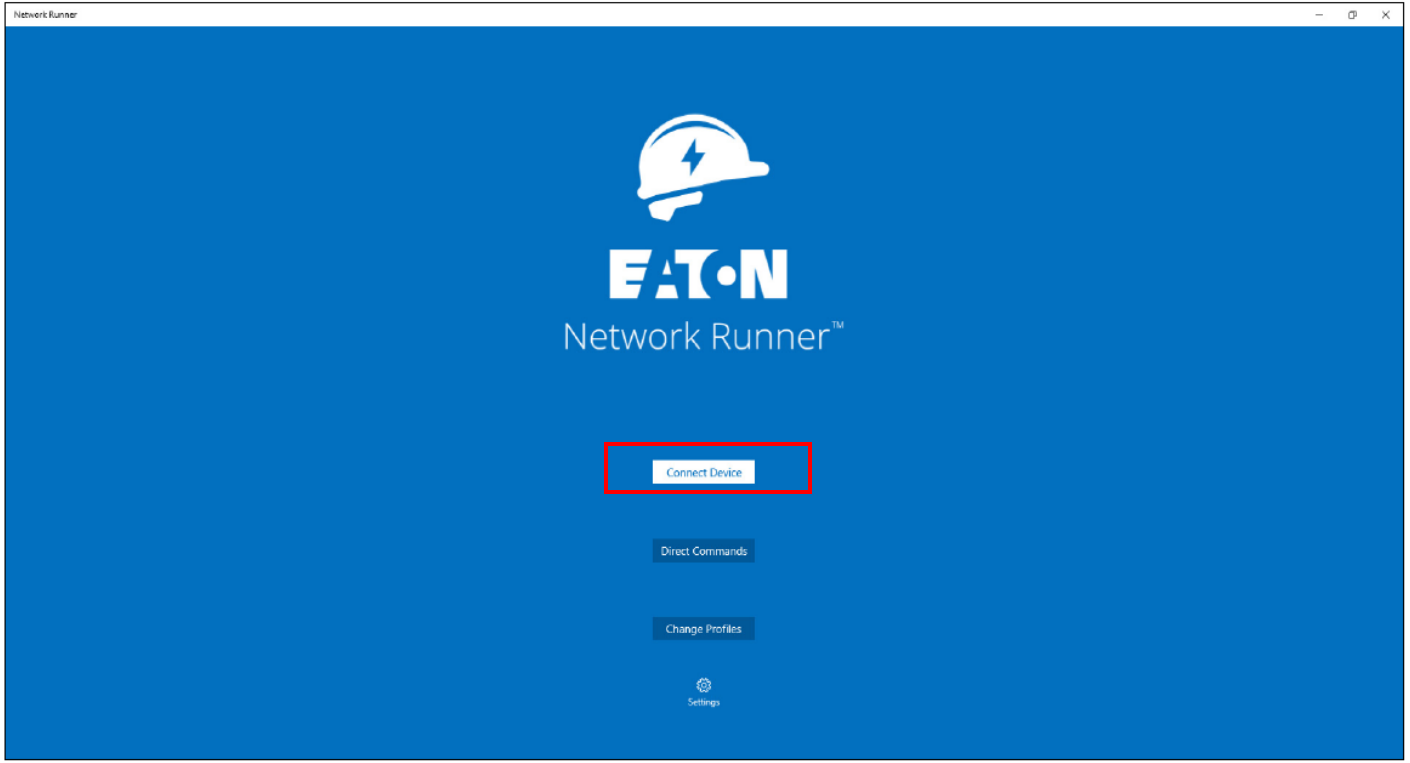
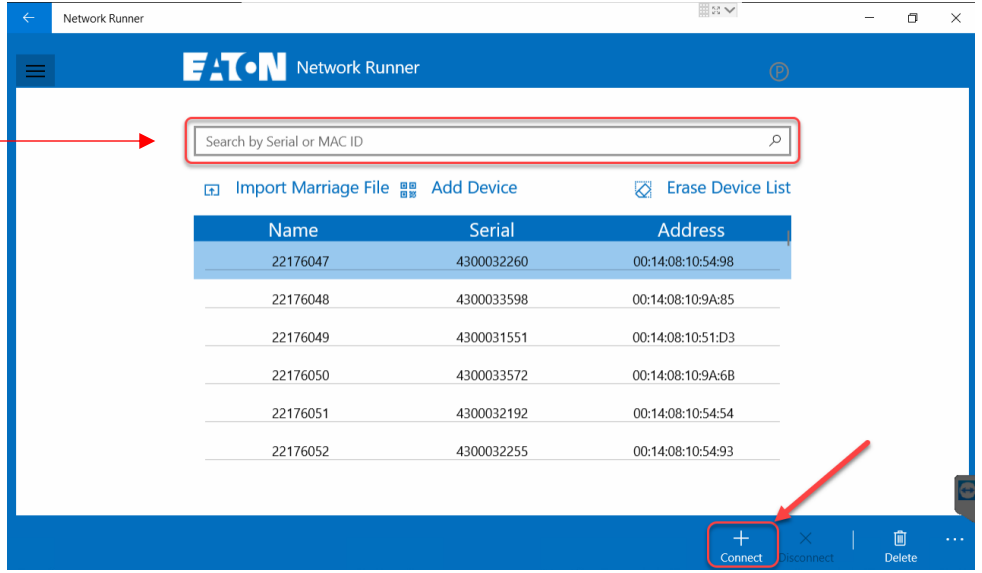
Connecting to a Device



Connecting to a Device

- Locate MAC Address on device with QR Code

Manually Type the MAC Address in the Search Window, if device is in the list, it will auto-populate

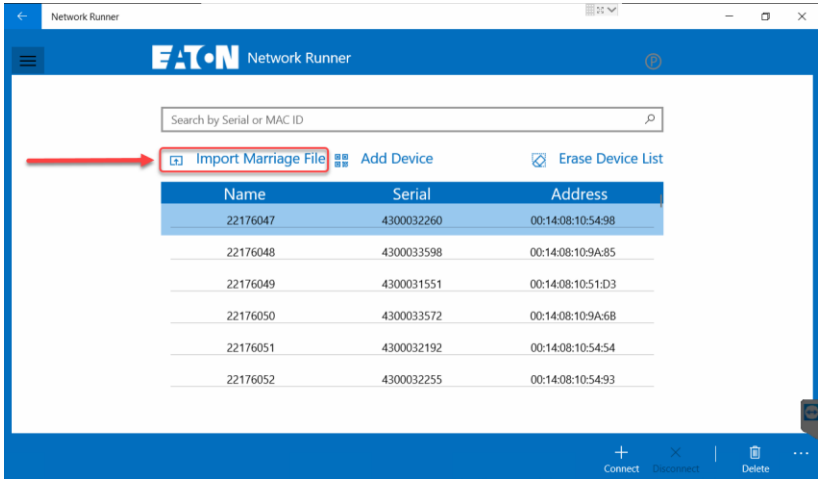


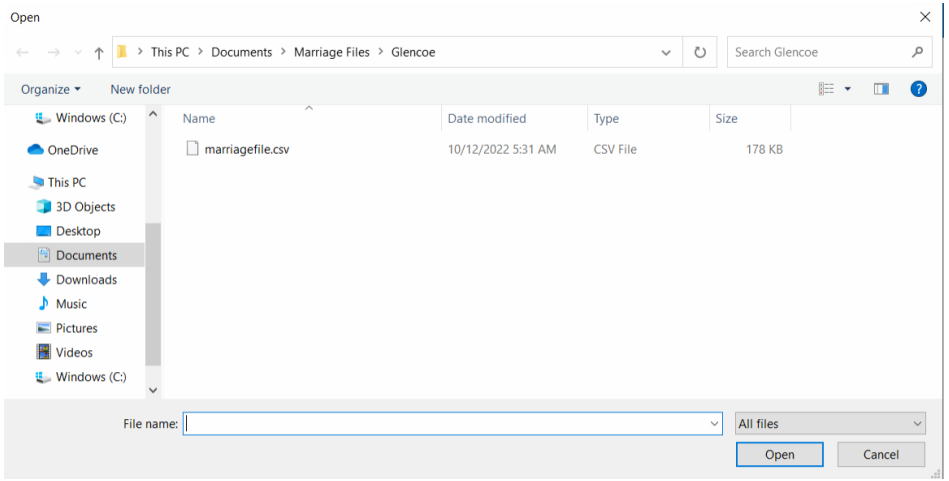
- Click/Select +Connect Button

Connecting to a Device

- Click/Select Import Marriage file:

  A Marriage file is generated from EATON which lists all the RF Node Serial Numbers with their MAC Addresses for your Network/Project. Once imported the list will be populated and displayed as below:

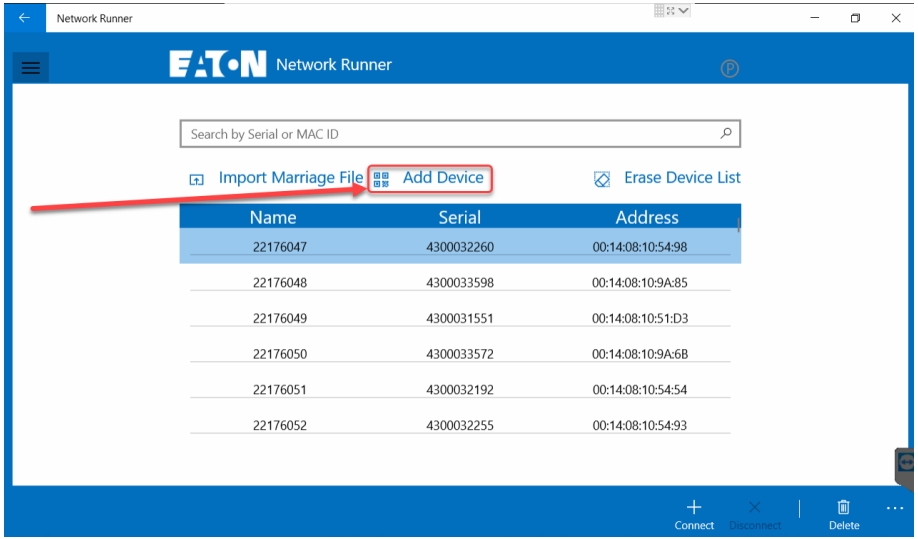




Connecting to a Device

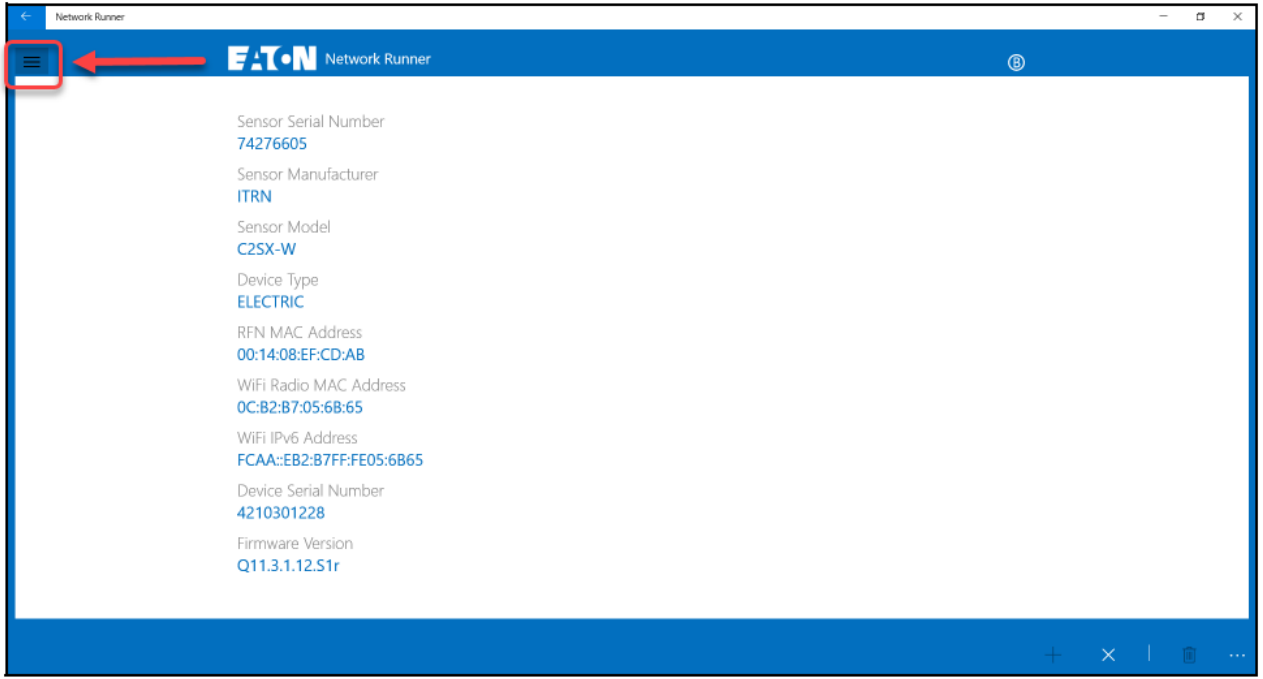
- Click Select Add Device

  Camera Application opens. Use rear camera to scan QR Code and import MAC Address.

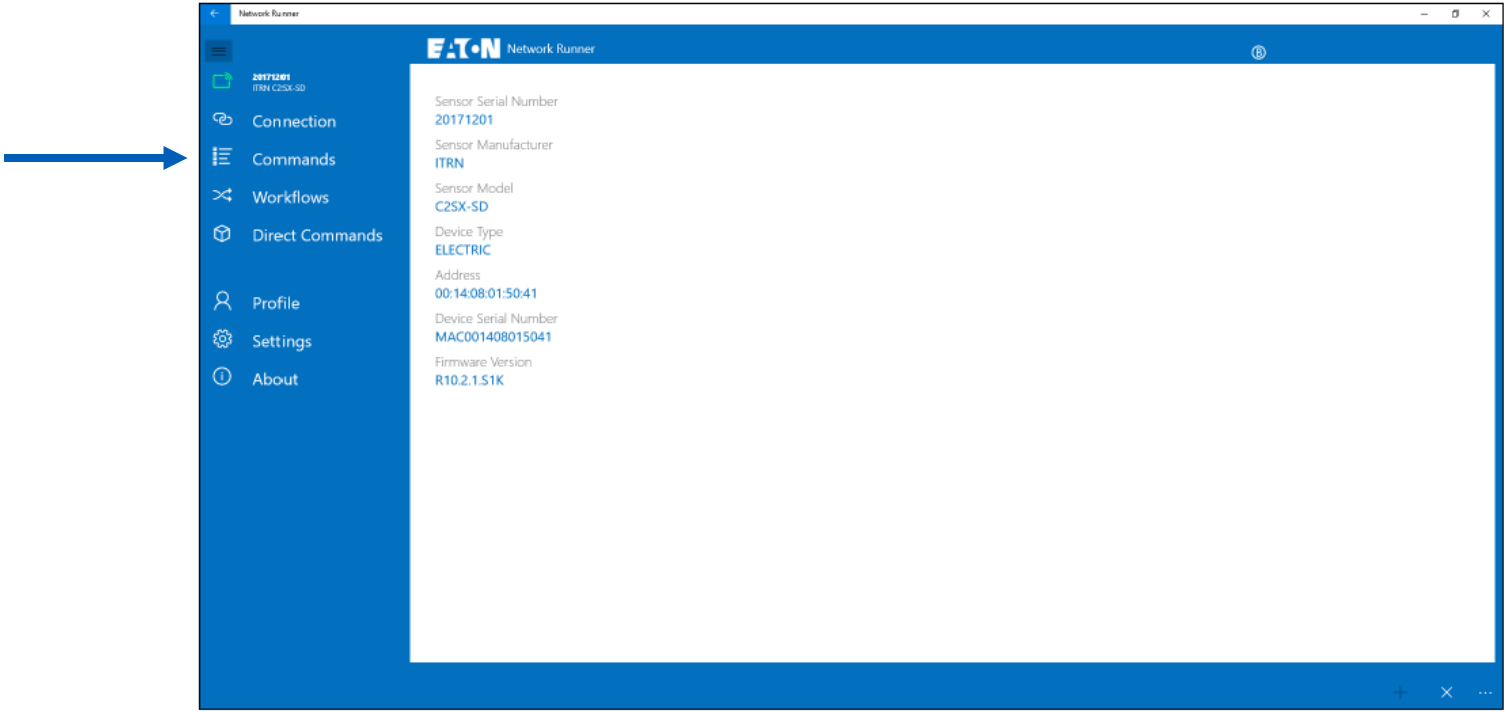


Network Runner Pages

- Device Identification Page
  - Click/Select on Menu Button to display the Navigation Menu



Connecting to a Device



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Metering Commands (RFN 400 & 500 only)

- **Read meter**
- Reset demand
- **Remote disconnect**
- **Network reset**
- Voltage profile control
- Reporting & Recording parameters
- Reset watt-hours
- Network data
- **Fast network join**
- **Location**
- Firmware upgrade
- Association
- **RSSI***
- **Factory reset**

RSSI

- **Received Signal Strength Indicator" :** measurement of the signal strength received by the RF node in dBm
  - 0 to -30 dBm – Excellent
  - -30 to -60 – Good
  - -60 to – 85 – Fair
  - -85 or less – Poor/No Signal
  - *Error message = 0 dBm*
- Measurement of signal strength between field tool and the device it's connected to
  - Use Cases: Water Node Installation, infrastructure locations

Let’s Practice!

Exercise 3: Connect to Electric Meter

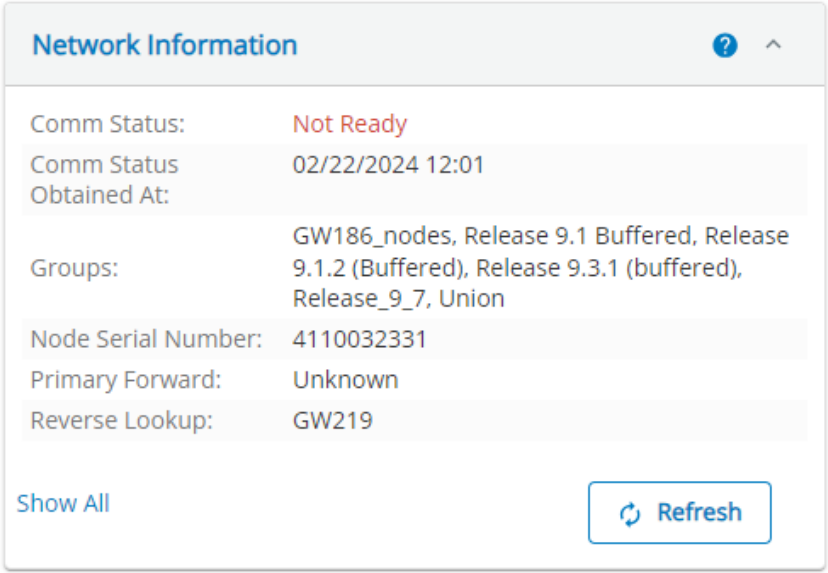
1. Connect to a meter (C1SX)
2. Read the meter
3. Perform a Network Reset
4. Set the Location of the device
5. Stand ~10 feet away from the device and calculate the RSSI signal quality
6. Repeat with C2SX-D meter
7. Repeat with A3 meter

Common Electric Meter Questions and Issues

- Meter has stopped reporting in Yukon
- Others?

Electric Meter: Yukon Troubleshooting

- 1. What is the Comm Status? – Not Ready, Ready, Unknown
- Ready: meter is communicating to Yukon
- Not Ready: check device with field tool
- Unknown: PF/RL are different, device could be switching gateways



Electric Meter: Field Tool Troubleshooting

When Electric Meter/Node Fails to report/read into Yukon:

1. Use Field Tool to attempt to communicate directly to the node in the field

- If NO-Cycle Power (*capacitor wait times) then attempt to communicate again using Field Tool.
  - If YES execute a Fast Network Join and/or Network Reset.
  - If NO-Node is defective, request RMA from EATON.

2. If YES-then communications are established, this tells us that the RF module & Node are working and communicating.

3. If YES-attempt to connect to neighboring devices (gateway, meters or relays)

4. If YES-Check RSSI Signal Quality (Received Signal Strength Indicator)

Questions?

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