

# NR500 Series Industrial Cellular VPN Router

## Application Note 060

### Modbus to IEC104

**Version:** V1.0.0  
**Date:** Sep 2021  
**Status:** Confidential



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# 1. Introduction

## 1.1 Overview

This document contains information regarding the configuration and use of Modbus to IEC104.

This guide has been written for use by technically competent personnel with a good understanding of the communications technologies used in the product, and of the requirements for their specific application.

## 1.2 Compatibility

This application note applies to:

**Models Shown:** NR500 series.

**Firmware Version:** V1.1.7(3b5122d) or newer

**Other Compatible Models:** None

## 1.3 Version

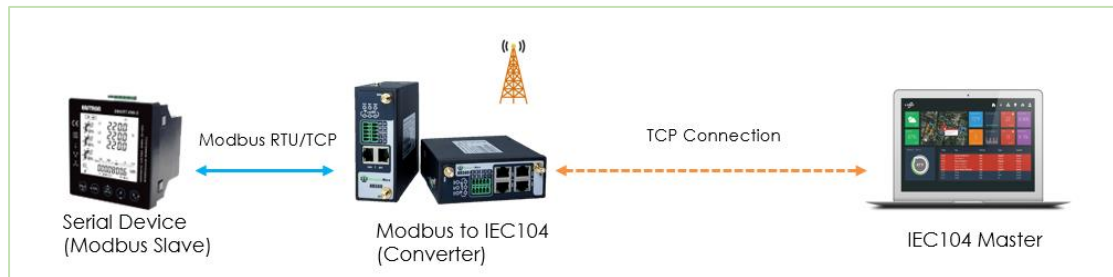
Updates between document versions are cumulative. Therefore, the latest document will include all the content of previous versions.

Release Date	Doc. Version	Firmware Version	Change Description
2021/09/14	V1.0.0	V1.1.7(3b5122d)	First released

## 1.4 Corrections

Appreciate for corrections or rectifications to this application note, and if any request for new application notes please email to: [support@navigateworx.com](mailto:support@navigateworx.com)

## 2. Topology

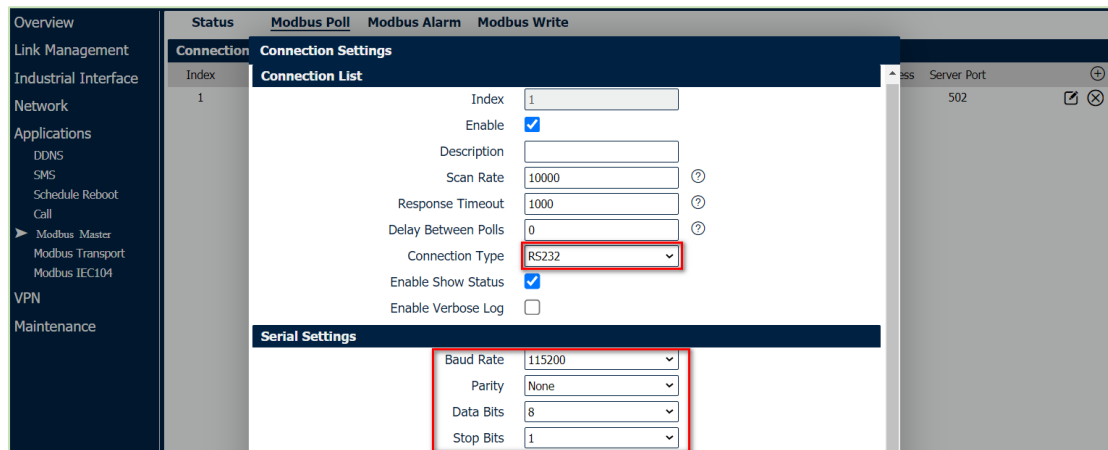


1. NR500 Router runs as Modbus to IEC104 converter, it acts as Modbus Master and IEC104 Slave.
2. A serial device support Modbus protocol and acts as Modbus Slave. It connected to NR500 router via serial port or Ethernet port.
3. NR500 router poll the Modbus data from end device (Modbus Slave), after that, send the date to the remote IEC104 Master.

## 3. Configuration

### 3.1 Configuration on NR500 (Modbus Master)

1. Go to **Applications>Modbus Master>Modbus Poll**, specify the serial settings to make the router connect to the Modbus Slave via RS232 interface:



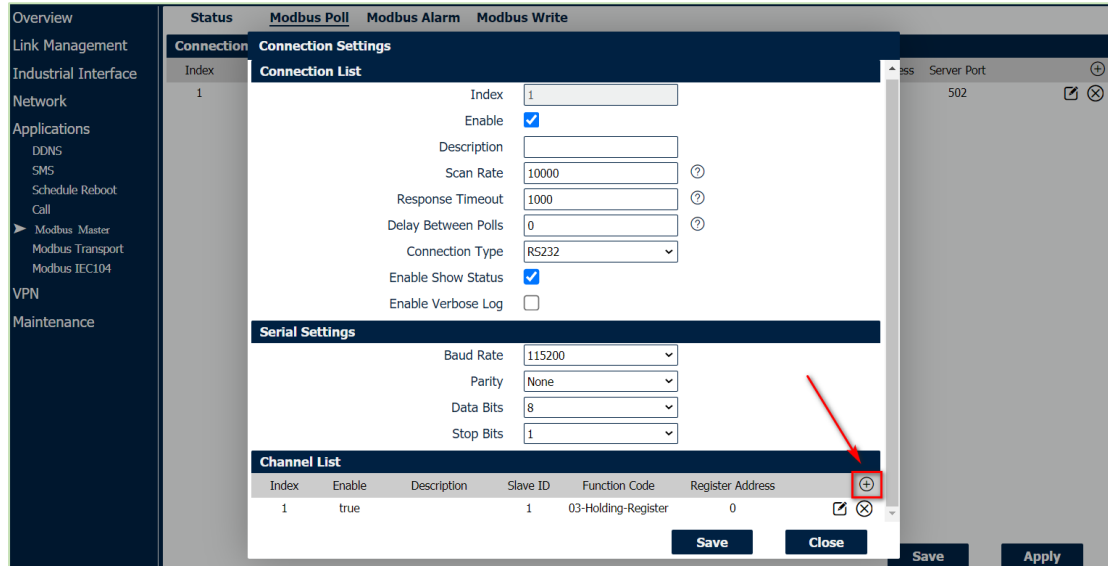
The screenshot shows the 'Modbus Poll' configuration page. The 'Connection Settings' section includes the following fields:

- Index: 1
- Enable:
- Description: (empty)
- Scan Rate: 10000
- Response Timeout: 1000
- Delay Between Polls: 0
- Connection Type: RS232 (highlighted with a red box)
- Enable Show Status:
- Enable Verbose Log:

The 'Serial Settings' section includes the following fields:

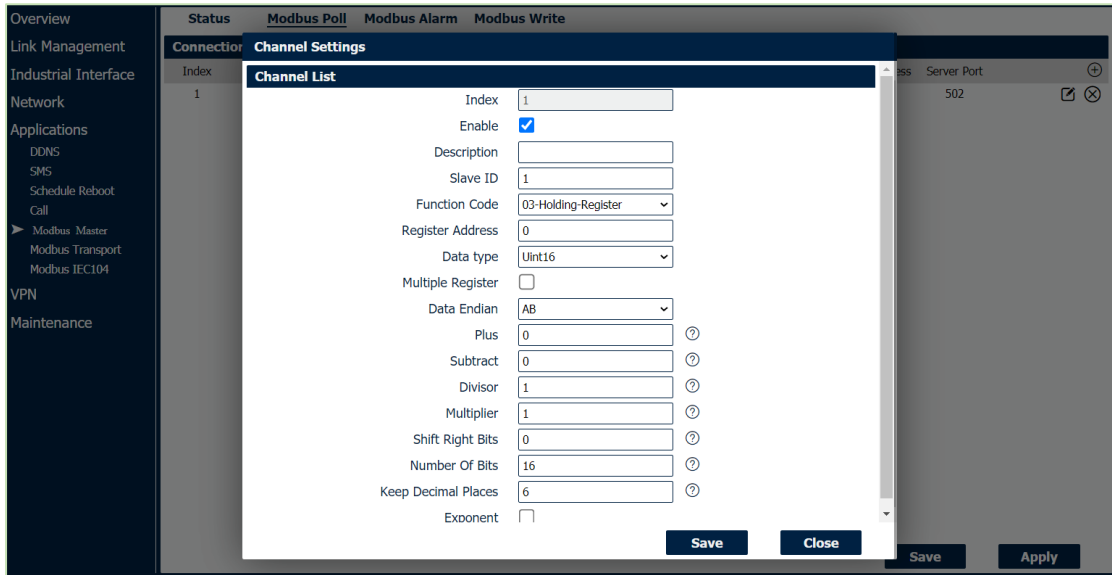
- Baud Rate: 115200 (highlighted with a red box)
- Parity: None (highlighted with a red box)
- Data Bits: 8 (highlighted with a red box)
- Stop Bits: 1 (highlighted with a red box)

2. Go to **Applications>Modbus Master>Modbus Poll>Channel List**, specify the Modbus Master settings:



The screenshot shows the 'Modbus Poll' configuration page with the 'Channel List' section expanded. A red arrow points to a '+' icon in the bottom right corner of the table, indicating the option to add a new channel.

Index	Enable	Description	Slave ID	Function Code	Register Address
1	true		1	03-Holding-Register	0



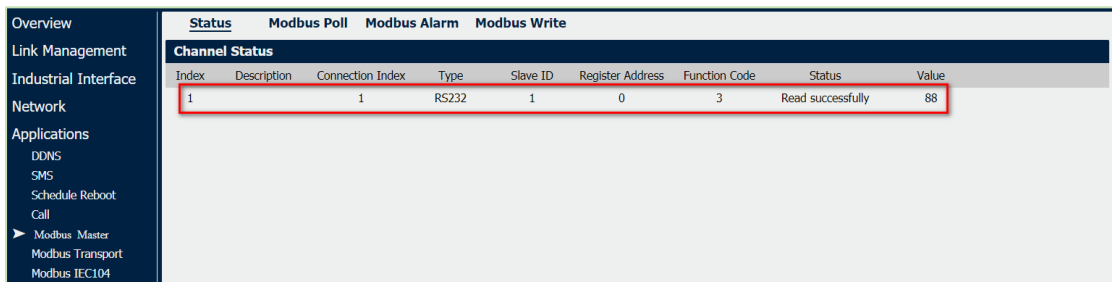
3. Click Save>Apply.

## 3.2 Configuration on Modbus Slave

1. Set Slave ID as "1"; Function Code as "03", and the value "88" on Register "0":



2. NR500 had polled the data from Modbus Slave successfully:



### 3.3 Configuration on NR500 (IEC104 Slave)

1. Go to **Applications>Modbus IEC104>Modbus to IEC104**, specify the IEC104 settings and data mapping as below:

**IEC104 Connection Settings**

**Connection Settings**

Index	<input type="text" value="1"/>
Enable	<input checked="" type="checkbox"/>
Description	<input type="text"/>
Local IP	<input type="text" value="0.0.0.0"/>
Local Port	<input type="text" value="2404"/>

**Modbus To IEC104 Mapping**

Connection Index	<input type="text" value="1"/> <span style="float: right;">?</span>
Slave ID	<input type="text" value="1"/> <span style="float: right;">?</span>
Register Address	<input type="text" value="0"/> <span style="float: right;">?</span>
Quantity	<input type="text" value="10"/> <span style="float: right;">?</span>
Start IOA	<input type="text" value="1"/> <span style="float: right;">?</span>

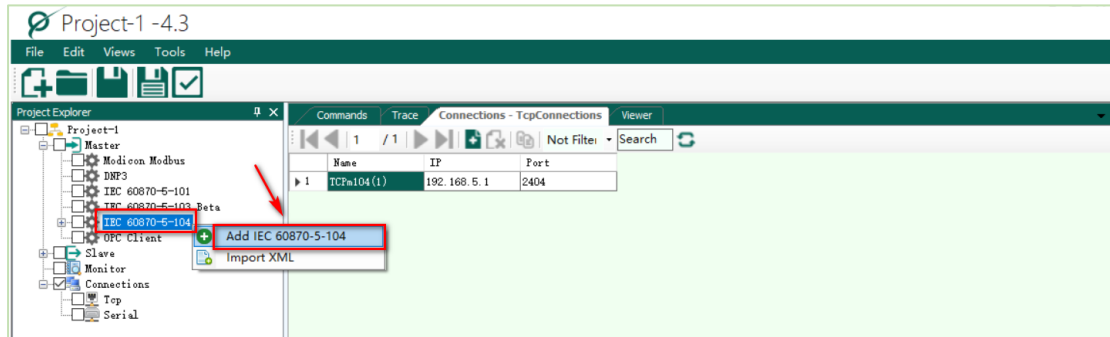
**IEC104 Settings**

Common Address	<input type="text" value="1"/> <span style="float: right;">?</span>
IEC104 Object Type	<input type="text" value="Measured Scaled"/>
Trigger	<input type="text" value="Cyclic"/>
T1 Timeout	<input type="text" value="15"/> <span style="float: right;">?</span>
T2 Timeout	<input type="text" value="10"/> <span style="float: right;">?</span>
T3 Timeout	<input type="text" value="20"/> <span style="float: right;">?</span>
K	<input type="text" value="12"/> <span style="float: right;">?</span>
W	<input type="text" value="8"/> <span style="float: right;">?</span>
Cause Of Transmission Length	<input type="text" value="2"/>
Common Address Length	<input type="text" value="2"/>
Information Object Address Length	<input type="text" value="3"/>
Enable Timestamp CP56Time2a	<input checked="" type="checkbox"/>
Enable Verbose Log	<input checked="" type="checkbox"/>

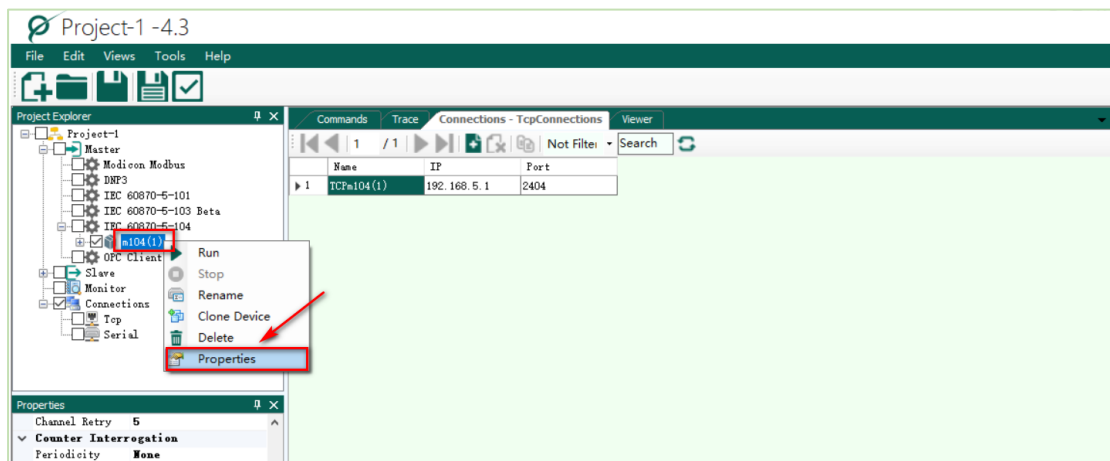
2. Click Save>Apply.

### 3.4 Configuration on IEC104 Master

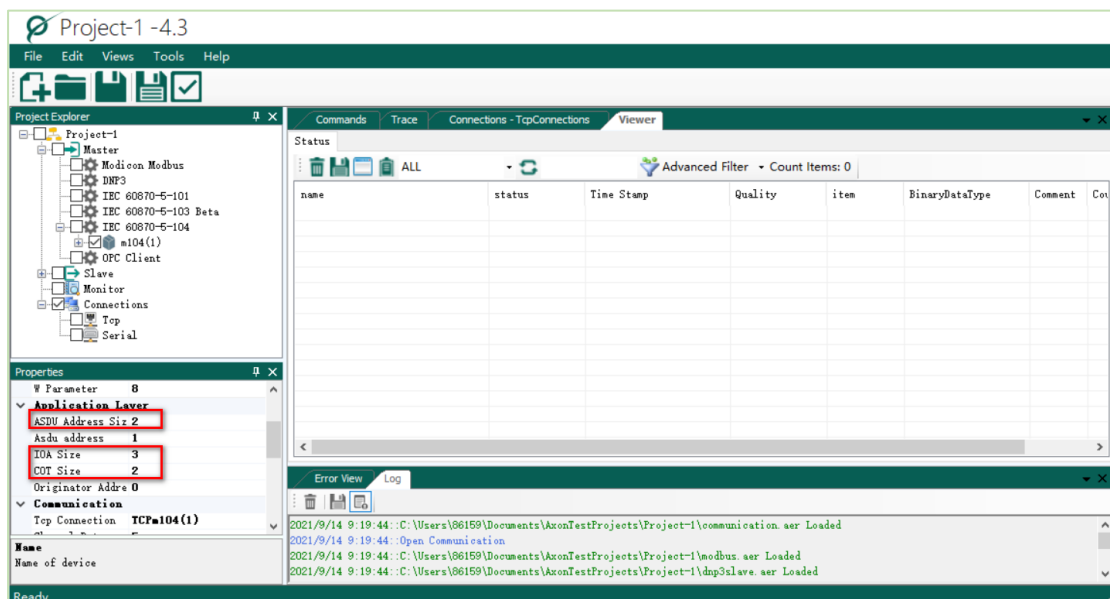
1. Run the IEC104 Master simulator and right click "IEC 60870-5-104", then click "Add IEC 60870-5-104":



2. Right click "m104" and then click "Properties":



3. Specify the parameters of IEC104 Master to make it connect to the Router (IEC104 Slave):





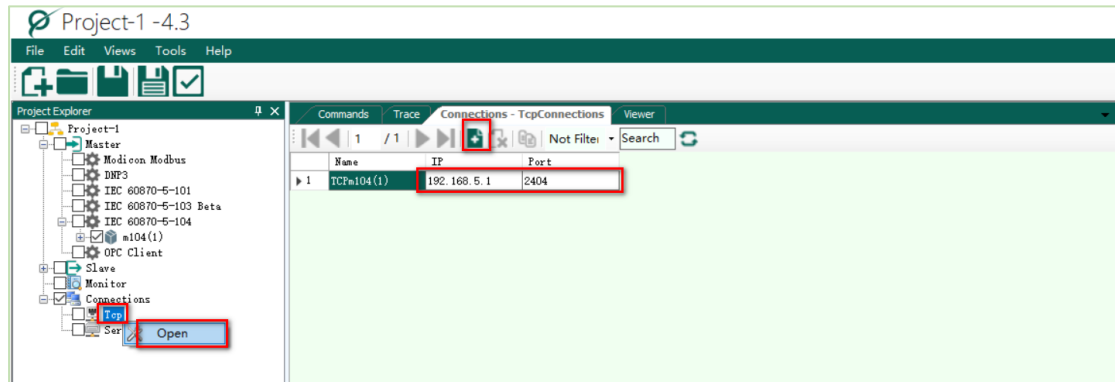
Note:

ASDU Address Size = Common Address Length

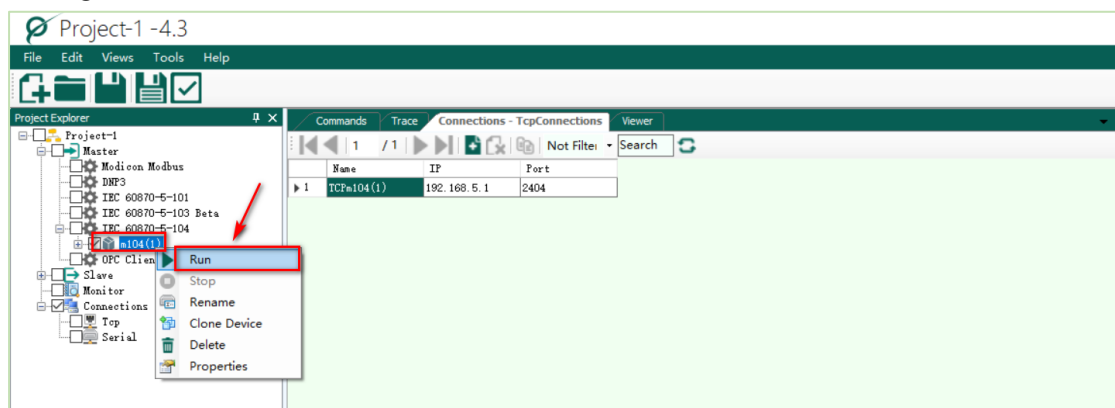
IOT Size = Information Object Address Length

COT Size = Cause of Transmission Length

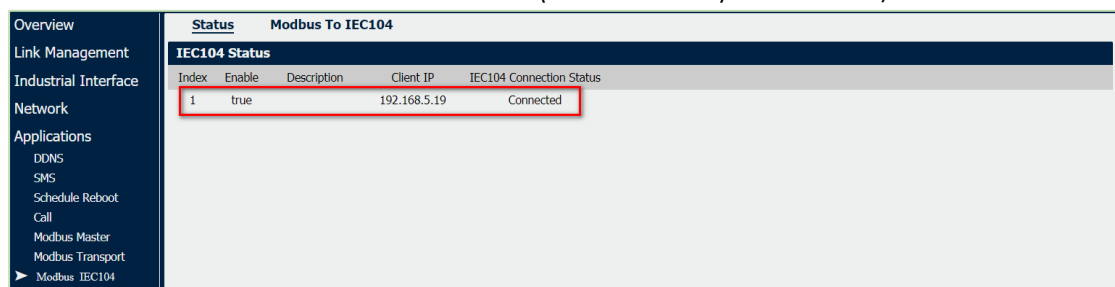
- Right click "TCP" and click "Open", enter the IP address and Port of the router to make it connect to the router:



- Right click "m104" and click "Run" to start to connect to the router:

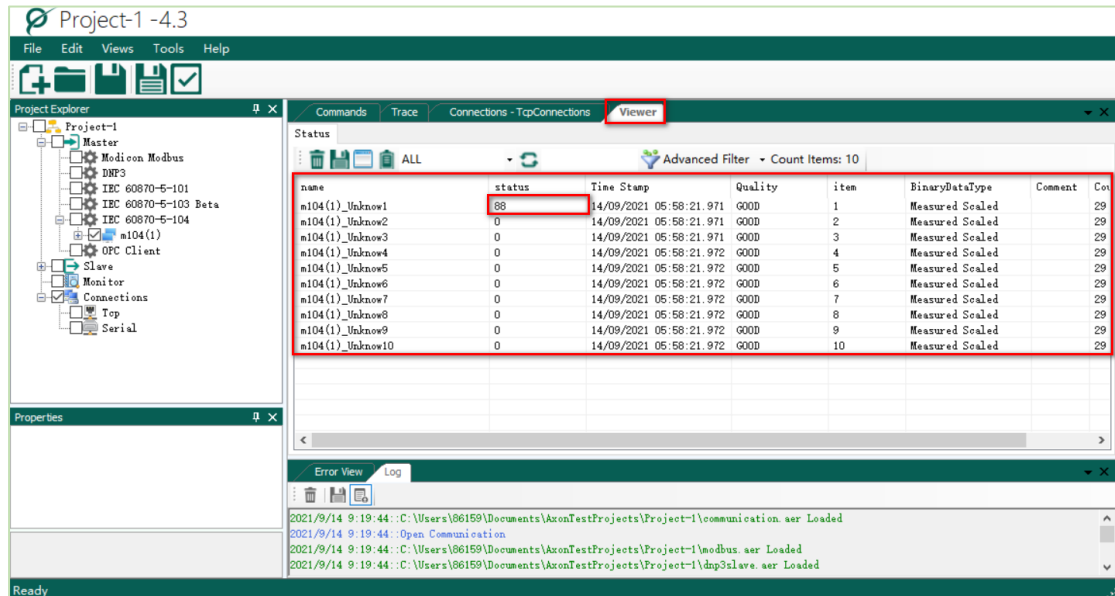


- IEC104 Master connected to router (IEC104 Slave) successfully:



### 3. Testing

1. Check the "Viewer" option on IEC104 Master and get the data from Modbus Slave:



2. Test successfully