NPort Real COM Mode for DNP3 Applications

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 Released on October 30, 2014

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NPort Real COM Mode for DNP3 Applications

1. Introduction

This note describes how to apply NPort Real COM Mode to DNP3 communications. Real COM Mode can provide a virtual COM port for original applications, just as if it is on a computer's native serial port. The benefit is to use Ethernet to extend the functional distance for legacy applications. Users can install the Real COM driver on their SCADA system, which creates an additional COM port. This serial port will be mapped to the IP address of the remote NPort.

DNP3 (Distributed Network Protocol) is a set of communication protocols used between components in process automation systems. It was developed for communication between various types of data acquisition and control equipment. It plays a crucial role in SCADA systems, where it is used by SCADA master stations (control centers), programmable logic stations (PLCs), remote terminal units (RTUs), and intelligent electronic devices (IEDs). It is primarily used for communication between a master station (DNP3 Master) and RTUs or IEDs (DNP3 Outstation).

Thus, an NPort can be located at remote locations providing real-time access to serial DNP3 outstation devices via Ethernet.

The system topology is shown in Figure 1 below:

Figure 1: System Topology

2. Applicable Products

Product Line	Model Names
NPort 5000A	NPort 5100A series, NPort 5200A series, NPort 5400A series, NPort IA5250A
NPort 5000	NPort 5100 series, NPort 5200 series, NPort 5400 series, NPort 5600 series, NPort IA5150, NPort IA5250

3. System Overview

In this example, we use the Protocol Test Harness application to simulate a DNP3 master and a DNP3 serial outstation (Figure 2).

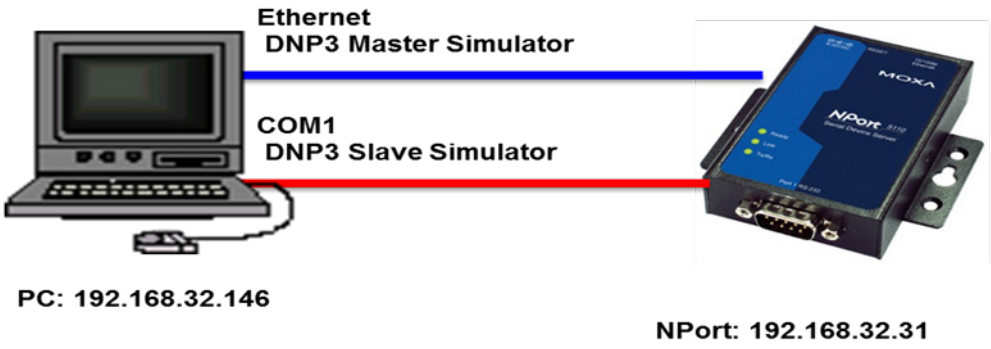

Figure 2: Demo topology

If you would like to use the Protocol Test Harness application, you can refer to this link: http://www.trianglemicroworks.com/products/testing-and-configuration-tools/test-harness-pages

4. NPort Settings

4.1. Mapping COM Port

Run "NPort Windows Driver Manager", then click "Add" to map the COM port of the NPort's Port 1 (Figure 3).

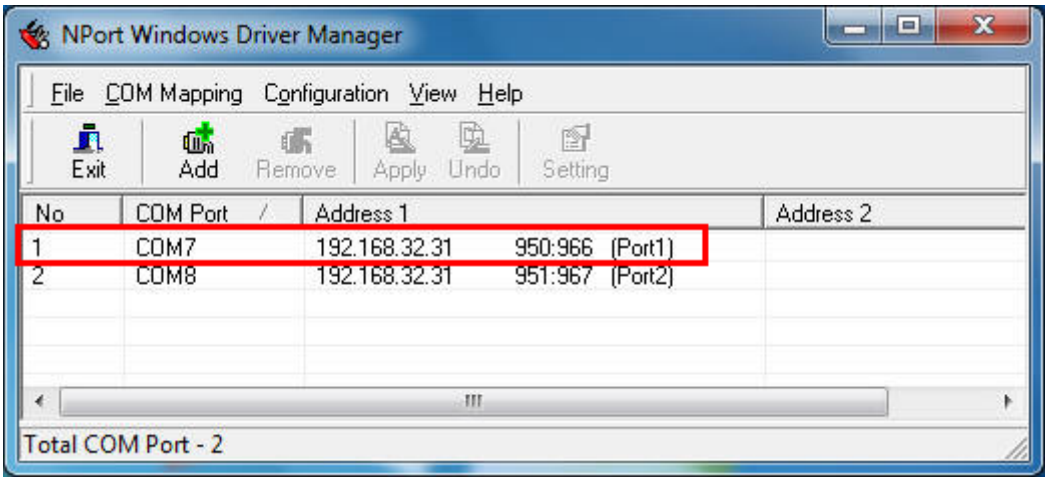

Figure 3: Mapping COM Port

4.2. Serial Settings

In the NPort web console, click on "Serial Settings → Port 1" to set serial parameters (Figure 4). Parameter settings should be the same as the outstation settings.

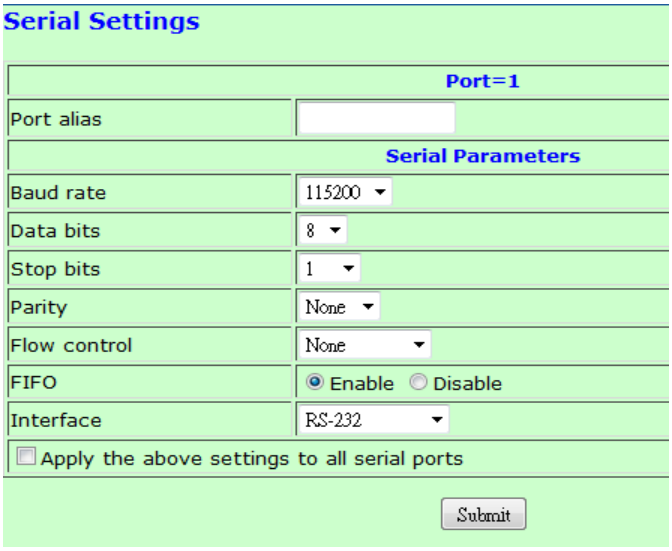

Figure 4: Serial Settings

4.3. Operation Mode Settings

In the NPort web console, click on "Operation Settings → Port 1" to set operation mode. Select "Real COM Mode" and the NPort will provide the virtual COM port for original applications (Figure 5).

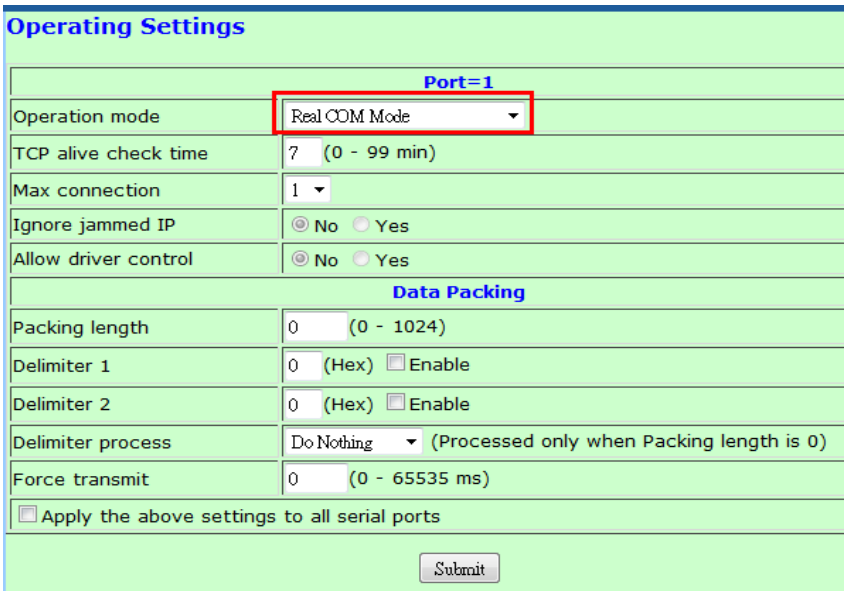

Figure 5: Operating Settings

5. DNP3 Outstation Settings

To input settings for the DNP3 Outstation, run the Protocol Test Harness application. Select "Open → Slave Session → DNP3" to add a DNP3 slave channel and session (Figure 6).

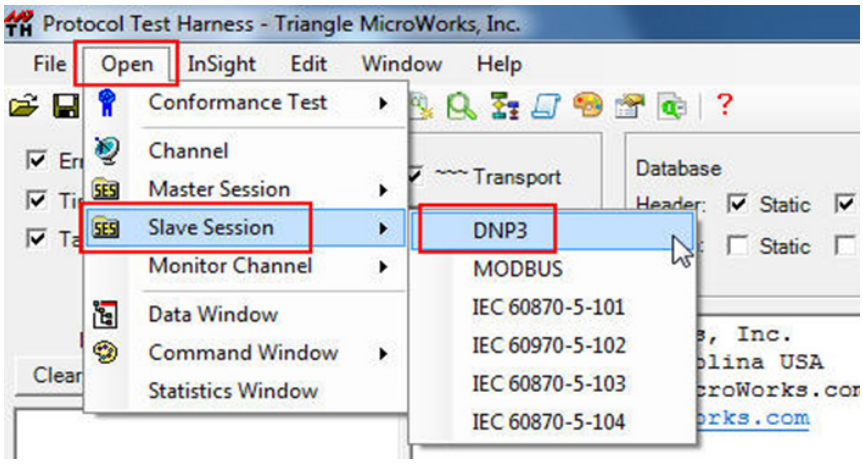

Figure 6: Opening Slave Channel and Session

In the "Session" tab, set "Link Layer Addresses" (Figure 7).

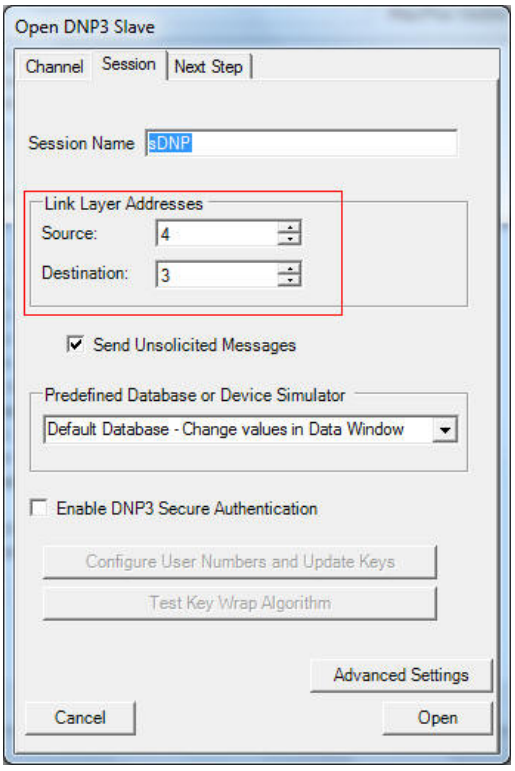

Figure 7: Setting Link Layer Addresses

In the "Channel" tab, select "Connection Type" as "Serial" then input serial port settings. Click on "Advanced Settings" to set other serial parameters (Figure 8).

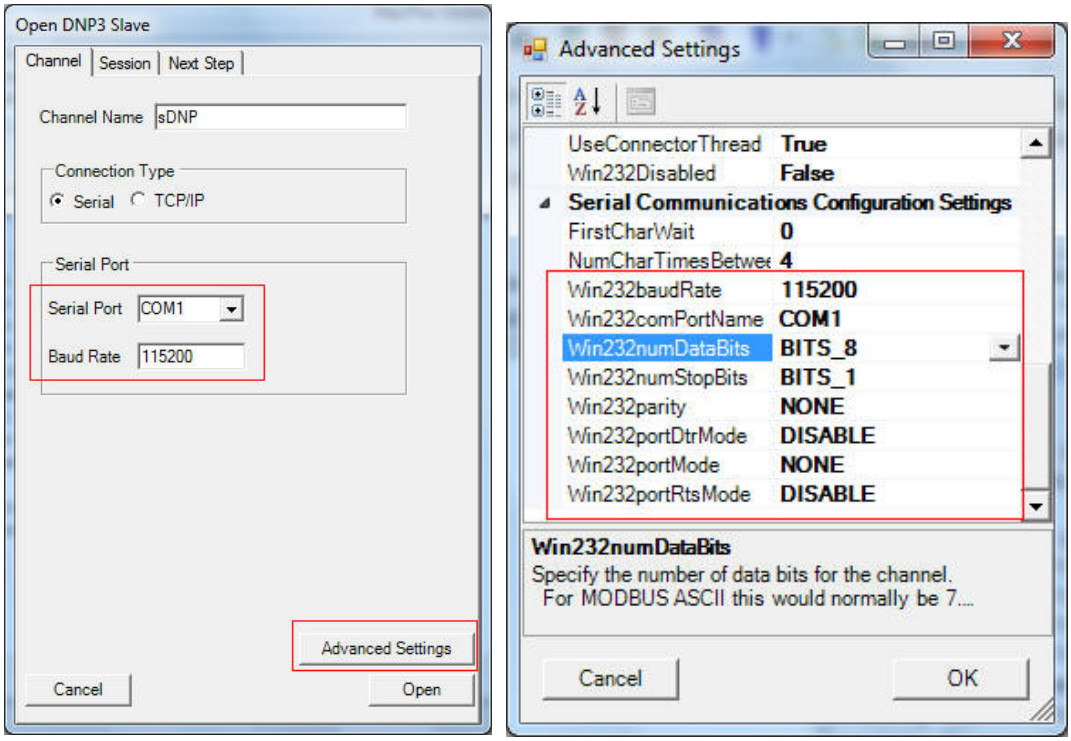

Figure 8: Setting Serial Parameters

After settings are complete, click "Open" to start the DNP3 outstation.

6. DNP3 Master Settings

In "Protocol Test Harness", Select "Open → Master Session → DNP3" to add a DNP3 master channel and session (Figure 9).

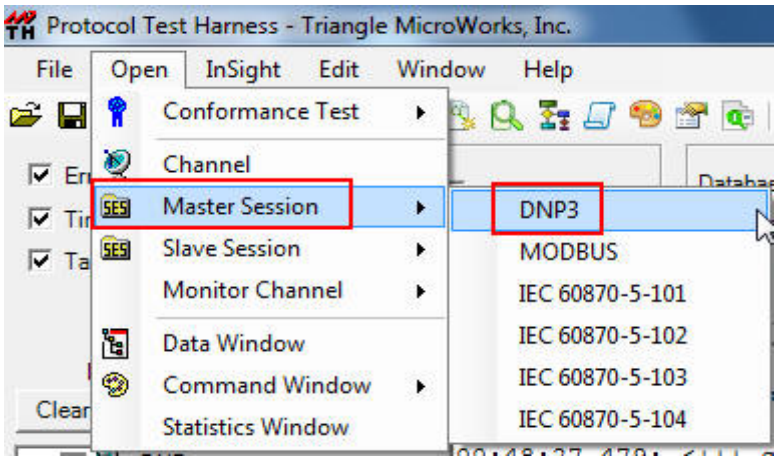

Figure 9: Adding a Master Channel and Session

In the "Session" Tab, set "Link Layer Addresses".

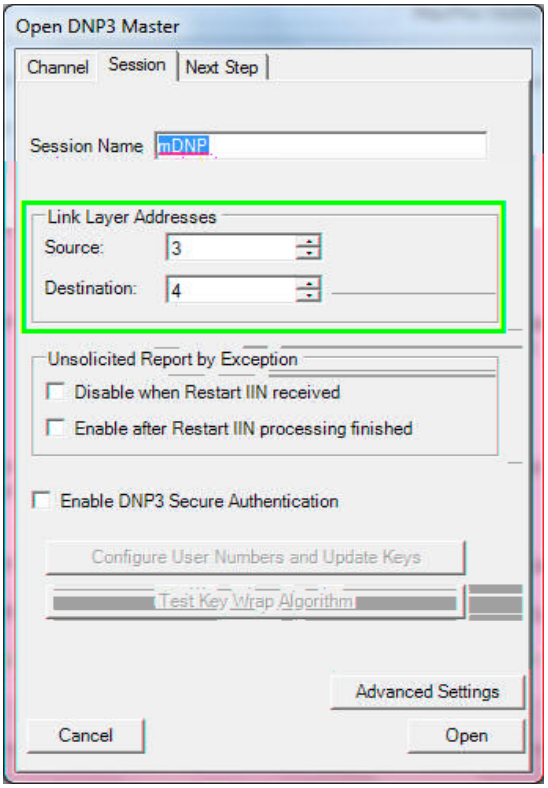

Figure 10: Setting Link Layer Addresses

In the "Channel" tab, select "Connection Type" as "Serial" then input serial port settings. Click "Advanced Settings" to set other serial parameters. After inputting the settings, click "Open" to start the DNP3 master (Figure 11).

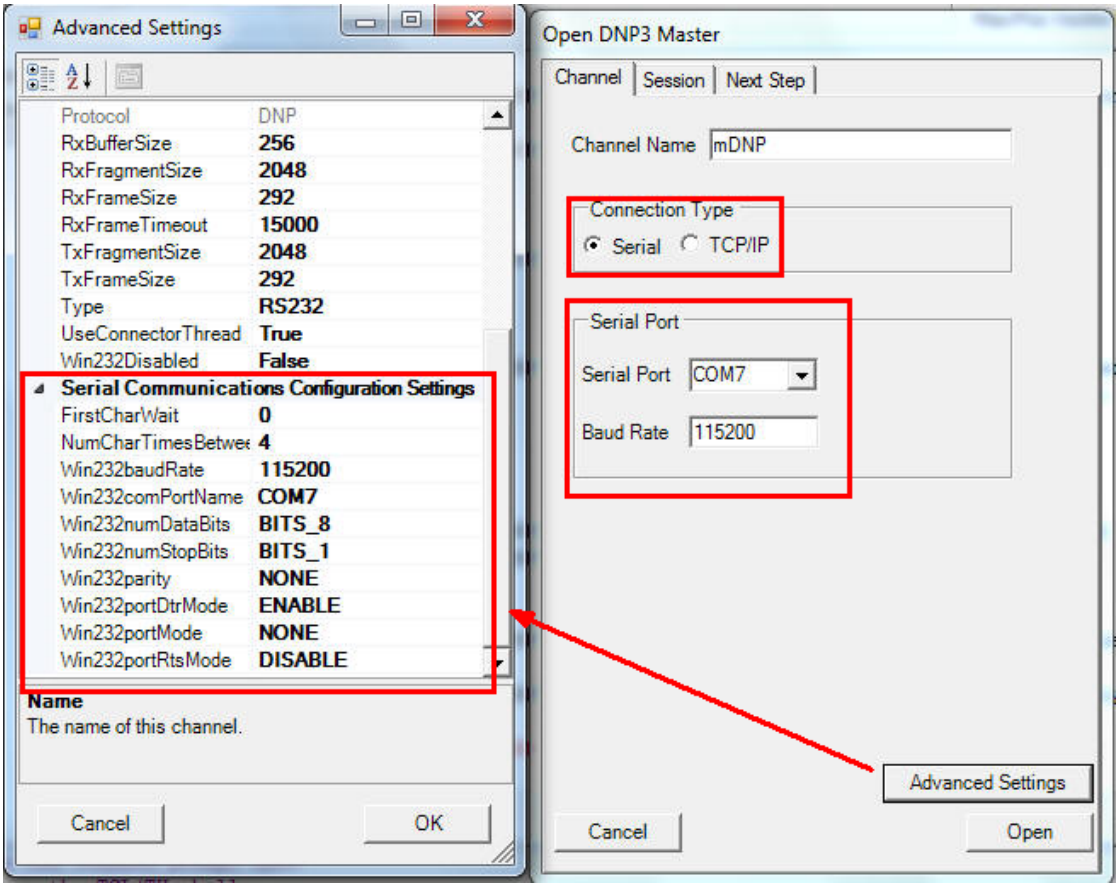

Figure 11: Setting Serial Parameters

7. DNP3 Communication Verification

In "DNP3 Commands", click "Integrity Data Poll – Class 0123". Set repeat interval to 10 seconds. Click "Start Repeat" to start testing (Figure 12).

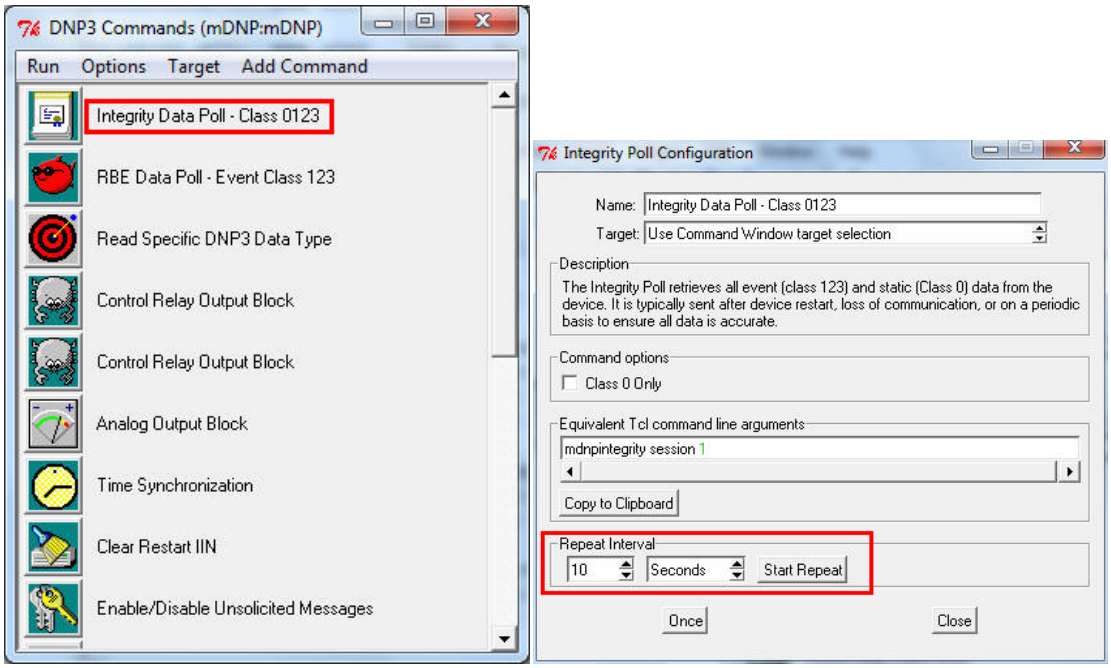

Figure 12: Integrity Poll Configuration

In "Statistics", we should see that both the "Requests Sent" and "Responses Received" counts are increasing.

Under normal operation, "Requests Failed", "Requests Time Out", and "Channel Errors" should not have values (Figure 13). If errors are displayed, recheck the configurations.

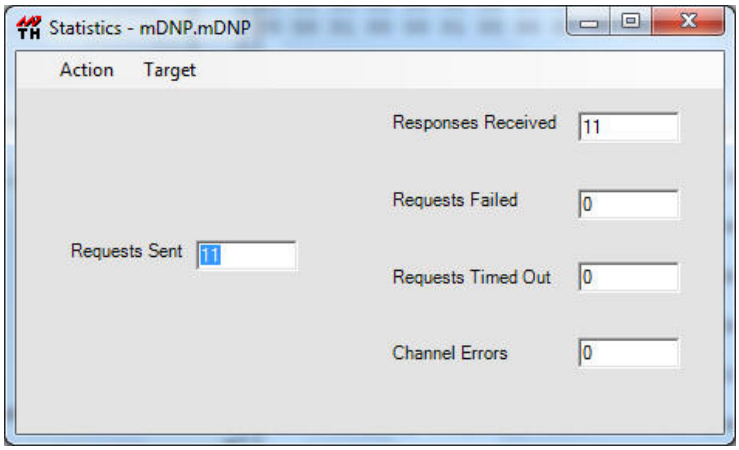

Figure 13: Statistics