

# NR500 Series Industrial Cellular VPN Router

## **Application Note 063**

## Transparent Mode with DNP3 Serial to DNP3 TCP on

## RS485

Version:V1.0.0Date:Aug 2022Status:Confidential





## **Directory**

1. Introduction	3
1.1 Overview	3
1.2 Compatibility	3
1.3 Version	3
1.4 Corrections	3
2. Topology	4
3. RS485 Cable	5
4. Configuration	6
4.1 RS485 Configuration	6
4.2 DNP3 Outstation Configuration	7
4.3 DNP3 Master Configuration	8
5. Testing	



## 1. Introduction

#### 1.1 Overview

This document contains information regarding the configuration and use of Transparent Mode with DNP3 Serial to DNP3 TCP on RS485.

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 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
2022/08/05	V1.0.0	V1.1.7	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** 



## 2. Topology



- 1. NR500 router runs as transparent mode and connect to Internet with SIM card.
- 2. PC1 simulate software as serial device and runs serial software, such as "OpenDNP3", the simulate will send the data to the DNP3 Master through NR500 router with TCP transparent mode.
- 3. PC2 runs as DNP3 Master simulate software and get data from the NR500 router.



## 3. RS485 Cable

1. Please follow below picture to make the RS485 cable:





## 4. Configuration

#### 4.1 RS485 Configuration

1. Go to Link Industrial Interface>Serial>Connection>Index 1, Click the Edit button of COM1.

Marianta								Login: admin
Navigate	worx							Reboot Logout
Overview	Stat	us	Connection	l,				
Link Management	Serial	Connecti	ion Settings	;				
Industrial Interface	Index	Enable	Port	Baud Rate	Data Bits	Stop Bits	Parity	
➤ Serial	1	false	COM1	115200	8	1	None	
Digital IO	2	false	COM2	115200	8	1	None	

2. Enable R\$485 setting, select Protocol as "TCP Server" and enter the Local ip address and Local Port. Click Save.

Connection Settings								
Serial Connection	Settings							
	Index	1						
	Enable							
	Port	COM1	~					
	Baud Rate	115200	~					
	Data Bits	8	~					
	Stop Bits	1	~					
	Parity	None	~					
Transmission Setti	ngs							
	Transmission Method	Transparent	~					
	MTU	1024		?				
	Protocol	TCP Server	~					
	Local IP Address	192.168.111.156						
	Local Port	2000						
				Sav	/e		Close	

3. Click Save>Apply.



### 4.2 DNP3 Outstation Configuration

Here used the DNP3 Simulator "OpenDNP3" to do the testing.

1. PC1 open DNP3 simulator to run as DNP3 Outstation and enter the serial port and serial settings, then make it connect to NR500 and click Add:

Simulator	Second grant Sec	- 🗆 X
🔘 Add 🜆 File		🕼 About
INT3           Intra           Metric           Value	X Add DNP3 Channel X Add DNP3 Channel X TCP Client TCP Server Serial X X X X X X X X X X X X X	
	Aut	×
📄 🗙 🕃 1/5000		

2. Right Click "channel", and Add Outstation:

Simulator	-		$\times$
C Add Sm File		6	About
DEP3 19:29:24.139 INFO system Initialized DNP3 plugin Add Master Add Outstation Remove			^

3. Choose "Relay Simulator" :

Relay Simu	lator	~
A simple r panel. Res	elay simulator with a mock front ponds to latch on/off	



4. Specify the address on DNP3 Outstation, to make it match the settings on DNP3 Master and click Add:

Simulator			- 0
🔘 Add 🛛 🙀 File			8
DHF3	Add Master Link Master 1024 g destination confirm options confirm options confirm options confirm options confirm options confirm options confirm options	Xgin	
Metric Value bytes rx 0 bytes tx 0 oro errors 0 open count 0 num close 0 open fail count 0 link frames rx 0 link frames tx 0 bad link fra 0	Logging master Alias	Add	

5. Right click "Relay", then we can see the simulator:

Simulator					
🔘 Add 🕸 File					
	DNP3			05 64 08 C4 00 04 0 D3 D1 00 64 18	1 00 9A 19
E- y channel		Relay Simulator			× N: 2
1					: 1 SEQ: 1 FUNC: CONFIRM
					D_USER_DATA Dest: 1024 ;
					89 B6 06 3C 04 06 3C 01 06 85
		SEL 503515			N: 14
		HILL HILL HALL DOWN	900000		: 0 SEQ: 8 PUNC: READ
Matrio	Value				lass 2 data - all object
Num transport ra Num transport ta	10812 10814				lass 0 data - all object
Num transport error rx	0	IA: 1241	VA: 8022	A very simple relay simulation. It reports	: 0 SEQ: 8 FUNC: RESPONS
		IB: 1242	VB: 8017	responds to a CROB latch on/off on	2-bit With Flag, 8-bit (
		IC: 1243	VC: 8034	operated via the buttons on the relay.	N: 45
	_				USER DATA Dest: 1 Sou

6. Then DNP3 Outstation will connect to NR500 router automatically.

#### 4.3 DNP3 Master Configuration

Here used the DNP3 Simulator "OpenDNP3" to do the testing.

1. PC1 open DNP3 simulator to run as DNP3 Master and enter the IP Address and



Simulator		- 🗆 X
C Add 🔤 File		G About
19:42:15.84	Add DNP3 Channel   TCF Client TCP Server Serial   192.168.111.166   Worning   Settings   channel   Alies   1000   Max Betry (ms)   1000   Max Betry (ms)   Debug   Application	
📁 🗙 🕃 1/5000		

Port to make it connect to NR500 and click Add:

#### 2. Right Click "channel", and Add Master:

Simulator				_	
🔘 Add 🛛 🙀 File					Q 4
Add Master Add Outstation Remove	17:02:24.234	INFO system	Initialized DNP3 plugin		

3. Specify the address on DNP3 Master, to make it match the settings on DNP3 Outstation and click Add:

Simulator	-	
🕜 Add 🛛 🙀 File		Q /
DNF3	Add Master X Link Master X I tink Master to the source 1024 destination I send confirme dusar data Confirme options 0 retries 1000 timeout (ms)	
Metric     Value       bytes rx     0       bytes tx     0       orc errors     0       open count     0       num close     0       opan fail count     0       link frames rx     0       link frames tx     0       bad link fra     0	Logging naster Alias Add	



## 5. Testing

1. Open DNP3 Master, right Click "Master" and open it:

Simulator						
🔘 Add 🛛 🔚 File						Q 4
DRP3	17:19:12.935	-lt->	master	Function: PRI UNCONFIRMED USER DATA Dest: 10 05 64 11 c4 00 04 01 00 60 4E c4 c3 14 3c 02 06 3c 03 06 3c 04 06 FD c9	024 S	ource:
Remove	17:19:12.938	<-IT-	channel	Function: PRI_UNCONFIRMED_USER_DATA Dest: 1 05 64 0A 44 01 00 00 04 67 88	Sour	ce: 102

2. Select the data type as "Analog", then we can see the data had been sent to DNP3 Master from NR500(DNP3 Outstation) successfully:



Test successfully.