

# NR500 Series Industrial Cellular VPN Router

## Application Note 057

### OpenVPN with x.509 Between NR500

**Version:** V1.0.0  
**Date:** Dec 2020  
**Status:** Confidential



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# 1. Introduction

## 1.1 Overview

This document contains information regarding the configuration and use of OpenVPN with x.509 certificate between NR500s.

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:** V1.1.4(0c0c9fa) or newer

**Other Compatible Models:** None

## 1.3 Version

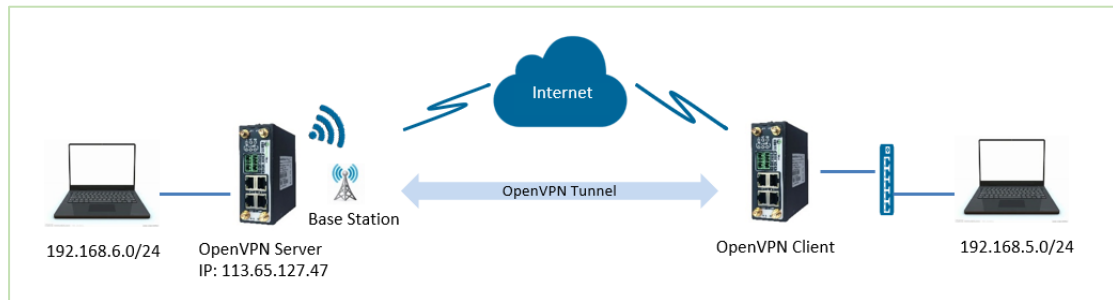
Updates between document versions are cumulative. Therefore, the latest document will include all the content of previous versions.

| Release Date | Doc. Version | Firmware Version | Change Description |
|--------------|--------------|------------------|--------------------|
| 2020/12/14   | V1.0.0       | V1.1.4(0c0c9fa)  | 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 OpenVPN Server with Public IP address or Domain Name, which can be accessed by another NR500 as OpenVPN Client successfully.
2. Two PCs connected to the LAN of OpenVPN Server and OpenVPN Client as the subnet.
3. OpenVPN tunnel is established between Server and Client, the subnet can PING each other successfully

## 3. Configuration

### 3.1 Server Configuration

1. Go to **VPN>OpenVPN>OpenVPN>General Settings**, click the Edit Button and configure OpenVPN as below picture. Click Save.

**OpenVPN Settings**

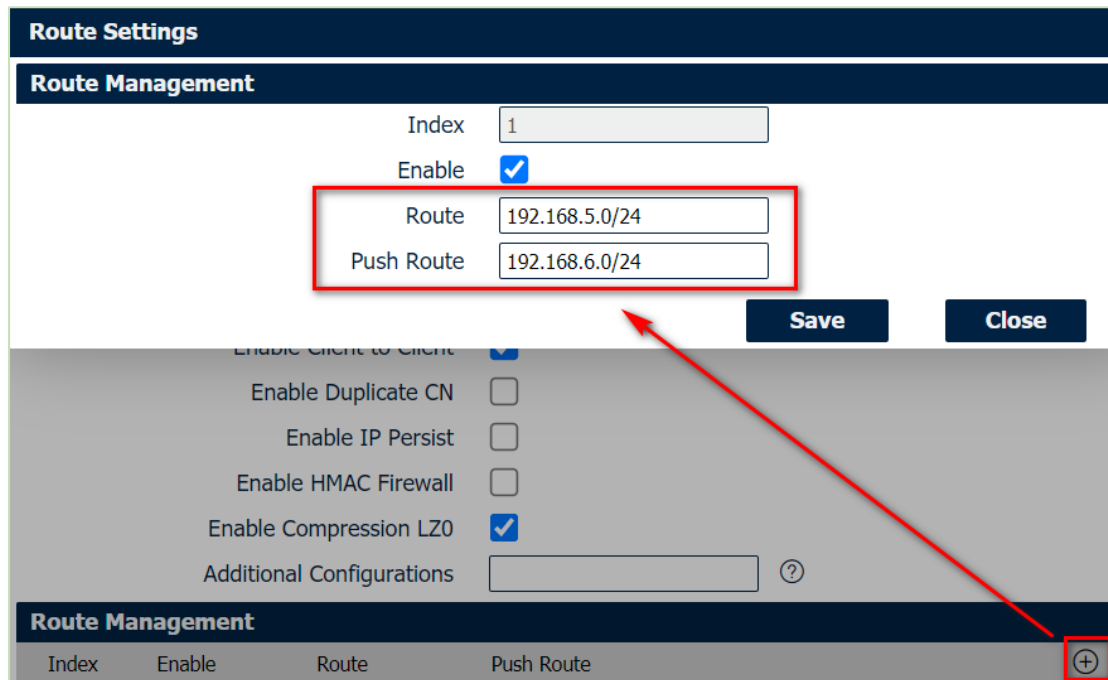
**General Settings**

|                        |  |
|------------------------|--|
| Index                  | <input type="text" value="1"/>             |
| Enable                 | <input checked="" type="checkbox"/>        |
| Description            | <input type="text"/>                       |
| Mode                   | <input type="text" value="Server"/>        |
| Protocol               | <input type="text" value="UDP"/>           |
| Connection Type        | <input type="text" value="TUN"/>           |
| Max Clients            | <input type="text" value="5"/>             |
| Authentication Method  | <input type="text" value="X.509"/> ?       |
| Encryption Type        | <input type="text" value="BF-CBC"/>        |
| Local IP Address       | <input type="text"/>                       |
| Local Port             | <input type="text" value="1194"/>          |
| Topology               | <input type="text" value="Subnet"/>        |
| Subnet                 | <input type="text" value="10.8.0.0"/>      |
| Subnet Netmask         | <input type="text" value="255.255.255.0"/> |
| Renegotiate Interval   | <input type="text" value="3600"/>          |
| Keepalive Interval     | <input type="text" value="20"/>            |
| Keepalive Timeout      | <input type="text" value="60"/> ?          |
| Fragment               | <input type="text" value="1500"/> ?        |
| Private Key Password   | <input type="text"/>                       |
| Output Verbosity Level | <input type="text" value="3"/>             |

**Advanced Settings**

|                           |                                     |
|---------------------------|-------------------------------------|
| Enable NAT                | <input checked="" type="checkbox"/> |
| Enable Default Gateway    | <input type="checkbox"/>            |
| Enable PKCS#12            | <input type="checkbox"/>            |
| Enable CRL                | <input type="checkbox"/>            |
| Enable Client to Client   | <input checked="" type="checkbox"/> |
| Enable Duplicate CN       | <input type="checkbox"/>            |
| Enable IP Persist         | <input type="checkbox"/>            |
| Enable HMAC Firewall      | <input type="checkbox"/>            |
| Enable Compression LZ0    | <input checked="" type="checkbox"/> |
| Additional Configurations | <input type="text"/> ?              |

2. Setting on Router Management like below, click "Save".



**Route Settings**

**Route Management**

Index

Enable

Route

Push Route

Save Close

Enable Client to Client

Enable Duplicate CN

Enable IP Persist

Enable HMAC Firewall

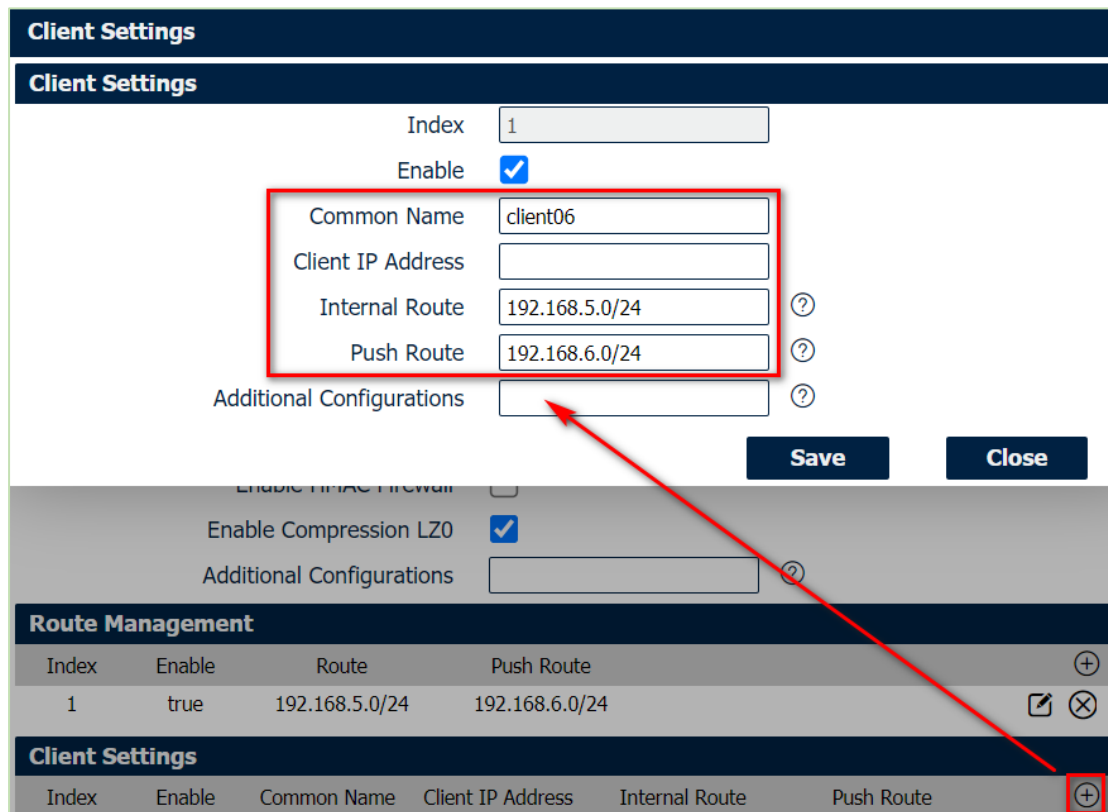
Enable Compression LZ0

Additional Configurations

**Route Management**

| Index | Enable | Route | Push Route |   |
|-------|--------|-------|------------|---|
|       |        |       |            | + |

3. Setting on Client Settings like below, click "Save":



**Client Settings**

**Client Settings**

Index

Enable

Common Name

Client IP Address

Internal Route  ?

Push Route  ?

Additional Configurations  ?

Save Close

Enable HMAC Firewall

Enable Compression LZ0

Additional Configurations  ?

**Route Management**

| Index | Enable | Route          | Push Route     |       |
|-------|--------|----------------|----------------|-------|
| 1     | true   | 192.168.5.0/24 | 192.168.6.0/24 | + ✎ ✕ |

**Client Settings**

| Index | Enable | Common Name | Client IP Address | Internal Route | Push Route |   |
|-------|--------|-------------|-------------------|----------------|------------|---|
|       |        |             |                   |                |            | + |

4. After that, click Save>Apply.

5. Go to VPN>OpenVPN>X.509 Certificate, import the related certificates:

Status **OpenVPN** **X.509 Certificate**

**X.509 Certificate Import**

OpenVPN Mode: Server

CA Certificate: Choose File No file chosen **ca.crt**

Local Certificate File: Choose File No file chosen **xx.crt**

Local Private Key: Choose File No file chosen **xx.key**

DH File: Choose File No file chosen **dh.pem**

HMAC Firewall Key: Choose File No file chosen

PKCS#12 Certificate: Choose File No file chosen

CRL File: Choose File No file chosen

**X.509 Certificate Files**

| Index | File Name  | File Size | Date Modified           |
|-------|------------|-----------|-------------------------|
| 1     | ca.crt     | 2399      | Thu Mar 5 08:40:08 2020 |
| 2     | dh.pem     | 769       | Thu Mar 5 08:40:45 2020 |
| 3     | server.crt | 8192      | Thu Mar 5 08:40:16 2020 |
| 4     | server.key | 3272      | Thu Mar 5 08:40:23 2020 |

6. Click Apply.

## 3.2 Client Configuration

1. Go to **VPN>OpenVPN>OpenVPN>General Settings**, click the Edit Button and configure OpenVPN as below picture. Click Save.

**OpenVPN Settings**

**General Settings**

Index: 1

Enable:

Description: 1

Mode: Client

Protocol: UDP

Connection Type: TUN

Server Address: 113.65.127.47

Server Port: 1194

Authentication Method: X.509

Encryption Type: BF-CBC

Renegotiate Interval: 3600

Keepalive Interval: 20

Keepalive Timeout: 60

Fragment: 1500

Private Key Password:

Output Verbosity Level: 3

**Advanced Settings**

Enable NAT:

Enable PKCS#12:

Enable X.509 Attribute nsCertType:

Enable HMAC Firewall:

Enable Compression LZ0:

Additional Configurations:

Save Close

- Go to VPN>OpenVPN>X.509 Certificate, import the related certificates:

**Status**   **OpenVPN**   **X.509 Certificate**   **Configuration Files**

**X.509 Certificate Import**

OpenVPN Mode: Client

Connection Index: 1

CA Certificate: Choose File | No file chosen | **ca.crt**

Local Certificate File: Choose File | No file chosen | **xx.crt**

Local Private Key: Choose File | No file chosen | **xx.key**

HMAC Firewall Key: Choose File | No file chosen

Pre-shared Key: Choose File | No file chosen

PKCS#12 Certificate: Choose File | No file chosen

User-Password File: Choose File | No file chosen

Private Key Password File: Choose File | No file chosen

**X.509 Certificate Files**

| Index | File Name  | File Size | Date Modified            |
|-------|------------|-----------|--------------------------|
| 1     | ca.crt     | 1188      | Mon Dec 14 13:49:11 2020 |
| 2     | client.crt | 4382      | Mon Dec 14 13:49:24 2020 |
| 3     | client.key | 1704      | Mon Dec 14 13:49:31 2020 |

- Click Apply. The Client had connected to the Server successfully:

**Overview**   **Status**   **OpenVPN**   **X.509 Certificate**   **Configuration Files**

**OpenVPN Information**

| Index | Enable | Description | Mode   | Status    | Uptime   | Local Virtual IP |
|-------|--------|-------------|--------|-----------|----------|------------------|
| 1     | true   |             | Client | Connected | 00:33:14 | 10.8.0.2         |

**OpenVPN Server Status**

| Index | Common Name | Status | Uptime | Remote Virtual IP | Remote IP | Remote Port |
|-------|-------------|--------|--------|-------------------|-----------|-------------|
|-------|-------------|--------|--------|-------------------|-----------|-------------|

## 4. Route Table

- Route Table on OpenVPN Server for reference.

**Status**   **Static Route**

**Route Table Information**

| Index | Destination | Netmask       | Gateway    | Metric | Interface |
|-------|-------------|---------------|------------|--------|-----------|
| 1     | 0.0.0.0     | 0.0.0.0       | 10.10.10.1 | 100    | wan       |
| 2     | 10.8.0.0    | 255.255.255.0 | 0.0.0.0    | 0      | tun1      |
| 3     | 10.10.10.0  | 255.255.255.0 | 0.0.0.0    | 0      | wan       |
| 4     | 192.168.5.0 | 255.255.255.0 | 10.8.0.2   | 0      | tun1      |
| 5     | 192.168.6.0 | 255.255.255.0 | 0.0.0.0    | 0      | lan0      |

- Route Table on OpenVPN Client for reference.

**Status**   **Static Route**   **RIP**   **OSPF**   **BGP**

**Route Table Information**

| Index | Destination   | Netmask         | Gateway       | Metric | Interface |
|-------|---------------|-----------------|---------------|--------|-----------|
| 1     | 0.0.0.0       | 0.0.0.0         | 10.152.127.41 | 100    | wwan1     |
| 2     | 10.8.0.0      | 255.255.255.0   | 0.0.0.0       | 0      | tun1      |
| 3     | 10.152.127.40 | 255.255.255.252 | 0.0.0.0       | 0      | wwan1     |
| 4     | 192.168.5.0   | 255.255.255.0   | 0.0.0.0       | 0      | lan0      |
| 5     | 192.168.6.0   | 255.255.255.0   | 10.8.0.1      | 0      | tun1      |



## 5. Testing

1. Go to **Maintenance>Debug Tool>Ping** and Ping from OpenVPN Client to OpenVPN Server LAN Device.

| <u>Ping</u>  | <u>Traceroute</u>                        | <u>AT Debug</u> |
|--|--|-----------------|
| <b>Ping Settings</b>   |  |                 |
| Host Address   | <input type="text" value="192.168.6.2"/> |                 |
| Ping Count   | <input type="text" value="5"/>           |                 |
| Local IP Address   | <input type="text" value="192.168.5.1"/> |                 |
| <pre> PING 192.168.6.2 (192.168.6.2) from 192.168.5.1: 56 data bytes 64 bytes from 192.168.6.2: seq=0 ttl=63 time=45.031 ms 64 bytes from 192.168.6.2: seq=1 ttl=63 time=52.755 ms 64 bytes from 192.168.6.2: seq=2 ttl=63 time=39.448 ms 64 bytes from 192.168.6.2: seq=3 ttl=63 time=44.184 ms 64 bytes from 192.168.6.2: seq=4 ttl=63 time=43.928 ms  --- 192.168.6.2 ping statistics --- 5 packets transmitted, 5 packets received, 0% packet loss round-trip min/avg/max = 39.448/45.069/52.755 ms                     </pre> |  |                 |

2. Go to **Maintenance>Debug Tool>Ping** and Ping from OpenVPN Server to OpenVPN Client LAN Device.

| <u>Ping</u>  | <u>Traceroute</u>                        | <u>AT Debug</u> |
|--|--|-----------------|
| <b>Ping Settings</b>   |  |                 |
| Host Address   | <input type="text" value="192.168.5.2"/> |                 |
| Ping Count   | <input type="text" value="5"/>           |                 |
| Local IP Address   | <input type="text" value="192.168.6.1"/> |                 |
| <pre> PING 192.168.5.2 (192.168.5.2) from 192.168.6.1: 56 data bytes 64 bytes from 192.168.5.2: seq=0 ttl=63 time=34.432 ms 64 bytes from 192.168.5.2: seq=1 ttl=63 time=44.027 ms 64 bytes from 192.168.5.2: seq=2 ttl=63 time=38.660 ms 64 bytes from 192.168.5.2: seq=3 ttl=63 time=44.314 ms 64 bytes from 192.168.5.2: seq=4 ttl=63 time=54.063 ms  --- 192.168.5.2 ping statistics --- 5 packets transmitted, 5 packets received, 0% packet loss round-trip min/avg/max = 34.432/43.099/54.063 ms                     </pre> |  |                 |

3. Test successfully.