

NR500 Series Industrial Cellular VPN Router

Application Note 003

Three Links Backup Between WAN, WWAN1 and

WWAN2

Version: Date: Status: V1.0.0 Jul 2018 Confidential





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1 Introduction

1.1 Overview

This document contains information regarding the configuration and use of three links backup between WAN, WWAN1 and WWAN2.

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:** V1.0.0(903.0) 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
2018/08/03	V1.0.0	V1.0.0(903.0)	First released

1.4 Rectifications

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. Specify EthO as Primary WAN interface and wwan1 as secondary backup interface, wwan2 as third backup interface.
- 2. If NR500 Pro detect primary WAN is down, it will switch to wwan1 to provide continual network connection.
- 3. If NR500 Pro detects both WAN and wwan1 is down, it will switch to wwan2 to provide continual network connection.
- 4. NR500 Pro will keep using WAN to ping the ICMP address, if success, then will switch back from backup link(wwan1 or wwan2) to primary link(WAN)



3 Configuration

3.1 Eth0 Configuration

1. Go to Link Management>Ethernet>Port Assignment, click the Edit Button of Eth0.

Navigate	Norx			Login: admin Reboot Logout
Overview	Port Ass	ignment	LAN	
Link Management	Genera	l Settings		
Connection Manager	Index	Port	Interface	
Cellular	1	Eth0	LAN0	
Ethernet	2	Eth1	LANO	ß

2. Specify the interface and set it as **WAN**, Click **Save**.

Port Settings			
General Settings			
Index	1		
Port	Eth0	Ŧ	
Interface	WAN	v	
		Save	Close

3. Go to Link Management>Ethernet>WAN, enter the relevant information of WAN to make sure connect to Internet.

Navigato	Norv					Login: admin	
Navigatev						Reboot	Logout
Overview	Port Assignment	WAN	LAN				
Link Management	General Settings						
Connection Manager			Connection Type	Static IP 🔹			
Cellular Ethornet			Ip Address	192.168.111.111	1		
To doubted Table 6			Netmask	255.255.255.0	1		
Industrial Interface			Gateway	192.168.111.1	1		
Network			Primary DNS	192.168.111.1	1		
Applications			Secondary DNS	8.8.8.8			
VPN	Advanced Settings						
Maintenance			NAT Enable				
			MTU	1500			
			Override Primary DNS				
		0	verride Secondary DNS				

4. Click Save>Apply.

3.2 Cellular Configuration

1. Go to Link Management>Cellular>Cellular, click the Edit button of SIM1 and SIM2.



Navigate	Vorx			Login: admin Reboot Logout	
Overview	Stat	us	Cellular		
Link Management	Moder	n General	Settings		ſ
Connection Manager	Index	SIM Card	Auto APN		
 Cellular Ethernet 	1	SIM1	true		
Industrial Interface	2	SIM2	true		

2. Enter the correct **APN**, **Username**, **Password** of **SIM1and SIM2** accordingly, to make sure connect to Internet. Click **Save**.

SIM Card Settings	
Modem General Settings	
Index	1
SIM Card	SIM1 v
Auto APN	
APN	internet
Username	
Password	
Authentication Type	Auto 🔻
PIN Code	0
Monthly Data Limitation	0 ⑦
Monthly Bliling Day	1 ⑦
Override Primary DNS	
Override Secondary DNS	
Modem Network Settings	
Network Type	Auto 🔻
Use All Bands	
	Save Close

3. Click Save>Apply.

3.3 Link Backup Strategy Configuration

1. Go to **Link Management>Connection Manager>Connection**, delete the WWAN1 and WWAN2 interface. Click **Save>Apply**.

NavigateV	Vorx				Login: admin Reboot	Logout
Overview	Status	Con	nection			
Link Management	General S	ettings				
 Connection Manager 	Priority	Enable	Connection Type	Description		(+)
Cellular	1	true	WWAN1			2 🛛
Industrial Interface	2	true	WWAN2			🗹 🗵

2. Add the WAN link and make it's priority as 1, meanwhile enable ICMP detection used for link detection. Click **Save**.



NavigateWorx				Login: admin Reboot	Logout
Overview Status C Link Management ≻ Connection Manager Cellular Priority Enable	Connection Is e Connection Type Descrip	tion			Ð
Connection Settings					
General Settings					
	Priority	1			
	Enable				
	Connection Type	WAN 🔻			
	Description		-		
ICMP Detection Settin	gs				
	Enable				
	Primary Server	8.8.8.8			
	Secondary Server	114.114.114.114			
	Interval	300	?		
	Retry Interval	5	?		
	Timeout	3	0		
	Retry Times	3	?		
			Save	С	lose

3.Add the WWAN1 link and make it's priority as 2, meanwhile enable ICMP detection used for link detection. Click **Save**

NavigateV	Vorx	Login: admin	
		Reboot	Logout
Overview	Status Connection		
Link Management Connection Manager 	General Settings Priority Enable Connection Type Description		(F)
Cellular	1 true WAN		⊠ ⊠
Luenet			
Connection S	Settings		
General Sett	ings		
	Priority 2		
	Enable 🗹		
	Connection Type WWAN1 🔹		
	Description		
ICMP Detect	tion Settings		
	Enable 🗹		
	Primary Server 8.8.8.8		
	Secondary Server 114.114.114		
	Interval 300 ⑦		
	Retry Interval 5		
	Timeout 3		
	Retry Times 3		
	Save	С	lose



4. Add the WWAN2 link and make it's priority as 3, meanwhile enable ICMP detection used for link detection. Click **Save**

	Norx						Login: admin	l
							Reboot	Logout
Overview	Status <u>Co</u>	onnection						
Link Management	General Settings							
Connection Manager Cellular	Priority Enable	Connection Type	Descript	ion				
Ethernet	2 true	WWAN1						Ľ⊗
Connection	Settings							
General Set	tings							
		Pric	ority	3				
		Ena	able					
		Connection T	уре	WWAN2	•			
		Descrip	tion					
ICMP Detec	tion Setting	s						
		Ena	able	•				
		Primary Ser	ver	8.8.8.8				
		Secondary Ser	ver	114.114.114.114				
		Inte	rval	300		?		
		Retry Inte	rval	5		?		
		Time	out	3		?		
		Retry Tir	nes	3		?		
						Save	с	lose

5. Click **Save>Apply**.



4 Testing

At the beginning both WAN and WWAN1 are online, NR500 Pro will connect to Internet with primary WAN.

If NR500 Pro detect the primary WAN is down, then it will switch to backup wwan1 for Internet connection.

If NR500 Pro detect both WAN and WWAN1 is down, then it will switch to WWAN2 for Internet connection.

If the Primary WAN up again, then NR500 Pro will switch back to primary WAN.

4.1 Internet Status

1. Go to **Overview>Overview>Active Link Information**, NR500 Pro is using primary WAN for Internet access.

С

Active Link Information	
Link Type	WAN
IP Address	192.168.111.111
Netmask	255.255.255.0
Gateway	192.168.111.1

2. Remove the Ethernet Cable of WAN, to make the primary link is down, NR500 Pro will switch to WWAN1 to communication with Internet.

Go to **Overview>Overview>Active Link Information** to check again, NR500 Pro is now using WWAN1 for Internet access.

Active Link Information	
Link Type	WWAN1
IP Address	10.162.9.151
Netmask	255.255.255.240
Gateway	10.162.9.152

3.When NR500 Pro detect WWAN1 is down, then switch to WWAN2 for Internet access.

Active Link Information	
Link Type	WWAN2
IP Address	10.132.13.31
Netmask	255.255.255.192
Gateway	10.132.13.32

4.Insert again the Ethernet Cable, NR500 Pro will switch back from WWAN2 to primary WAN again.

Go to Overview>Overview>Active Link Information to check the status, NR500 Pro



is now using primary link for Internet access.

Active Link Information	
Link Type	WAN
IP Address	192.168.111.111
Netmask	255.255.255.0
Gateway	192.168.111.1

4.2 Syslog

Syslog shows the switch process of link, please check below:

Jun 12 08:00:07 navigateworx user.debug connection_manager[1126]: setup active link wan Jun 12 08:00:07 navigateworx user.debug connection manager[1126]: start ICMP detecting(wan->8.8.8.8/114.114.114.114) Jun 12 08:00:07 navigateworx daemon.info dnsmasq[1139]: reading /etc/resolv.conf Jun 12 08:00:11 navigateworx user.debug connection_manager[1126]: WAN ICMP detecting failed (1/3)Jun 12 08:00:12 navigateworx user.debug modem[1294]: AT+CGDCONT=1,"IP" Jun 12 08:00:12 navigateworx user.debug modem[1294]: OK Jun 12 08:00:12 navigateworx user.debug modem[1294]: AT+CMGF=0 Jun 12 08:00:12 navigateworx user.debug modem[1294]: OK Jun 12 08:00:12 navigateworx user.debug modem[1294]: AT+CNMI=2,1 Jun 12 08:00:12 navigateworx user.debug modem[1294]: OK Jun 12 08:00:12 navigateworx user.debug modem[1294]: AT+CGREG? Jun 12 08:00:12 navigateworx user.debug modem[1294]: +CGREG: 2,1,"2508","6016C02",7 Jun 12 08:00:13 navigateworx user.debug modem[1294]: OK Jun 12 08:00:13 navigateworx user.debug modem[1294]: modem is ready Jun 12 08:00:14 navigateworx daemon.notice procd: /etc/rc.d/S96led: /etc/rc.common: line 165: uci_load: not found Jun 12 08:00:14 navigateworx user.debug connection_manager[1126]: timer proc status = 2 Jun 12 08:00:14 navigateworx user.debug connection_manager[1126]: start ICMP detecting(wan->8.8.8.8/114.114.114.114) Jun 12 08:00:14 navigateworx user.debug modem[1294]: OK Jun 12 08:00:14 navigateworx user.err modem[1294]: stopping quectel_cm failed Jun 12 08:00:14 navigateworx user.debug modem[1294]: set apn(3gnet) interface(wwan1) Jun 12 08:00:17 navigateworx user.debug connection_manager[1126]: connection_manager proc_icmp_detection Jun 12 08:00:17 navigateworx user.debug connection_manager[1126]: WAN ICMP detecting failed (2/3)Jun 12 08:00:20 navigateworx user.debug connection_manager[1126]: timer proc status = 2 Jun 12 08:00:20 navigateworx user.debug connection manager[1126]: start ICMP detecting(wan->8.8.8.8/114.114.114.114) Jun 12 08:00:23 navigateworx user.debug connection_manager[1126]: connection_manager

proc_icmp_detection



Jun 12 08:00:23 navigateworx user.debug connection_manager[1126]: WAN ICMP detecting failed (3/3) Jun 12 08:00:23 navigateworx user.debug connection_manager[1126]: Jun 12 08:00:28 navigateworx daemon.err udhcpc[1955]: started, v1.25.1 Jun 12 08:00:28 navigateworx daemon.err udhcpc[1955]: sending discover

Jun 12 08:00:28 navigateworx daemon.err udhcpc[1955]: sending select for 10.169.103.152

Jun 12 08:00:28 navigateworx daemon.err udhcpc[1955]: lease of 10.169.103.152 obtained, lease time 7200

Jun 12 08:00:29 navigateworx user.debug udhcpc: dhcpc get configuration of wwan1

Jun 12 08:00:29 navigateworx user.debug connection_manager[1126]: connection_manager proc_connected

Jun 12 08:00:29 navigateworx user.debug connection_manager[1126]: connection_manager proc_icmp_detection

Jun 12 08:00:29 navigateworx user.debug connection_manager[1126]: WWAN1 ICMP detecting success

Jun 12 08:00:29 navigateworx user.debug connection_manager[1126]: connection wwan1, active link 1, health state 0

Jul 29 19:22:20 navigateworx user.debug connection_manager[1126]: timer proc status = 0

Jul 29 19:22:20 navigateworx user.debug connection_manager[1126]: reconnect wan

Jul 29 19:22:20 navigateworx user.debug connection_manager[1126]: co

Jul 29 19:23:03 navigateworx user.debug modem[1294]: OK

Jul 29 19:23:06 navigateworx user.debug connection_manager[1126]: timer proc status = 2

Jul 29 19:23:06 navigateworx user.debug connection_manager[1126]: start ICMP detecting(wwan1->8.8.8.8/114.114.114.114)

Jul 29 19:23:06 navigateworx user.debug connection_manager[1126]: connection_manager proc_icmp_detection

Jul 29 19:23:06 navigateworx user.debug connection_manager[1126]: WWAN1 ICMP detecting failed (1/3)

Jul 29 19:23:09 navigateworx user.debug connection_manager[1126]: timer proc status = 2

Jul 29 19:23:09 navigateworx user.debug connection_manager[1126]: start ICMP detecting(wwan1->8.8.8.8/114.114.114.114)

Jul 29 19:23:09 navigateworx user.debug connection_manager[1126]: connection_manager proc_icmp_detection

Jul 29 19:23:09 navigateworx user.debug connection_manager[1126]: WWAN1 ICMP detecting failed (2/3)

Jul 29 19:23:11 navigateworx user.debug connection_manager[1126]: timer proc status = 0

Jul 29 19:23:11 navigateworx user.debug connection_manager[1126]: reconnect wan

Jul 29 19:23:11 navigateworx user.debug connection_manager[1126]: connection_manager proc_connect

Jul 29 19:23:11 navigateworx user.debug connection_manager[1126]: connection

Jul 29 19:23:12 navigateworx user.debug connection_manager[1126]: start ICMP detecting(wwan1->8.8.8.8/114.114.114.114)

Jul 29 19:23:12 navigateworx user.debug connection_manager[1126]: connection_manager proc_icmp_detection



Jul 29 19:23:12 navigateworx user.debug connection_manager[1126]: WWAN1 ICMP detecting failed (3/3)

Jul 29 19:23:12 navigateworx user.debug connection_manager[1126]: connection_manager proc_disconnect

Jul 29 19:23:12 navigateworx user.debug connection_manager[1126]: optimal connection wwan2 health state 1 cs 0, current connection wwan1 health state 4 cs 0

Jul 29 19:23:12 navigateworx user.debug connection_manager[1126]: SIM switch from SIM1 to SIM2, reload modem with SIM2

Jul 29 19:23:12 navigateworx user.debug connection_manager[1126]: II wwan2 reconnect in 10s

Jul 29 19:23:13 navigateworx user.debug modem[1294]: AT+CSQ

Jul 29 19:23:13 navigateworx user.debug modem[1294]: +CSQ: 31,99

Jul 29 19:23:13 navigateworx user.debug modem[1294]: OK

Jul 29 19:23:13 navigateworx user.debug modem[1294]: AT+CGREG?

Jul 29 19:23:13 navigateworx user.debug modem[1294]: +CGREG: 2,1,"2508","6016C02",7

Jul 29 19:23:55 navigateworx user.debug connection_manager[1126]: setup active link wwan2

Jul 29 19:23:55 navigateworx user.debug connection_manager[1126]: start ICMP detecting(wwan2->8.8.8.8/114.114.114.114)

Jul 29 19:23:55 navigateworx daemon.info dnsmasq[1139]: reading /etc/resolv.conf

Jul 29 19:23:58 navigateworx user.debug connection_manager[1126]: connection_manager proc_icmp_detection

Jul 29 19:23:58 navigateworx user.debug connection_manager[1126]: WWAN2 ICMP detecting success

Jul 29 19:23:58 navigateworx user.debug connection_manager[1126]: connection wwan2, active link 1, health state 0

Jul 29 19:24:01 navigateworx user.debug modem[3832]: AT+CNUM

Jul 29 19:24:01 navigateworx user.debug modem[3832]: OK

Jul 29 19:24:01 navigateworx user.debug modem[3832]: AT+CSQ

Jul 29 19:24:01 navigateworx user.debug modem[3832]: +CSQ: 31,99

Jul 29 19:24:01 navigateworx user.debug modem[3832]: OK

Jul 29 19:24:01 navigateworx user.debug modem[3832]: AT+CGREG?

Jul 29 19:24:01 navigateworx user.debug modem[3832]: +CGREG: 2,1,"2508","6016C02",7

Jul 29 19:24:01 navigateworx user.debug modem[3832]: OK

orx user.debug modem[3832]: OK

Jul 29 19:24:14 navigateworx user.debug connection_manager[1126]: timer proc status = 2

Jul 29 19:24:14 navigateworx user.debug connection_manager[1126]: start ICMP detecting(wan->8.8.8.8/114.114.114.114)

Jul 29 19:24:14 navigateworx user.debug connection_manager[1126]: connection_manager proc_icmp_detection

Jul 29 19:24:14 navigateworx user.debug connection_manager[1126]: WAN ICMP detecting success

Jul 29 19:24:14 navigateworx user.debug connection_manager[1126]: connection wan, active link 0, health state 0