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Quick Start Guide

V431 VoIP Gateway 3x FXS + 1x FXO

L4 L3 L2 L1 WAN   P4 P3 P2 P1   Alarm Run Power

Smartvoice VoIP Gateway

NetComm™

Safety and Precaution

Installation

- Use only the type of power source indicated on the marking labels.
- Use only power adapter supplied with the product.
- Do not overload wall outlet or extension cords as this may increase the risk of electric shock or fire. If the power cord is frayed, replace it with a new one.
- Proper ventilation is necessary to prevent the product overheating. Do not block or cover the slots and openings on the device, which are intended for ventilation and proper operation. It is recommended to mount the product with a stack.
- Do not place the product near any source of heat or expose it to direct sunlight.
- Do not expose the product to moisture. Never spill any liquid on the product.
- Do not attempt to connect with any computer accessory or electronic product without instructions from qualified service personnel. This may result in risk of electronic shock or fire.
- Do not place this product on unstable stand or table.

When in Use

- Power off and unplug this product from the wall outlet when it is not in use or before cleaning. Pay attention to the temperature of the power adapter. The temperature might be high.
- After powering off the product, power on the product at least 15 seconds later.
- Do not block the ventilating openings of this product.
- When the product is expected to be not in use for a period of time, unplug the power cord of the product to prevent it from the damage of storm or sudden increases in rating.

Service

Do not attempt to disassemble or open covers of this unit by yourself. Nor should you attempt to service the product yourself, which may void the user's authority to operate it. Contact qualified service personnel under the following conditions:

- If the power cord or plug is damaged or frayed.
- If liquid has been spilled into the product.
- If the product has been exposed to rain or water.
- If the product does not operate normally when the operating instructions are followed.
- If the product has been dropped or the cabinet has been damaged.
- If the product exhibits a distinct change in performance.

Caution

- Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.

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Contents

Note: this reference is intended to provide a quick overview of NetComm's SmartVoice VoIP Gateways, using the V431 (3 FXS + 1 FXO) as an example in typical applications. The target reader is someone who has already gained knowledge and basic skills in VoIP and PBX systems.

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SECTION 1:   BEFORE CONFIGURING THE V431

1.1 Default Network Settings:

LAN Port: 192.168.8.254/24;

LAN DHCP Server: enabled;

WAN Port: 192.168.1.2/24;

1.2 Save Settings:

Some changes in settings won't take effect until the V431 system is restarted. Please click "Accept" on web configuration page to commit your changes and then click "Save" Settings" into V431 flash.

Port of Web Access from WAN [0=disable, 1 - 65535]	8880
Enable Web UI	☑
Enable Telnet Service	☐

Accept   Reset   Default

All settings will take effect only after Gateway is restarted.
Please save all settings before restart the system.

Fig 1-1: Apply Settings

To restart the system select "Restart" and click "Accept". These "Save Settings" and "Restart" options are under System Setting > System Operation sub-menu. Fig 1-1 shows the save setting and restart screen.

System Operation	
☑ Save Settings	Save all configurations.
	Be sure to save all settings before restart.
☑ Restart	Restart the Gateway right away. All calls will be DROPPED when Restart.
Accept	

Fig 1-1: Save Settings & Restart

1.3 Internet Access Bandwidth Recommendation:

To guarantee the V431 has enough bandwidth for carrying VoIP traffic, we suggest providing a dedicated 256 Kbps (upstream) ADSL link to the V431. The reason for this is that real bandwidth used by VoIP traffic is much more than the codec bit rate itself because the RTP, IP and ATM header adds additional overhead on raw VoIP payloads.

1.4 Querying network settings using the V431 IVR system

The V431 provides a convenient IVR function which allows users to query and set some of V431 basic configurations using an analog telephone handset. It is very useful when the users check and set the IP address of the V431. Following are simple instructions of using the IVR. For complete reference, please see its the user guide.

To access IVR setting mode: lift a telephone handset connected to a FXS port and input "**password#"; the default "password" is "admin", so when the V431 is in default settings the users input "***4144534954#" to enter the IVR.

Note: three asterisk "" is required for type in default password "admin" as the third one indicates the input is alphabets rather than numbers.*

Use the V431 function code to query or set network information: for example: enter "301" to query LAN port IP address; enter "311" to set LAN port IP address and type "192*168*5*254#" to set its LAN IP to 192.168.5.254.

After entering IVR mode, type "509" to save current settings. Wait for about 3 seconds a confirmation tone "1" will be played. At this point, new settings are saved in the V431 flash. Reboot the V431 to activate the new settings.

SECTION 2:   CONNECTING V431 TO INTERNET

2.1 Internet Access

Fig 2-1 shows a simplified network connection of the V431. Methods of traversing NAT/Firewall are also discussed below.
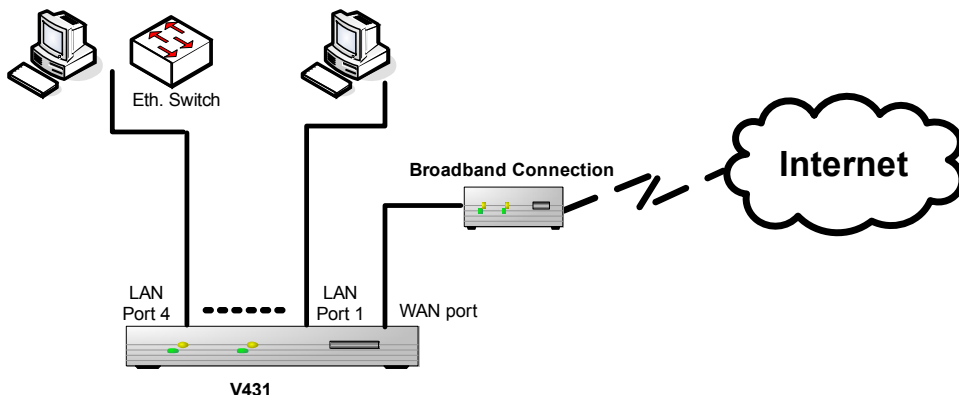

Figure 2-1: V431 broadband access & Ethernet connection

WAN port (public IP)

When the V431 has a public IP for Internet connection regardless of whether it is a static public IP, dynamic public IP via DHCP or PPPoE, the V431 will be exposed to the Internet and should have no problem to traverse a NAT/Firewall.

WAN port (private IP):

when the V431 WAN port is assigned with a private IP, NAT/firewall traversal settings need to be configured to ensure the V431 can support bi-directional conversations.

Following section describes 3 different ways to allow V431 traverse NAT/Firewall.

> *Note: traversing NAT/firewall is only required when the WAN uses a private IP address and when your VoIP service provider doesn't offer NAT traversing at their server side. Please consult your provider for the best method of traversing NAT.*

1. Port Forwarding Support:

This method will allow the V431 to traverse any type of NAT. It requires end users to do configuration on both the V431 and the users' broadband router.

Following are the conditions to use this method:

1) the Internet connection needs to have a fixed public IP;

2) the broadband router needs to be configured to forward a specific range of ports to the private LAN IP address of V431.

The router side:

The router needs to be configured to forward a specific range of ports to the private IP address of the V431, on which ports the V431 listens for VoIP signaling and will send/receive RTP traffic. This type of setting is normally under router "Port Forwarding" or "Virtual Server" section.

The following image Fig 2-2 comes from NetComm's NB620W Wireless Router. It illustrates the NB620W forwarding UDP port 5988 and UDP ports UDP 9000 ~ 9008 to 192.168.1.131, which is the IP address of the V431.
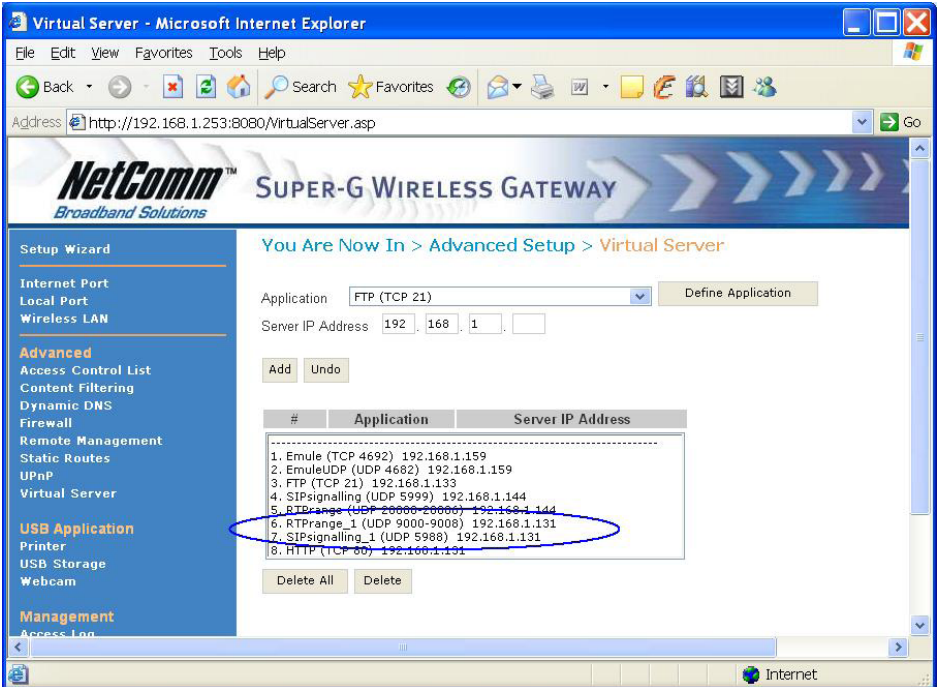

Fig 2-2: NB620 router port forwarding setting

The following image Fig 2-3 illustrates the settings on the V431. The V431 uses a static LAN IP 192.168.1.131. The 'listen' port and RTP port base have to match the settings in the NB620W as shown above. Note: the number of RTP ports used by the V431 is based on the total number of FXS and FXO ports. Each FXS/FXO port requires two UDP ports. So for the V431 (3FXS +1FXO) it needs 8 ports and the actual RTP UDP port range is **RTP port base ~ RTP port base + twice of total number of FXS/FXO ports** (port 9000~9008 in this example)

Fig 2-3

In the V431 NAT traversal section, the user needs to specify the fixed public IP of the broadband router and check 'NAT public IP' option.

NAT Traversal		
NAT Public IP ☑	NAT IP/Domain	202.44.167.165
Enable STUN Client ☐	STUN Server IP / Domain	stun.fwdnet.net
	STUN Server Port[1 ~ 65535]	3478
Enable UPnP Control Point ☐		

Fig 2-4

2. STUN:

using the STUN protocol can help a VoIP device to detect the presence and type of NAT which ensures bi-directional conversation and avoids configuring broadband Internet router. However, the STUN cannot traverse all types of NAT. The following image shows you an example of STUN configuration.

NAT Traversal		
NAT Public IP ☐	NAT IP/Domain	202.44.167.165
Enable STUN Client ☑	STUN Server IP / Domain	stun.fwdnet.net
	STUN Server Port[1 ~ 65535]	3478
Enable UPnP Control Point ☐		

Fig 2-5: STUN setting

3. UPnP:

this function only works when the broadband router supports UPnP and has it enabled. Note: many routers claim support for UPnP but do not work very well. So, be cautious to use this method in order to allow the V431 to traverse NAT.

SECTION 3: CONFIGURING V431 SIP

3.1 SIP configuration

Before you start to configure the V431 SIP settings, you need to collect the following information:

VoIP phone number (also called SIP username):

VoIP account authentication ID:

VoIP account authentication password (password):

SIP proxy server IP/URL:

SIP proxy server port:

SIP Domain name:

Your service's preferred voice codec:

The following images illustrate typical V431 SIP client settings. The analog ports of the V431 can be registered under one SIP account (representative account) or individual SIP accounts for each FXS line.

				SIP				
Line	Type	Number	Register	Invite with ID / Account	User ID / Account	Password	Confirm Password
FXS Representative Number			☐			••••••••••	••••••••••
FXO Representative Number			☐			••••••••••	••••••••••
1	FXS	799901 [Auto]	☑	☑	799901	••••••••••	••••••••••
2	FXS	799902	☑	☑	799902	••••••••••	••••••••••
3	FXS	799903	☑	☑	799903	••••••••••	••••••••••
4	FXO	799904	☑	☑	799904	••••••••••	••••••••••

☑ Enable Support of SIP Proxy Server / Soft Switch

☑ Enable SIP Proxy 1			
Proxy Server IP / Domain	fwd.pulver.com	Proxy Server Port [1 - 65535]	5060
Proxy Server Realm		TTL (Registration interval) [10 - 7200 s]	240
SIP Domain	fwd.pulver.com	Use Domain to Register	☑
☐ Enable SIP Proxy 2			
Proxy Server IP / Domain	192.168.1.1	Proxy Server Port [1 - 65535]	5060
Proxy Server Realm		TTL (Registration interval) [10 - 7200 s]	600
SIP Domain		Use Domain to Register	☐

Fig 3-1: SIP configuration using different accounts for each FXS port

				SIP				
Line	Type	Number	Register	Invite with ID / Account	User ID / Account	Password	Confirm Password
FXS Representative Number		5500	☑		5500	••••••••••	••••••••••
FXO Representative Number		6600	☑		6600	••••••••••	••••••••••
1	FXS	5001 [Auto]	☐	☐		••••••••••	••••••••••
2	FXS	5002	☐	☐		••••••••••	••••••••••
3	FXS	5003	☐	☐		••••••••••	••••••••••
4	FXO	5004	☐	☐		••••••••••	••••••••••

Fig 3-2: SIP configuration using a single account for all FXS ports

Note: if you use representative account to register all FXS ports, you need make sure the SIP server that the V431 registers on supports multiple concurrent active calls using the SIP representative account. Check this with your VoIP service provider.

Note: the V431 supports SIP proxy mode and Peer-to-Peer call (direct IP) at the same time. That means even when the V431 registers on a SIP server, the user can still use the V431 to make Peer-to-Peer calls. The Peer-to-Peer calls are defined in "Local Phone Book" configuration section. Fig 3-3 is an example of phone book setting.

Phone Book				
1 - 5	6 - 10	11 - 15	16 - 20	21 - 25
26 - 30	31 - 35	36 - 40	41 - 45	46 - 50
51 - 55	56 - 60	61 - 65	66 - 70	71 - 75
76 - 80	81 - 85	86 - 90	91 - 95	96 - 100

#	Gateway Name	Gateway Number	IP / Domain Name	Port
1	GW7700	7700	61.141.247.21	5060
2				5060
3				5060

Fig 3-3: example of local phone book setting

3.2 Check VoIP registration status

SIP registration status can be check at Status > Current Status. In Fig 3-4 example, the FXS1, FXS2 and FXS3 registered successfully, but FXO1 failed to register.

Current Status							
Port Status							
No	Type	Extension Number	Line Status	Calls	Dialed Number	Proxy Register	UPnP on RTP
1	FXS	5001	Idle	0		Successful	
2	FXS	5002	Idle	0		Successful	
3	FXS	5003	Idle	0		Successful	
4	FXO	5004	Idle	0		Failed	
SIP Proxy Hunting Number Registration				FXS Disabled (00:03:11), Trunk Disabled (00:03:11)			
Server Registration Status							
DDNS Registration				Disabled (00:03:11)			
Phone Book Manager Registration				Disabled (00:03:11)			
STUN Registration				Disabled (00:03:11)			
UPnP Negotiation				Disabled (00:03:11)			

SECTION 4:   VOIP APPLICATIONS

4.1 Basic Usage: Stand Alone VoIP gateway

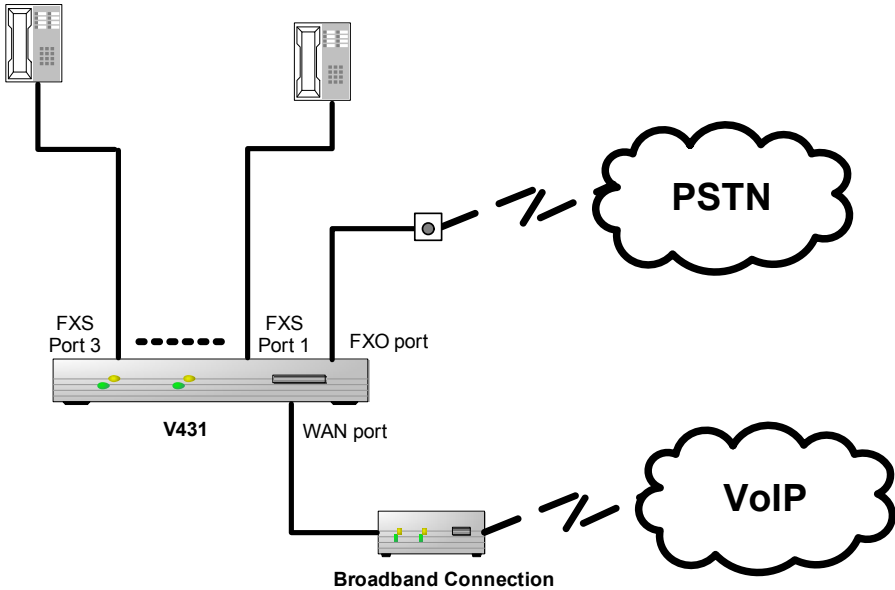The Fig 4-1 shows a diagram in which the V431 is used as a stand alone VoIP gateway.

Figure 4-1: V431 works as a stand alone VoIP box

General FXS operation behavior:

The operation of the FXS ports of the V431 is straight forward: lift up a handset and dial the destination number to make VoIP calls.

General FXO operation behavior:

The FXO port of the V431 allows the user to route calls between the PSTN and VoIP networks. Following are scenarios of different types of call routing.

1) When an incoming VoIP call reaches the VoIP phone number of the FXO port, the FXO port will pick up the landline that it is connected to. A dial tone generated by the landline will be provided to the calling party through the VoIP voice channels. At this point, the user is able to dial the destination number (a landline or mobile number), and the V431 will use the landline to establish the call.

Call Model 1:

1. Calling party (from VoIP network) calls the VoIP number associated with the FXO port of the V431 (called party);
2. The FXO loops the landline (off hook action) and dial tone is generated by the landline;
3. Calling party inputs real destination number (a landline or mobile number)
4. The landline connected to the FXO port of the V431 tries to establish the call through the PSTN network.

2) When an incoming PSTN call reaches the PSTN phone number of the landline connected to the FXO port of the V431, the FXO port will pick up the landline after a very short delay. A voice prompt will be played and ask the calling party to input a VoIP phone number or an extension phone number of the V431. Once the V431 receives the VoIP phone number sent from the PSTN call, it will try to connect to the destination (the VoIP phone number or the extension).

Call Model 2:

1. Calling party (from PSTN network) calls PSTN number of the FXO port connected to landline (called party)
2. The FXO loops the landline (off hook action) and a voice prompt from the V431 prompts calling party to enter number
3. The calling party inputs a VoIP phone number or extension phone number
4. The FXO port will use its VoIP phone number to establish the call through the VoIP network.

Enable Hotline and Hotline Dial Wait on the FXO port

When the "Hotline" and "Hotline Dial Wait" functions are used in the FXO port, the V431 will divert an incoming call (from PSTN network) to an extension line after a set wait time. For example, assuming the assigned hotline for the FXO port is extension 601 and the wait time is 6 seconds. If no VoIP number or extension number is dialed within 6 seconds, the call will be automatically diverted to this assigned hotline (ext. 601). This feature might be very useful when the V431 is used with a PBX because the diverted call will ring on the FXS port which could be the receptionist. The PBX will answer this call and transfer the call to a person that the calling party would like to speak to. Fig 4-2 shows an example of hotline configuration.

	Enable	Type	Hot Line	Hot Line No.	Warm Line (Hot Line Delay)	Dial-Out Prefix	Group Hunting	Grounding Compensation	Enable FAX
Line 1	☑	FXS	☐				☑		☑
Line 2	☑	FXS	☐				☑		☑
Line 3	☑	FXS	☐				☑		☑
Line 4	☑	FXO	☑	601	6 [0 – 60 s]			☐	☑

Fig 4-2: FXO Hotline configuration

4.2 Advanced Usage: Connecting with PBX system

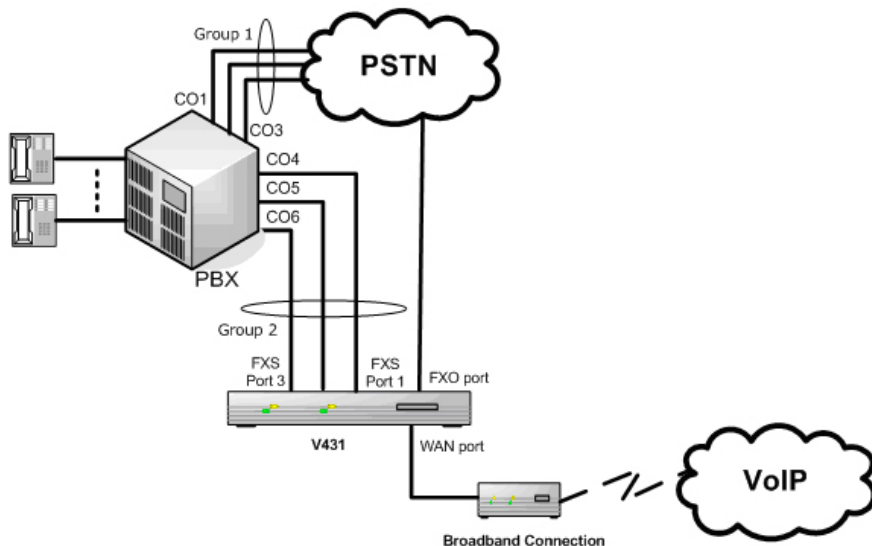Fig 4-3 shows a simplified diagram of connecting V431 with PBX system

Figure 4-3: V431 works in conjunction of PBX

When the V431 is used in conjunction with a PBX system, the FXS ports can connect to PBX CO line ports. In this type of setup, the PBX can be configured to separate CO lines into two different exchange line hunting groups. We can use Figure 4-3 as an example.

In Figure 4-3, the PBX separates CO line 1~6 into two groups: line 1-3 (group 1) and line 4-6 (group 2). The PBX can keep the old convention for people dialing out (e.g. dialing "0" to get an available CO line (exchange line)) from normal landline hunting group to allow people to call outside using PSTN network. However, the PBX can be programmed to put CO4 ~ CO6 into another CO line hunting group which consists of FXS1 ~ FXS3 VoIP links, and use another prefix to get VoIP lines by dialing "9".

Therefore, practical usage could be like this:

a)   For local calls: dial "0" > CO hunting group 1 > any available landline

b)   For STD & international calls: dial "9" > CO hunting group 2 > any available VoIP line (FXS line)

c)   The V431 might be registered with a SIP server using one SIP account.

This has two advantages:

1)   The calling party only needs to remember a single VoIP number to call the V431.

2)   When an incoming VoIP call reaches the V431, it will choose any available FXS line to establish the call. In contrast, if each FXS line uses a different account to register and a specific line is engaged, at the point the other party calls the line, then the calling party has to call this line another time or call other FXS lines of the V431.

d)   The FXO can be used to hop on the PSTN network if a call is initiated from the VoIP network, or hop on the VoIP network if call is initiated from the PSTN network (for FXO port processing behavior, please see Section 4: General FXO operation behaviors).

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APPENDIX A: LEGAL & REGULATORY INFORMATION

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ACA (Australian Communications Authority) requires you to be aware of the following information and warnings:

(1)   This unit shall be connected to the Telecommunication Network through a line cord which meets the requirements of the ACA TS008 Standard.

(2)   This equipment has been tested and found to comply with the Standards for C-Tick and or A-Tick as set by the ACA . These standards are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio noise and, if not installed and used in accordance with the instructions detailed within this manual, may cause interference to radio communications. However, there is no guarantee that interference will not occur with the installation of this product in your home or office. If this equipment does cause some degree of interference to radio or television reception, which can be determined by turning the equipment off and on, we encourage the user to try to correct the interference by one or more of the following measures:

- *Change the direction or relocate the receiving antenna.*
- *Increase the separation between this equipment and the receiver.*
- *Connect the equipment to an alternate power outlet on a different power circuit from that to which the receiver/TV is connected.*
- *Consult an experienced radio/TV technician for help.*

(3)   The power supply that is provided with this unit is only intended for use with this product. Do not use this power supply with any other product or do not use any other power supply that is not approved for use with this product by NetComm. Failure to do so may cause damage to this product, fire or result in personal injury.

Product Warranty

The warranty is granted on the following conditions:

1. This warranty extends to the original purchaser (you) and is not transferable;

2. This warranty shall not apply to software programs, batteries, power supplies, cables or other accessories supplied in or with the product;

3. The customer complies with all of the terms of any relevant agreement with NetComm and any other reasonable requirements of NetComm including producing such evidence of purchase as NetComm may require;

4. The cost of transporting product to and from NetComm's nominated premises is your responsibility; and,

5. NetComm does not have any liability or responsibility under this warranty where any cost, loss, injury or damage of any kind, whether direct, indirect, consequential, incidental or otherwise arises out of events beyond NetComm's reasonable control. This includes but is not limited to: acts of God, war, riot, embargoes, acts of civil or military authorities, fire, floods, electricity outages, lightning, power surges, or shortages of materials or labour.

6. The customer is responsible for the security of their computer and network at all times. Security features may be disabled within the factory default settings. NetComm recommends that you enable these features to enhance your security.

The warranty is automatically voided if:

1. You, or someone else, use the product, or attempts to use it, other than as specified by NetComm;

2. The fault or defect in your product is the result of a voltage surge subjected to the product either by the way of power supply or communication line, whether caused by thunderstorm activity or any other cause(s);

3. The fault is the result of accidental damage or damage in transit, including but not limited to liquid spillage;

4. Your product has been used for any purposes other than that for which it is sold, or in any way other than in strict accordance with the user manual supplied;

5. Your product has been repaired or modified or attempted to be repaired or modified, other than by a qualified person at a service centre authorised by NetComm; and,

6. The serial number has been defaced or altered in any way or if the serial number plate has been removed.

Limitations of Warranty

The Trade Practices Act 1974 and corresponding State and Territory Fair Trading Acts or legalisation of another Government ("the relevant acts") in certain circumstances imply mandatory conditions and warranties which cannot be excluded. This warranty is in addition to and not in replacement for such conditions and warranties.

To the extent permitted by the Relevant Acts, in relation to your product and any other materials provided with the product ("the Goods") the liability of NetComm under the Relevant Acts is limited at the option of NetComm to:

- *Replacement of the Goods; or*
- *Repair of the Goods; or*
- *Payment of the cost of replacing the Goods; or*
- *Payment of the cost of having the Goods repaired.*

All NetComm ACN 002 490 486 products have a standard 12 months warranty from date of purchase. However some products have an extended warranty option (refer to packaging). To be eligible for the extended warranty you must supply the requested warranty information to NetComm within 30 days of the original purchase by registering on-line via the NetComm web site at

www.netcomm.com.au

Contact Information

If you have any technical difficulties with your product, please do not hesitate to contact NetComm's Customer Support Department.

Email: support@netcomm.com.au

www.netcomm.com.au

Note: NetComm Technical Support for this product only covers the basic installation and features outlined in the Quick Start Guide. For further information regarding the advanced features of this product, please refer to the configuring sections in this User Guide or contact a Network Specialist.