



**VWG-40**  
**Viconics Wireless Gateway**  
**Design Consideration and Setup Guide**  
 (Issue Date June 9, 2008 – 028-6013 E06)

**Product overview**

The VWG-40 and related wireless thermostats are targeted to retrofit applications where the addition of communicating field bus wiring within the building space is prohibitive. The Gateway and Communicating Thermostats with wireless field bus encourages the use of existing wiring utilized by existing electronic thermostat type controls.



The VWG-40-XX-1000 when utilized in conjunction with the VT7xxxXxxxxW series wireless thermostats will offer the integrator simple BACnet IP or BACnet MS/TP objects to integrate over standard building automation systems using familiar integration toolsets.



A maximum of 30 wireless thermostats can be wirelessly attached to a single VWG

The following additional documentation is available on [www.viconics.com](http://www.viconics.com)

- Gateway BACnet integration guide (VWG-40-IP & VWG-40-MSTP), is available in document ITG-VWG-40-BAC-Exx
- Information on VWG hardware installation is available in document LIT-VWG-40-INSTALL-Exx

**Part available**

Part number	Description
VWG-40-IP-1000	Viconics BACnet over IP wireless gateway. Includes: <ul style="list-style-type: none"> <li>- Supports up to 30 wireless thermostats</li> <li>- Factory mounted wireless adapter</li> <li>- 24 Vac panel mounted power supply</li> <li>- Gateway mounted antenna</li> </ul>
VWG-40-MSTP-1000	Viconics BACnet RS485 MS-TP wireless gateway. Includes: <ul style="list-style-type: none"> <li>- Supports up to 30 wireless thermostats</li> <li>- Factory mounted wireless adapter</li> <li>- 24 Vac panel mounted power supply</li> <li>- Gateway mounted antenna</li> </ul>
VWG-40-LON-1000 <b>(Upcoming)</b>	Viconics LON wireless gateway. Includes: <ul style="list-style-type: none"> <li>- Supports up to 30 wireless thermostats</li> <li>- Factory mounted wireless adapter</li> <li>- 24 Vac panel mounted power supply</li> <li>- Gateway mounted antenna</li> </ul>
VWG-APP	Interface software for VWG configuration and set-up. Operates under Windows XP™. Uses a LAN crossover IP connection for initial set-up.
VWG-RA	Remote antenna for gateway when the gateway is installed inside a metal cabinet or when remote antennal mounting is required by physical installation
VWG-WA	Replacement antenna for gateway mounted antenna setup
VWG-PS-DC	24 Vac to 15 Vdc panel mounted power supply for VWG
VWG-PS-AC	120 Vac to 15 Vdc power supply for VWG with cord
VWG-BB	Replacement battery backup pack for the VWG

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Electronic controls are static sensitive devices. Discharge yourself properly before manipulation and installing the Viconics wireless gateway.

All Viconics wireless gateways and related wireless thermostats are to be used only as operating controls. Whenever a control failure could lead to personal injury and/or loss of property, it becomes the responsibility of the user to add safety devices and/or alarm system to protect against such catastrophic failures.

All VT7000 series wireless thermostats and associated VWG (Viconics Wireless Gateway) have been rigorously tested to ensure reliable operation in most building applications using the latest 2.4 Zigbee technologies. Viconics cannot guarantee against potential network interference should additional wireless systems be deployed sharing close proximity.

Best practices covered in this manual and all related Viconics VWG documents should be considered as a guide to apply Viconics Wireless Network devices only. The instructions included in this manual are based upon Viconics in house testing and should be referred to as a guide only.

Viconics Inc. may not be held liable for continued reliable, or robust operation of any and all wireless based devices. Although Viconics has taken many precautions in assuring the robustness of the VT7000 series wireless thermostat product line and associated network access point (VWG-40-XXXX-1000) Please note; future application of additional wireless devices utilizing the same or similar channels and / or frequencies may degrade performance of overall system and / or reliability.

Non-approved modifications or changes made to the VWG or wireless thermostats may void the FCC compliance of the VWG and wireless thermostats.

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

## About Viconics Wireless Mesh Networks

The Viconics Wireless Gateway (VWG) and related wireless thermostat family (VT7xxxXxxxxW) networkable devices operate using ZigBee/IEEE 802.15.4 physical layer for communication.

### General characteristics of the wireless physical communication layer are:

- Uses a wireless physical layer of 2.4GHz with a data rates of 250 kbps
- Yields high throughput and low latency
- Automatic multiple topologies configuration: star, peer-to-peer, mesh
- Fully handshake protocol for transfer reliability
- Range: 30 feet / 10M typical (up to 100 feet / 30 M based on environment)

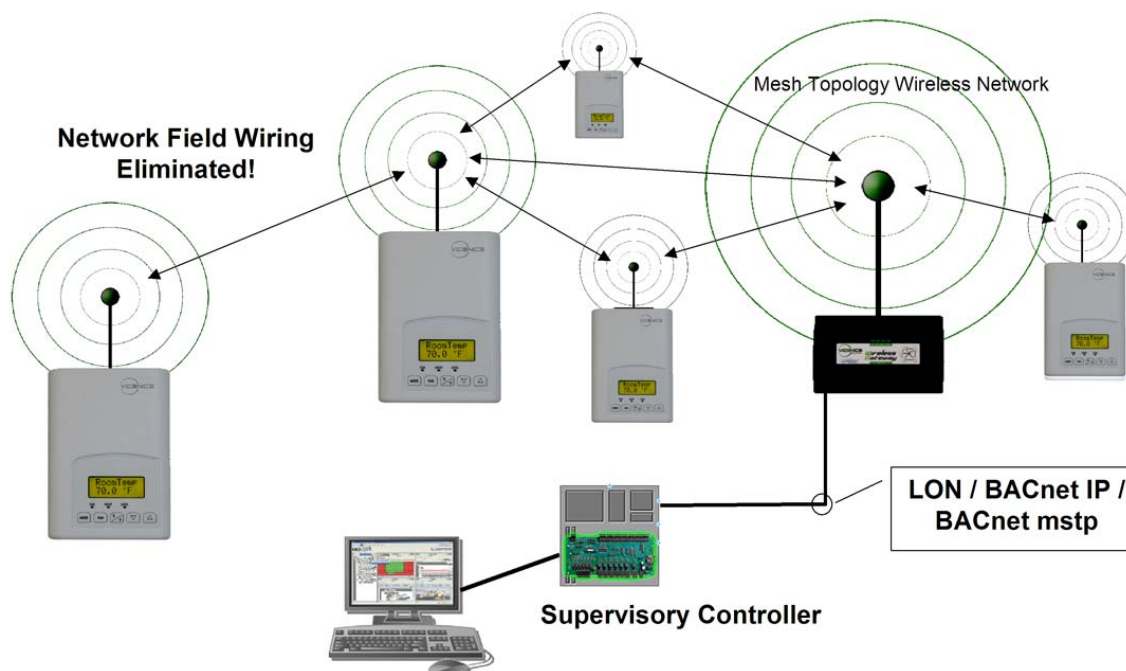
### IEEE 802.15.4 along with ZigBee's Network and Application Support Layer provide:

- Low cost installation deployment
- Ease of implementation
- Reliable data transfer
- Short range operation
- Very low power consumption
- Appropriate levels of security

The VWG acts as network coordinator device for the IEEE 802.15.4/ZigBee network used with the Viconics wireless thermostats.

Many network specific features of the IEEE 802.15.4 standard are not covered in detail in this paper. However, these are necessary for the efficient operation of a ZigBee network. These features of the network physical layer include receiver energy detection, link quality indication and clear channel assessment. Both contention-based and contention-free channel access methods are supported with a maximum packet size of 128 bytes, which includes a variable payload up to 104 bytes. Also employed are 64-bit IEEE and 16-bit short addressing, supporting over 65,000 nodes per network. All those properties of the physical layer are used and employed by the Viconics mesh network but are hidden to the installed / user for ease of configuration and commissioning of the network database.

A maximum of **30** networkable thermostats can be supported by a single VWG. Database creation and configuration is easily made using a Viconics software appliance that communicates with the VWG.

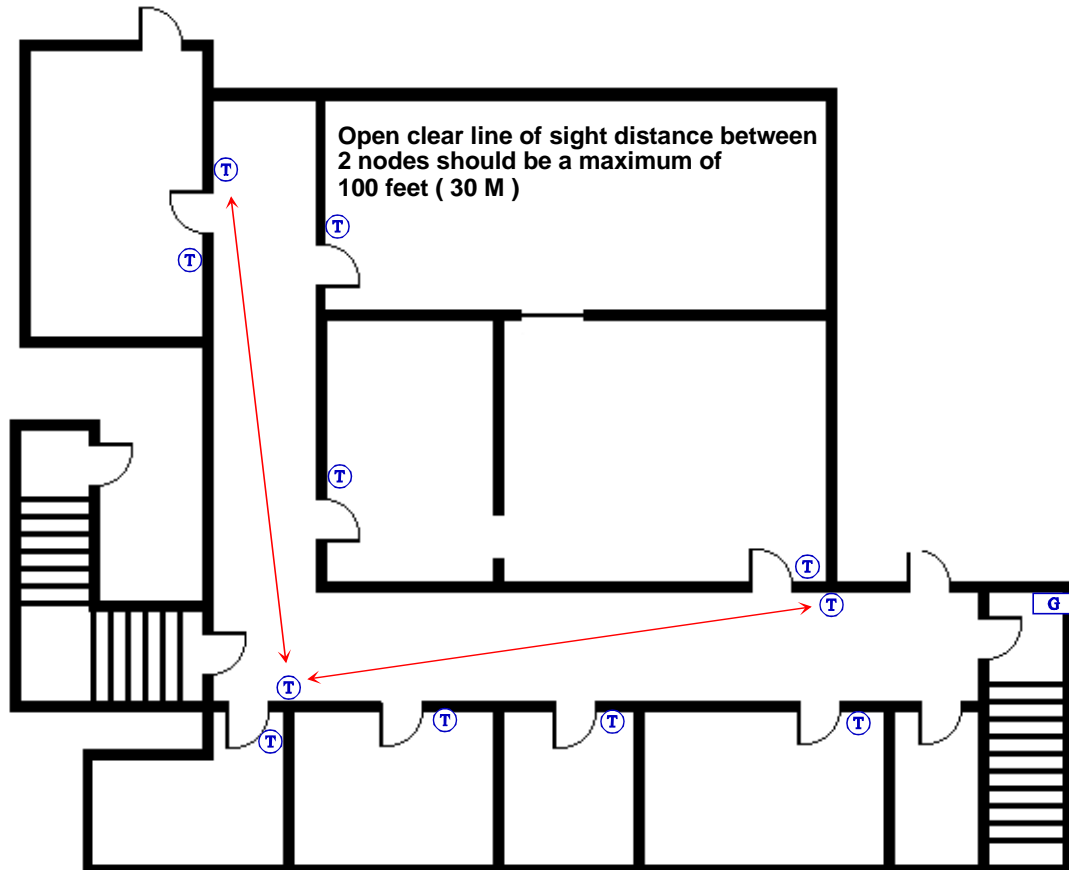


## Basic Initial Design And Deployment Consideration

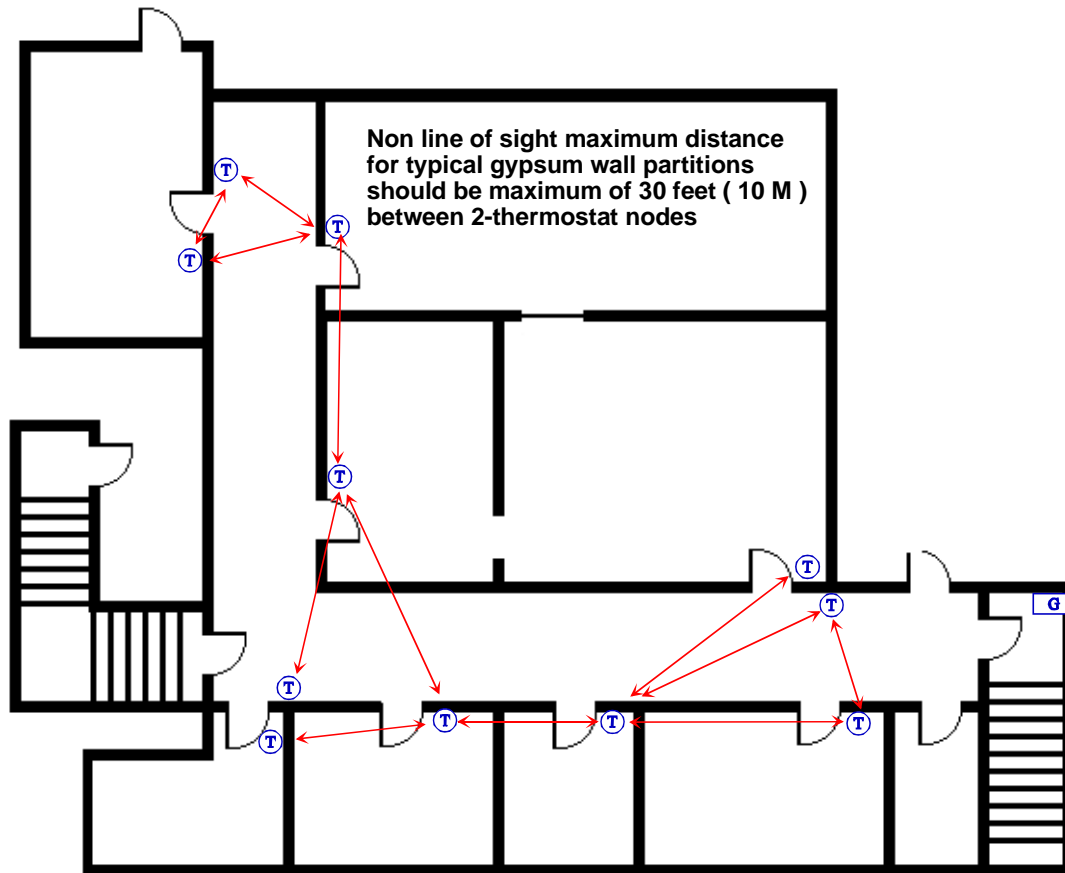
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Proper design considerations need to be addressed prior to any installation of a Viconics Wireless Gateway (VWG) and related wireless thermostats.

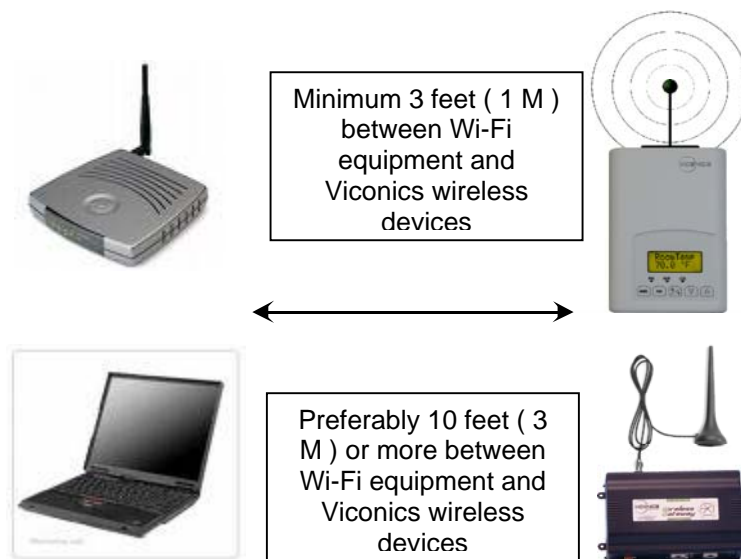
1. To properly avoid network interference with 802.11 Wi-Fi devices in the 2.4GHz spectrum range, Viconics recommends the use of 802.15.4 channels 25 and 26 only. 802.11 Wi-Fi transmissions overlap and may interfere with other channel selection allowed by 802.15.4 ( Channels 11 to 24 )
2. Maximum distance between each node ( thermostat ) should be:
  - Clear line of sight between 2 nodes should be under 100 feet ( 30 M )



- Non line of sight, typical wall gypsum wall partitions made with metal stud frame should be under 30 feet ( 10M )

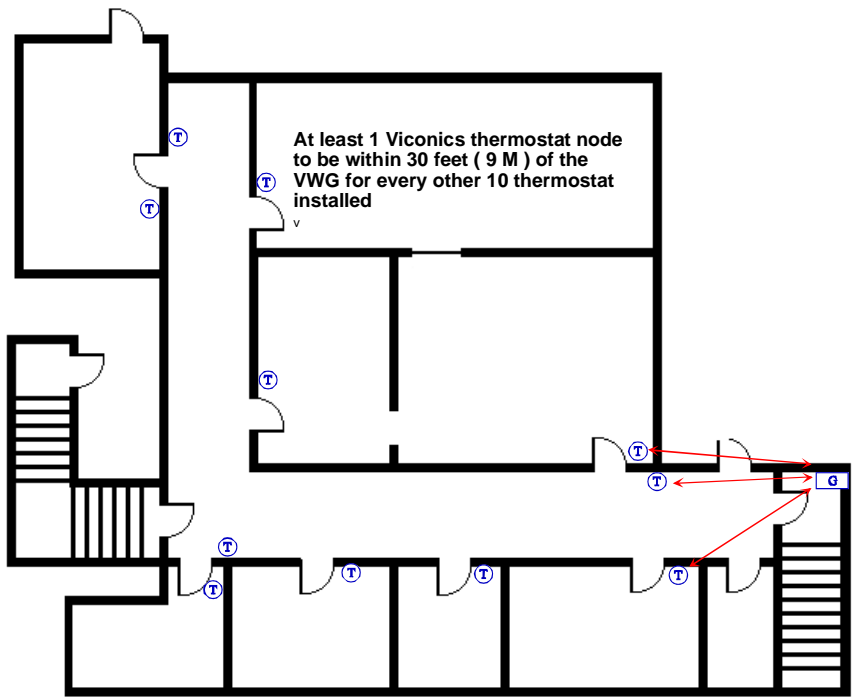
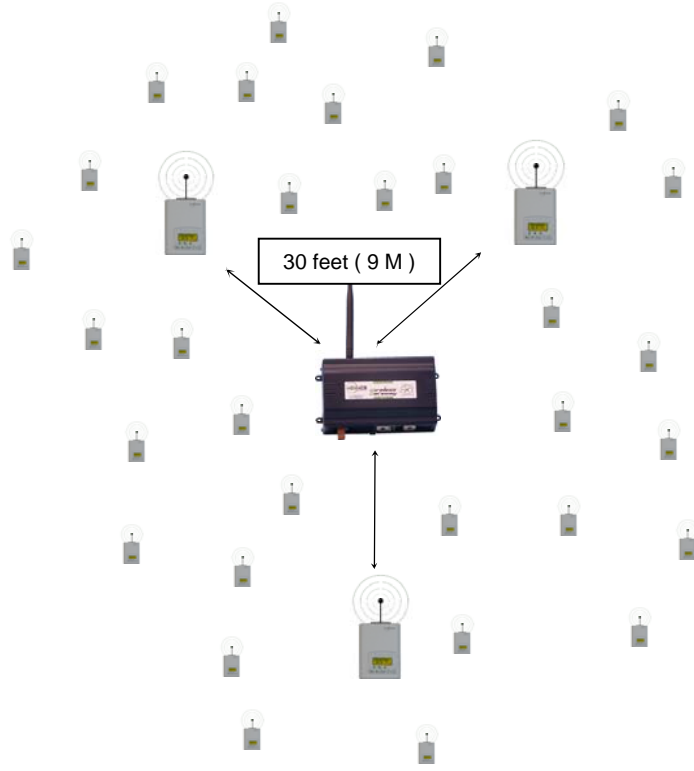


3. Ensure that the minimum distance between any Viconics node and any Wi-Fi devices ( wireless routers, wireless adapters, lap-tops using wireless networks, etc....) to be at least 3 foot ( 1 M ) and preferably 10 feet ( 3 M ) or more.



4. Ensure that at least one thermostat is within 30 feet of the VWG for every cluster of 10 thermostats installed.
5. Always try to locate if possible the VWG near the center of all associated wireless thermostats.
6. Always try to locate the VWG near on in line of sigh to as many wireless thermostats as possible.
7. Try to avoid metal, brick walls or concrete obstructions between wireless devices as much as possible.
8. Make sure the antenna on the VWG is always perpendicular to the floor.
9. Avoid placing VWG and thermostats near metal or enclosed in metal boxes. If the VWG needs to be installed inside a metal cabinet, use the remote antenna accessory.

Ex. 30 wireless thermostats total. A minimum of 3 of them should be within 30 feet ( 9 M ) of the VWG range.



## Gateway Configuration

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### Initial Connection

Install the software on the CD provided with the VWG. The setup will guide you through the necessary installation steps. The minimum system requirements for installation are:

- An Ethernet adapter with TCP/IP support
- A WEB browser installed.

**IMPORTANT NOTE:** Unless updated ( Jar files ), the tool used to service or commission the VWG should always be the one originally supplied with the VWG

An Ethernet TCP/IP connection to the VWG is required for commissioning. For this initial Ethernet connection, you can use either:

- A “crossover” cable connected directly between your PC and the VWG
- A normal LAN connection, meaning that both your PC and the VWG are physically connected to the same Ethernet hub or switch.

As shipped from the factory, a VWG contains only the bare minimum software to run the wireless gateway application. The gateway does *not contain* a Java Virtual Machine runtime environment, a WEB UI interface or any additional software modules. A VWG *does include* a core Niagara software load and a Tridium certificate. Using the supplied software appliance, you must connect to the VWG for initial configuration. Some important related tasks including setting the VWG IP network address and related wireless database setup can only be accomplished using this software appliance.

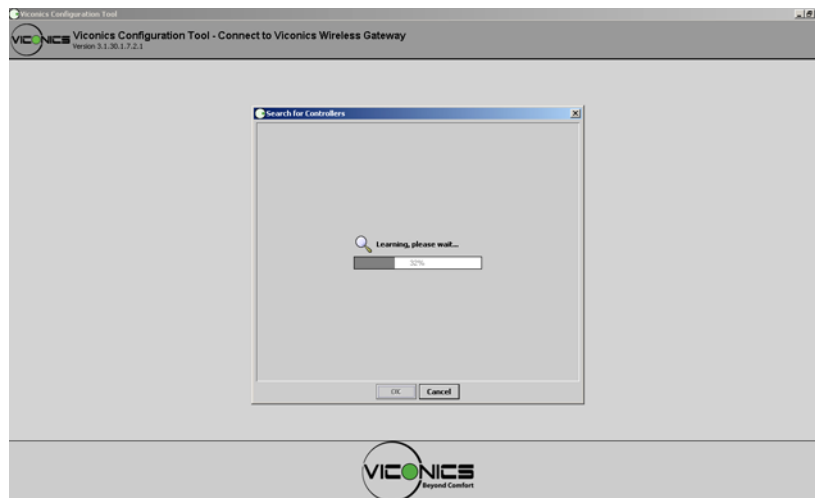
**Initial IP address** When shipped, a new VWG is pre-configured with an IP address in the range of: 192.168.1.12*n* (*primary* “LAN1” port, the “LAN2” port is disabled) where the last numeral (*n*) in the IP address matches the last numeral in the VWG *serial number*. The VWG serial number can be found directly on the label inside the VWG. In all cases, the default subnet mask is: 255.255.255.0 .

Two areas of preparation are required before proceeding with the configuration. Provide power and connectivity. After you complete the commissioning process described in this document, you can mount and wire the VWG controller at the job site, making permanent mounting and wiring connections.

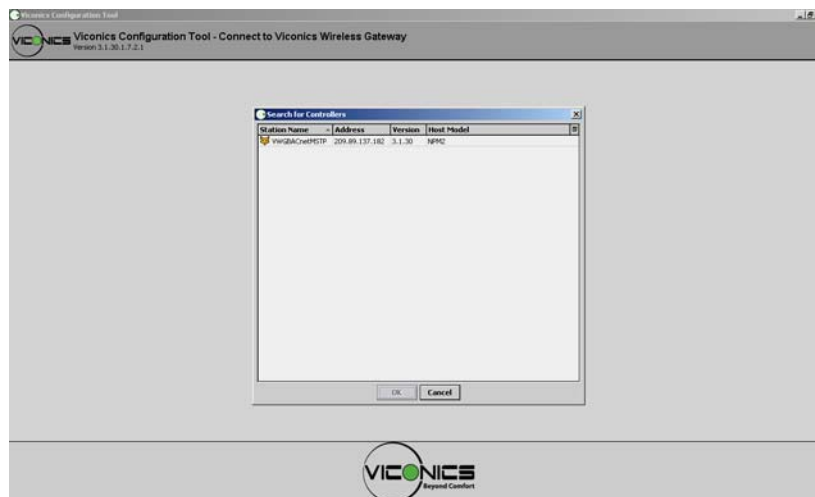
To prepare a new VWG for commissioning, do the following steps:

1. If not already installed, install the supplied Viconics Configuration Software on your local host PC machine.
2. Attach one end of a standard category-5 Ethernet unshielded twisted pair (UTP) patch cable to the RJ-45 Ethernet connector on the VWG.
3. Attach the other end of the patch cable to a network port or directly to an Ethernet hub.
4. Power up the VWG.
5. Record your PC's current IP settings, then re-assign your PC's IP address for its Ethernet LAN adapter (if necessary, refer to Windows online Help for information about configuring TCP/IP settings).
6. For this initial connection to a factory-shipped VWG, configure your PC to use an IP address in the same subnet as the VWG, as well as a matching subnet mask.
7. Set the IP address in the range: 192.168.1.1 to 192.168.1.254 with a subnet mask of: 255.255.255.0  
Note: **Do not** assign your PC the identical IP address as the VWG factory-assigned IP address.
8. From your PC, start the Configuration software. ( under Start\Viconics Configuration Tool Setup 1.X.X

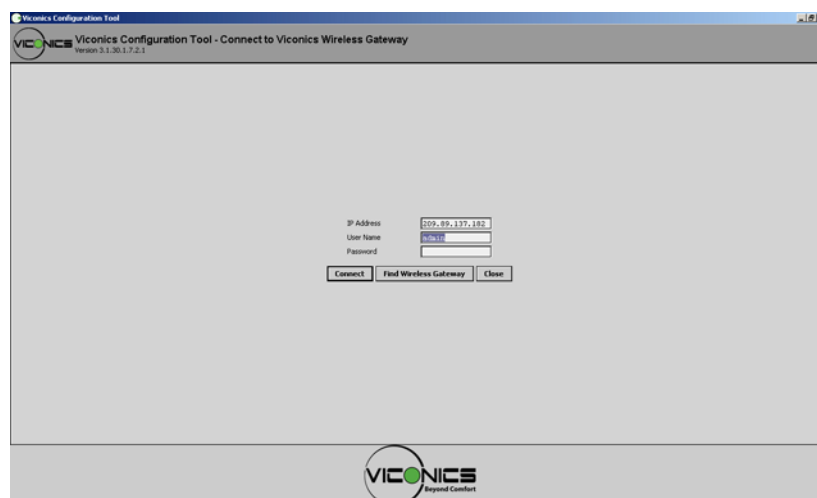
When the Configuration software tool is first started, it will automatically search its subnet for any present VWG. This process takes a few seconds to be accomplished.



When done, a list of VWG present on the subnet will appear. For a VWG to appear on this list, its internal IP gateway IP address must be set to your network value. If no VWG show up on your list you can manually enter the IP address of the VWG in the log on page.



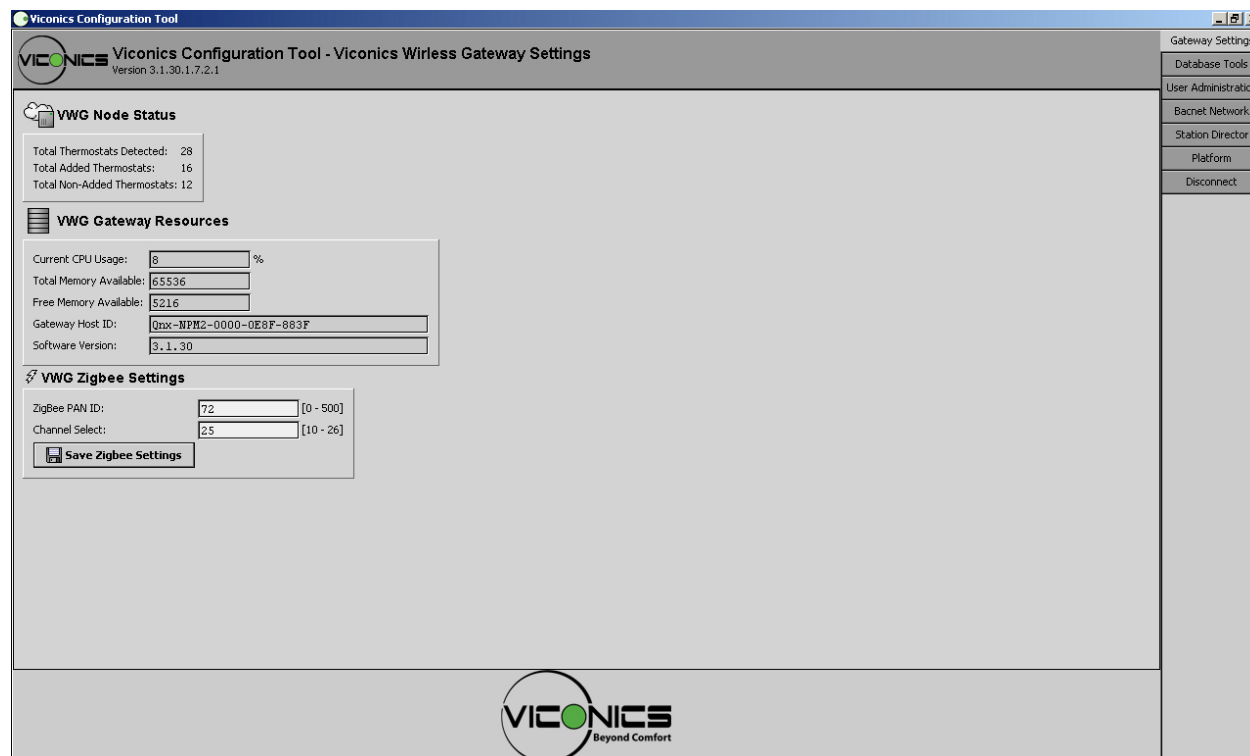
The last numeral (*n*) in the IP address matches the last numeral in the VWG *serial number* value as indicated on the label inside the VWG. The default factory user name is: **admin**. There is no default password. A blank entry should be used for the first log on.





## Gateway Settings.

The first tab on top after initial connection is for the Gateway basic configuration.



### VWG Node Status

- Total Thermostats Detected, represent the total number of wireless thermostats currently detected by the Gateway. This number includes all thermostats either in the database or not.
- Total Added Thermostats, represent the total number of thermostats currently in the Gateway database. I.E. these thermostats have either LON or BACnet objects associated with them.
- Total Non-Added Thermostats, represent the total number of thermostats currently NOT in the Gateway database. I.E. these thermostats DO NOT have LON or BACnet objects associated with them yet.

### VWG Gateway Resource

The gateway resource count is used as a general indication of the CPU and memory usage of the gateway. It also indicates the current assigned Niagara Host of the gateway and the current Niagara software build used.

**PLEASE NOTE:** If the configuration tool is opened on the VWG at the same time as the VWG is in operation with a fully loaded database, expect both the tool and VWG to react with a small delay. Once all modifications, servicing or configuration to the VWG is done, the tool should be closed to allow all resources of the VWG to be used by the VWG wireless gateway application only. In all cases, Viconics recommends to **not** leave open the tool attached to the VWG permanently.

### VWG Zigbee Settings

Those settings are where you set the ZigBee PAN ID. ( Personal Area Network Identification ) address and the channel for the VWG.

- **Gateway ZigBee PAN ID.** ( Personal Area Network Identification ). This is where the PAN ID of the gateway is set. Range is from address 1 to 500. The default of "0" is not a valid PAN ID.
- **Channel Select.** This is where the current Channel frequency used by the gateway is set. Range is from 11 to 26. ( 2405 MHz to 2480 MHz, 5 MHz channel spacing ) Please note that channel 26 is attenuated by 4 db compared to the other channels. The default of "10" is not a valid Channel.

## IMPORTANT NOTES ( Please Read Carefully ) :

- For every thermostat reporting to a gateway ( maximum of 30 thermostats per gateway ), be sure you set the **SAME** PAN ID and Channel value at both the gateway and the thermostat(s).
- When properly configured, the issue of RF interference and lost data between the gateway and the thermostats can be avoided. Without proper care or proper software configuration serious interference issues can happen.
- **Viconics recommends using only the 2 last channels ( 25-2575MHz and 26-2580MHz )** Viconics recommends this purely as a practical tip for deployment in the field based on our experience. These 2 upper channels are not affected and are out of the range of IEEE802.11x Wi-Fi Channels spectrum.

## Database Tools.

This section is used to configure the wireless gateway thermostat database with its own toolset.

Comm Address	Thermostat Name	Added to Network	Duplicate Detected	Thermostat Version	Comm Module Version	Status	Health
60	VT7300C1000_60	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
63	VT7300C1000_63	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
67	VT7300C1000_67	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
69	VT7300C1000_69	False	False	6	1.171	OK	OK [01-May-08 10:02 AM EDT]
64	VT7300C1000_64	False	False	6	1.171	OK	OK [01-May-08 10:02 AM EDT]
72	VT7300C1000_72	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
66	VT7300C1000_66	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
75	VT7300C1000_75	False	False	6	1.171	OK	OK [01-May-08 10:02 AM EDT]
68	VT7300C1000_68	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
71	VT7300C1000_71	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
74	VT7300C1000_74	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
73	VT7300C1000_73	False	False	6	1.171	OK	OK [01-May-08 10:01 AM EDT]
60	VT7300C1000_60	True	False	6	1.171	OK	OK [01-May-08 10:02 AM EDT]
61	VT7300C1000_61	True	False	6	1.171	OK	OK [01-May-08 10:02 AM EDT]
62	VT7300C1000_62	True	False	6	1.171	OK	OK [01-May-08 10:02 AM EDT]
63	VT7300C1000_63	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
64	VT7300C1000_64	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
65	VT7300C1000_65	True	False	6	1.171	OK	OK [01-May-08 10:02 AM EDT]
66	VT7300C1000_66	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
67	VT7300C1000_67	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
68	VT7300C1000_68	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
69	VT7300C1000_69	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
71	VT7300C1000_71	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
72	VT7300C1000_72	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
73	VT7300C1000_73	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
74	VT7300C1000_74	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
75	VT7300C1000_75	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout
80	VT7300C1000_80	True	False	6	1.171	Offline	Fail [01-May-08 10:02 AM EDT] Device timeout

The table lists the current thermostats detected by the gateway that have the same PAN ID and Channel settings as the gateway. A Yellow highlight indicates a previously discovered thermostat that has not updated its mandatory wireless heartbeat to the VWG and is now offline to the VWG.

- **Comm Address.** The current physical MAC address set at each individual thermostat in its local configuration.
- **Thermostat Name.** The thermostat's given name in the database. The name is constructed of the thermostat model number and its current local MAC address. Ex. A VT7300C1000W with a local MAC address of 21 will carry a name in the database of VT7300C1000\_21
- **Added to Network**
  - True = thermostat already added to the BACnet or LON network. When discovered on either the BACnet or LON world, the thermostat's points will be available and exposed.
  - False = thermostat **NOT** added to the BACnet or LON network. When discovered on either the BACnet or LON world, the thermostat's points will **NOT** be available and exposed.
- **Duplicate Detected.** This is used if by accident the same local MAC address was set at more than one thermostat reporting to the same gateway. Both would be reported with the same thermostat name ( if the same model number are used ) and both would carry the same Comm Address.
  - False = thermostat MAC address **NOT** duplicated. Indicates a normal condition.
  - True = thermostat MAC address duplicated. Indicates an **abnormal** condition. The following actions need to be taken.
    1. Physically re-address all of the duplicate thermostat address to new MAC addresses NOT used in the current database.
    2. Delete all the duplicates in the database using the Add/Remove Selected Thermostat button.
    3. Use the Discover Thermostat button to refresh the database with using the thermostat new MAC addresses.



### Database Tools. Update / Ack Duplicates

Scans the database for duplicate MAC addresses in the database.

If any duplicates are found in the database, they will be highlighted in the database

Follow these steps to correct the duplicate addresses:

- 1) Physically re-address all of the duplicate thermostat address to new MAC addresses NOT used in the current database.
- 2) Delete all the duplicates in the database using the Add/Remove Selected Thermostat button.
- 3) Use the Discover Thermostat button to refresh the database with using the thermostat new MAC addresses.

### Database Tools. Delete Selected Thermostats

This tool allows you to directly delete the selected thermostat(s) both from the BACnet or LON database and the list of discovered thermostats at the same time. If the thermostat needs to be re-discovered after modifications, use the “discover thermostat” button

### Database Tools. Set Unit Conversion

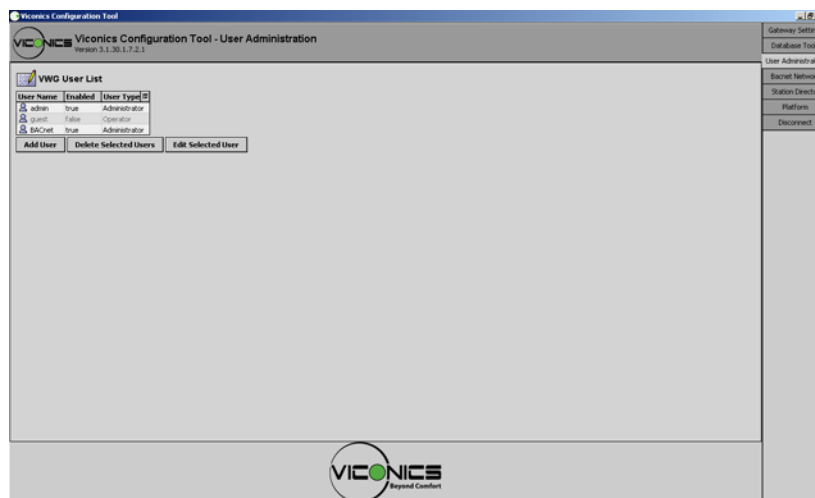
Use this function *prior* to the addition of thermostat s to the BACnet or LON database. This allows to set the desired exposed temperature analog variables of the selected thermostats to be exposed either in degree Celsius or degree Fahrenheit scale with the proper unit attribute attached to the objects.

- English sets the units to degree Fahrenheit
- Metric sets the units to degree Celsius



### User Administration.

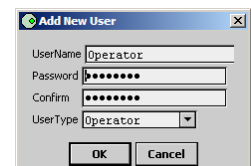
This tab is used to set users and access rights to the VWG for commissioning and testing.



### User Administration. Add User

Add different users to the VWG and set their access rights.

- User Name: Enter desired user name for the new user
- Password: Enter desired user password for new user. Password is case sensitive
- Confirm: Confirm desired user password for new user. Password is case sensitive
- User Type:
  - Administrator, grant's access all functions of the VWG
  - Supervisor, grant's access to all functions required for commissioning of the VWG
  - Operator, grant's access in view mode only without the possibility of doing any modifications



#### Please note:

Both the BACnet and the Admin users cannot be deleted  
A password can be added to the admin user if required

## User Administration. Delete Selected User

Delete a selected user from the current VWG user list.

## User Administration. Edit Selected User

Edit the profile or password of a selected user from the current VWG user list.

- If “Enabled” is set to:
  - True, will grant access to the user
  - False, will void access to the user. Profile is still in the user list if it needs to be re-activated at a later time.

## BACnet Settings.

This tab is used to set all BACnet IP or BACnet MS-TP settings for the VWG. Only the settings related to the purchased models will be presented. I.E. an IP VWG will display IP settings only and an MS-TP VWG will present the settings for MS-TP

## BACnet Settings. BACnet IP Settings

- **BACnet Object ID.** Is the current assigned BACnet ID ( Object Identifier ). It is a unique identification number of a device on a BACnet network. Object assigned to the VWG is always a “device” type. Usable ID range is from 0 to 4194302. Default is value is –1, which disables BACnet IP communication.
- **Network Number.** Is the current assigned network number for the VWG. Usable range is from 1 to 65534 Default is value is –1 which disables BACnet IP communication.
- **BACnet Adapter.** This selects which of the 2 IP network connection is to be used for BACnet IP communication. Net1 or Net2. The default is set to Net1
- **UDP Port.** Is the UDP port number assigned to the device if the VWG for BACnet IP communication.
- The default port for BACnet communication is: 47808 (0xBAC0)
- The default port for the Station connection is: 1911
- The default port for the Platform connection is: 3011
- **BACnet IP Device Type.** Defines the type of IP connectivity required.
  - **Standard.** Used when the VWG is connected to a LAN and is **not** required to be accessed or have connectivity through an Internet WAN connection.
  - **Foreign Device.** Not used
  - **Ddmd. BACnet/IP Broadcast Management Device.** Used when the VWG is connected to a LAN and is required to be accessed or have connectivity through an internet WAN connection
- **BACnet BBMD Address.** Defines the Internet network address of the VWG when **Ddmd** is enabled and remote Internet connectivity is required. Usable range is from 1 to 65534

## BACnet Settings. BACnet MS-TP Settings

- **BACnet Object ID.** Is the current assigned BACnet ID ( Object Identifier ). It is a unique identification number of a device on a BACnet network. Object assigned to the VWG is always a “*device*” type. Usable ID range is from 0 to 4194302. Default is value is –1, which disables BACnet MS-TP communication.
- **Network Number.** Is the current assigned network number for the VWG. Usable range is from 1 to 65534 Default is value is –1 which disables BACnet IP communication.
- **MS-TP Address.** Is the BACnet MAC address assigned to the VWG. It is a unique identification number of a device on a BACnet MS-TP network and needs to be unique on that RS-485 trunk. Usable MS-TP MAC range is from 0 to 127. Default is value is –1, which disables BACnet MS-TP communication.
- **MS-TP Baud Rate .** Is the assigned Baud rate of the VWG on the BACnet MS-TP networks. All node on the trunk need to be set to the same speed for proper operation

Valid and usable ranges are:

- 9600 Kbps
- 19200 Kbps
- 38400 Kbps
- 76800 Kbps

- **ADPU Segment Timeout and ADPU Timeout.** These are important MS-TP settings and should be modified only if you master and fully understand the functions these parameter hold in BACnet MS-TP communication. These can / could be changed only if certain problematic behaviors are encountered in MS-TP communication. For more information, please contract your Viconics representative.
  - ADPU Segment Timeout default is: 2000 ms
  - ADPU Timeout default is: 3000 ms.

## BACnet Settings. BACnet Table

The current table view represents the actual current BACnet value inside the VWG.

Target Name	Object Name	Object Type	Inst Name	Value	Reliability	BACnet Writable
AlarmOut	V77300C1000_A0_AlarmOut	binaryValue	988	Off (s) @ def	No Fault Detected	no
AlarmStatus	V77300C1000_A0_AlarmStatus	binaryValue	987	Off (s) @ def	No Fault Detected	no
Alarm	V77300C1000_A0_Alarm	multiStateValue	987	No Alarm (s) @ def	No Fault Detected	no
B11Status	V77300C1000_A0_B11Status	binaryValue	985	Activated (s) @ def	No Fault Detected	no
B12Status	V77300C1000_A0_B12Status	binaryValue	986	Activated (s) @ def	No Fault Detected	no
CoolHeatStatus	V77300C1000_A0_CoolHeatStatus	multiStateValue	989	Stopped (s) @ def	No Fault Detected	no
HeatValueStatus	V77300C1000_A0_HeatValueStatus	multiStateValue	988	Stopped (s) @ def	No Fault Detected	no
KeepRelOut	V77300C1000_A0_KeepRelOut	multiStateValue	986	Level 1 (s) @ 9	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
OutCoolSetpoint	V77300C1000_A0_OutCoolSetpoint	analogValue	990	75.0 °F (s) @ def	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
OutHeatSetpoint	V77300C1000_A0_OutHeatSetpoint	analogValue	991	75.0 °F (s) @ def	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
Occupancy	V77300C1000_A0_Occupancy	multiStateValue	985	Occupied (s) @ 16	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
OutdoorTemp	V77300C1000_A0_OutdoorTemp	analogValue	986	57.5 °F (s) @ 16	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
PreCoolingDemand	V77300C1000_A0_PreCoolingDemand	analogValue	989	0.0 % (s) @ def	No Fault Detected	no
PreHeatingDemand	V77300C1000_A0_PreHeatingDemand	analogValue	988	75.0 % (s) @ def	No Fault Detected	no
RoomTemp	V77300C1000_A0_RoomTemp	analogValue	995	75.0 °F (s) @ def	No Fault Detected	no
SequenceOfOperation	V77300C1000_A0_SequenceOfOperation	multiStateValue	990	Cooling & Heating (s) @ 16	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
StandByCoolSetpoint	V77300C1000_A0_StandByCoolSetpoint	analogValue	894	75.0 °F (s) @ def	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
StandByHeatSetpoint	V77300C1000_A0_StandByHeatSetpoint	analogValue	895	0.0 °F (s) @ def	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
SupplyTemp	V77300C1000_A0_SupplyTemp	analogValue	987	-0.0 °F (s) @ def	No Fault Detected	no
SystemMode	V77300C1000_A0_SystemMode	multiStateValue	891	Auto (s) @ def	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
LED	V77300C1000_A0_LED	analogValue	996	-0.0 (s) @ def	No Fault Detected	no
UnCoolSetpoint	V77300C1000_A0_UnCoolSetpoint	analogValue	892	80.0 °F (s) @ def	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
UnCoolHeatSetpoint	V77300C1000_A0_UnCoolHeatSetpoint	analogValue	893	62.0 °F (s) @ def	No Fault Detected	in_1, in_2, in_3, in_4, in_5, in_6, in_7, in_8, in_9, in_10, in_11, in_12, in_13, in_14, in_15, in_16
AlarmOut	V77300C1000_A0_AlarmOut	binaryValue	903	Off (s) @ def	No Fault Detected	no
AlarmStatus	V77300C1000_A0_AlarmStatus	binaryValue	902	Off (s) @ def	No Fault Detected	no
Alarm	V77300C1000_A0_Alarm	multiStateValue	902	No Alarm (s) @ def	No Fault Detected	no
B11Status	V77300C1000_A0_B11Status	binaryValue	900	Activated (s) @ def	No Fault Detected	no
B12Status	V77300C1000_A0_B12Status	binaryValue	901	Activated (s) @ def	No Fault Detected	no
CoolHeatStatus	V77300C1000_A0_CoolHeatStatus	multiStateValue	904	Stopped (s) @ def	No Fault Detected	no

Internally, the VWG uses 2 databases. There is one that is for all the thermostat objects used on the wireless trunk portion ( from the gateway to all the thermostats ). These objects in the wireless trunk can only be seen in “**Database Tools. View Selected Thermostat**” using the configuration tool.

The other database is the one used by a 3<sup>rd</sup> party BACnet integration system. This database bi-directionally exchanges information with the wireless object database.

Please note that the wireless object database works on a fixed COV subscription base. The BACnet and LON database of the VWG operate on separate set of rules as defined by the Niagara AX™ frameworks. What this means is that there will be difference in which the local VWG BACnet objects and the wireless objects are handled.

Back and forth from the VWG to the wireless thermostats, the COV values are fixed to:

- 2.5% for PI demand objects
- 0.5 for all temperature ( C & F ) and humidity AV objects
- On change for all MV's & BV's

- **Target Name.** Assigned wireless object name from the wireless database.
- **Object Name.** Default assigned BACnet object name. The current assigned BACnet object name is automatically derived from the following structure.

**Current model number\_Current local thermostat MAC address\_Object assigned**

Ex. A VT7300C1000W with a local MAC address of 21 for the room temperature object will carry a BACnet object name of: VT7300C1000\_21\_RoomTemp.

**Please note:**

Some 3<sup>rd</sup> party integration tools will let you edit and change the default assigned BACnet object name to a new value as required in your application.

If your BACnet tool set does not give you access and view the default BACnet object name assigned to each object, you will need to refer to this table to cross-refer the assigned object instance ID to each thermostat objects

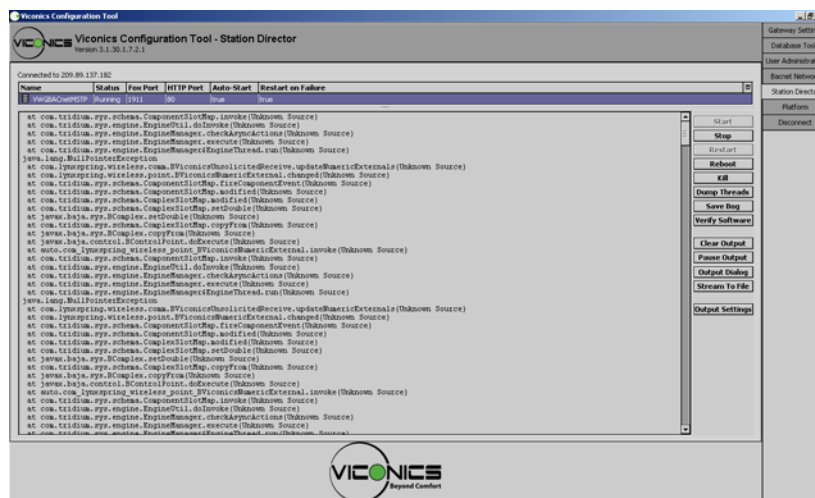
- **Object Type.** Defines the type of object BACnet associated with the wireless device.
- **Instance Number.** Defines each BACnet instance ID assigned to each object
- **Value.** Shows the current value of the objects in the BACnet database
- **Reliability.** Displays the BACnet reliability attribute of each object in the database
  - No Fault Detected. Point is properly refreshed over the wireless network
  - Unreliable Other. Point is down either due to heartbeat failure or object did not respond to a wireless write command after the mandatory 3 write retries

More information on this subject is available in the BACnet integration guide of the VWG

- **BACnet Writable.** Indicates if the objects will accept a Priority Array write command or if they are read only

## Station Director.

This tab displays the Niagara AX™ standard Station Director output window. It is used for diagnostic purposes only and displays current information on the internal operation of the VWG.



The VWG is based on a Niagara AX™ platform and the configuration utility tool is based on Niagara AX™ Workbench.

The two start settings for the station are as follows:

- **Auto-start** ( Leave box checked )

Specifies whether the AX station starts following a platform startup. This means following a host reboot, perhaps as a result of a power cycle, but possibly from a platform reboot command.

- **Restart on Failure** ( Leave box checked )

Specifies whether the platform restarts the station if the station's process exits with a nonzero return code (e.g., engine watchdog had killed the station because of a "deadlock" condition).

Note: Be careful about using station controls, and understand the difference between them before using them.

- **Start**

Enabled only if the station has an "Idle" or "Failed" status in the installed stations area. When pressed, that host's platform daemon immediately starts that station. Text in the station output is cleared, and output messages begin with the new startup of that station.

- **Stop**

Enabled only if the station has a "Running" status in the installed stations area. When pressed, a popup confirmation appears. If you confirm, the host's platform daemon shuts the station down *gracefully* (saving its configuration to its config.bog file, and potentially saving history data).

- **Restart**, Not available or used

- **Reboot**

Always enabled. When pressed, a popup confirmation dialog appears. If you confirm, the selected host is rebooted. This is considered a drastic action.

- **Kill**

Enabled only if the station has a status of "Starting", "Stopping", or "Running" in the installed stations area. When pressed, a popup confirmation dialog appears. If you confirm, the host's platform daemon terminates the station process immediately. Note: Always use **Stop** instead of **Kill**, unless unavailable (stuck for a long time as either "Starting" or "Stopping"). Unlike a station stop, a station kill does not cause the station to save its config.bog, nor does it update the station output area.

- **Dump Threads**

Enabled only if the station has a "Running" status in the installed stations area. When pressed, the host's platform daemon has the station send a VM thread dump to its station output.

- **Save Bog**

Enabled only if the station has a "Running" status in the installed stations area. When pressed, the host's platform daemon has the station locally save its configuration to config.bog.

- **Verify Software**

Enabled regardless of station status. When pressed, Workbench parses the station's config. bog file and the host's platform.bog file, looking for module references. Workbench then checks to see if those modules are installed. Any missing modules are listed in a popup dialog and if available in your Workbench installation, the dialog offers to install the missing modules in the remote host.

- **Clear Output**

Enabled regardless of station status. When pressed, all text in the station output area is cleared. Note: Data in the station output area is fetched from a memory buffer in the platform daemon. Clearing the output does not actually clear the daemon's buffer. Therefore, if you change the selection away from, and then back to the station, it re-fetches all buffered data.

- **Pause Output**

Enabled only if the station has a "Running" status in the installed stations area. When pressed, the button toggles to "**Load Output**", and the next press back to "**Pause Output**" (and so on). During a paused output, text remains frozen in the station output area. This is useful when the station is rapidly writing output. When you press **Load Output**, text in the station output area is reloaded with the station's buffered output, and output remains updating in real time.

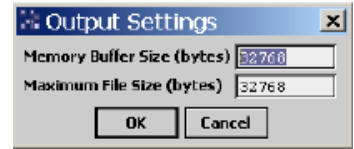


- **Output Dialog**

Enabled regardless of station status. When pressed, this produces a separate “non-modal” output window displaying the same output text as in the Station Director’s station output area. Included are buttons to **Dump Threads**, **Pause Output**, **Clear Output**, and **Close** the window.

- **Output settings**

For the currently selected station in the Station Director, the **Output Settings** button produces a dialog in which you specify how the platform daemon buffers the output from that station.



### Output Settings dialog

The two available settings are in bytes, and are:

- **Memory Buffer Size**

Size of the memory buffer for the station output. If the station creates more output than the size of the memory buffer, the oldest output is lost.

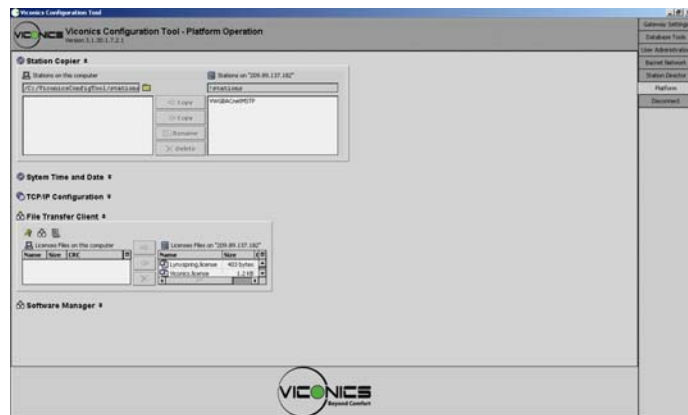
- **Maximum File Size**

When the station stops, its output buffer is written to a console.txt file. This setting defines the maximum size of that file.

### Platform.

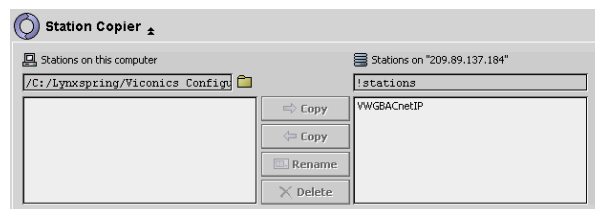
This tab sets up different functions of the VWG

- Station Copier
- System Date and Time
- TCP/IP Configuration
- File Transfer Client
- Software Manager



- **Station Copier**

The Station Copier is only used to install a new version of the VWG station when released by Viconics. The important functions are:



- Copy from left to right to install a new VWG station from a local drive to the gateway.
- Copy from right to left save the current VWG station in the gateway to backup to a local drive.
- Use the Rename button to rename the VWG station name
- Use the delete button to delete a station that is no longer in use (older version on the gateway)

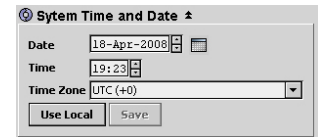
### IMPORTANT NOTES:

Unless updated ( Jar files ), the tool used to service or commission the VWG should always be the one originally supplied with the VWG.

When your database is fully up and all your devices have been added, it is recommended to do a backup of your station for references and safety.

- **Station Date and Time**

This is used to set the local time at the VWG. This information practical in the Database Tool view when viewing the health status and last time a thermostat was online and communicating to the VWG



Use local will set the VWG time to the local time currently in the computer where the toll resides. Press the “Save” button to confirm the changes.

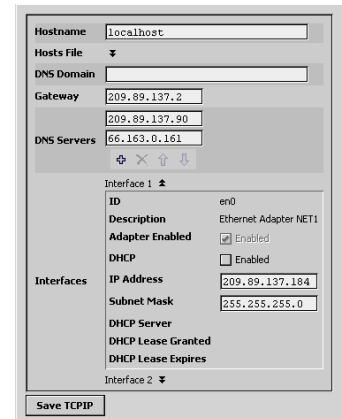
- **TCP/IP Configuration**

**Hostname.** Is the local hostname exposed on the network. Please do not change and leave to “Localhost”

**DNS Domain.** The TCP/IP Domain Name System (DNS) domain this host belongs to. Only if DNS is used.

**Gateway.** The IP address for the device that forwards packets to other networks or subnets.

**DNS Servers.** The IP address for one or more DNS servers, each of which can automate associations between hostnames and IP addresses. Included are icon-buttons to Add (to enter IP address of server), delete and move Up/Down (to set the DNS search order).



- **Interface 1.** Set's the local device IP settings for NET1
- **Interface 2,** Set's the local device IP settings for NET2

The interface selected for BACnet IP communication is made at the “BACnet Network” tab under BACnet IP Settings. The default connection used is NET1

Selectable fields are as follows:

**ID.** A read-only OS identifier for the hardware interface).

**Description.** A read-only text string such as “Ethernet Adapter”.

**Adapter Enabled.** Read-only checkbox that indicates whether the Ethernet port is usable.

**DHCP.** A checkbox to specify DHCP (Dynamic Host Configuration Protocol) instead of static IP addressing. Successful use requires a DHCP server installed on your network. If enabled, other interface fields such as IP Address and Subnet Mask become read-only, as the DHCP server assigns these after the platform reboots.

Note: In general (for stability), static IP addressing is recommended over DHCP. Caution: Do not enable DHCP unless sure that your network has one or more DHCP servers! Otherwise, the VWG may become unreachable over the network.

**IP Address.** The “static” IP address for this host, unique on your network. When changed and saved, this will be the new IP address under which you will connect to the VWG.

**Subnet Mask.** The “static” IP subnet mask used by this host.

**DHCP Server.** Applies only if DCHP is enabled. Shows read-only address of the DHCP server from which this host last obtained its IP address settings.

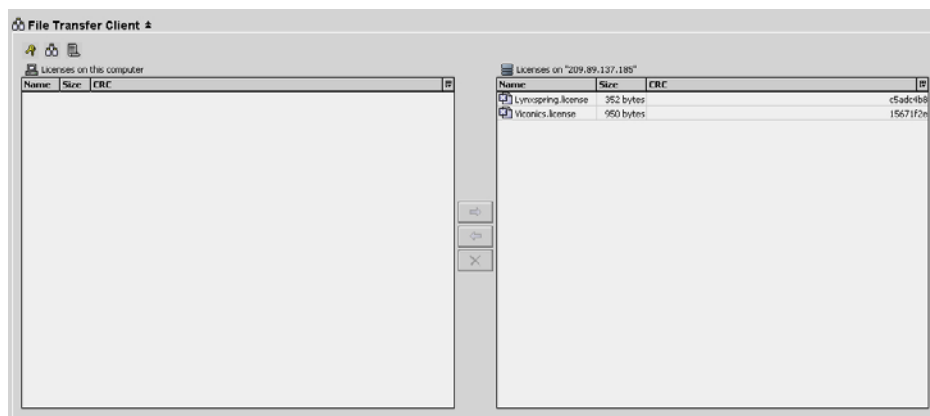
**DHCP Lease Granted.** Applies only if DCHP is enabled. Shows a read-only timestamp of when the DHCP lease started.

**DHCP Lease Expires.** Applies only if DCHP is enabled. Shows a read-only timestamp of when the DHCP lease will expire, and will need renewal.

- **File Transfer Client**

The File Transfer Client is used to copy files and licenses to and from your local computer to the VWG.

The licenses and certificates used at the moment in the VWG license never expire. The File Transfer Client can be used for advanced servicing if required.



### Notes about Beta Released Versions

Please be aware of the following potential issues regarding the Beta versions of the products during installation and commissioning.

### Installing VT7000 Series Wireless Zigbee Thermostats

Description / Symptom	Problem	Possible Cause	Work Around
<b>Receiving same refreshed messages at 2 separate devices</b>	Duplicated wireless Zigbee addresses	Duplicated Zigbee addresses created during commissioning.	<ol style="list-style-type: none"> <li>1) Assure that PAN ID and Channel settings are secured prior to network discovery.</li> <li>2) Change PAN ID of all thermostat and associated gateway</li> <li>3) Redo a wireless network discovery</li> </ol>
<b>Station Crash during group Edit/Delete</b>	Corrupted file tables	Group edit / deletion attempted.	<ol style="list-style-type: none"> <li>1) Reboot wireless gateway</li> <li>2) Assure nodes are edited uniquely and not as part of a group.</li> </ol>
<b>VWG will not reboot and is rendered un recoverable.</b>	Serial traffic disrupting station boot sequence.	Network traffic present during VWG boot/discovery sequence.	<ol style="list-style-type: none"> <li>1) Shut down gateway power</li> <li>2) Remove RF antenna during initial boot up to allow option card and station sufficient time to stabilize.</li> <li>3) Re-connect antenna</li> </ol>
<b>VWG will not reboot and is rendered un recoverable.</b>	SPI corrupted.	Option card (V-RFC) replaced while power remained on or battery back up installed.	<ol style="list-style-type: none"> <li>1) Assure power is battery pack-up is completely disconnected and that there is no power to gateway prior to servicing VWG or making internal adjustments.</li> </ol>
<b>VWG not discoverable by configuration tool.</b>	Network cable not properly connected or shorted between VWG and Computer	Cross over cable not used. Ethernet switch not used.	<ol style="list-style-type: none"> <li>1) Assure cross over cable is used when connecting from VWG to PC.</li> </ol>
<b>Unable to logon to VWG configuration tool.</b>	Logon unsuccessful	Incorrect user name and password.	User name: admin Password: <Blank>

<b>Gateway Wireless Adapter LED Status Indicators</b>	
<b>1 x 200ms short blink</b>	Power on
<b>2 x 200ms short blinks</b>	Power on and card memory initialized properly
<b>3 x 200ms short blinks</b>	Power on, card memory initialized properly and serial communication with VWG main board active
<b>4 x 200ms short blinks</b>	Power on, card memory initialized properly, serial communication with VWG main board active and wireless networks started successfully
<b>4 x 200ms short blinks and 1 x 1500ms long blink</b>	Power on, card memory initialized properly, serial communication with VWG main board active, wireless networks started successfully and wireless communication with thermostats active
<b>Thermostat Wireless Adapter LED Status Indicators</b>	
<b>1 x 200ms short blink</b>	Power on
<b>2 x 200ms short blinks</b>	Power on and communicating with thermostat
<b>3 x 200ms short blinks</b>	Power on, communicating with thermostat and there is connectivity to wireless network
<b>4 x 200ms short blinks</b>	Power on, communicating with thermostat, connectivity to wireless network and VWG is communicating with Wireless thermostat
<b>4 x 200ms short blinks and 1 x 1500ms long blink</b>	Power on, communicating with thermostat, connectivity to wireless network and VWG is communicating with Wireless thermostat. Thermostat is also added to the exposed BACnet database
<b>System Troubleshooting Recommendations</b>	
<ol style="list-style-type: none"> <li>1. If a thermostat is not detected by the VWG, verify that the LED is blinking at least 4 times. If it is only blinking twice, ensure that the PAN and Channel of the thermostat is the same as the VWG it must communicate with.</li> <li>2. If there are no points associated to a specific thermostat, verify the LED pattern. If the LED is blinking 4 times then the thermostat is communicating with the gateway, but its points have not been added to the LON or BACnet database. Launch the Configuration utility tool and add that thermostat to the network / database using the Add/Remove thermostat button.</li> <li>3. When commissioning a network, it is recommended to use channels 25 and 26. Alternate these channels between floors.</li> <li>4. If a particular thermostat refuses to join the network and cannot be seen by the VWG. Please move momentarily closer to the VWG until it has joined the network and it is added to the database. It can then be re-located to its original position.</li> </ol>	