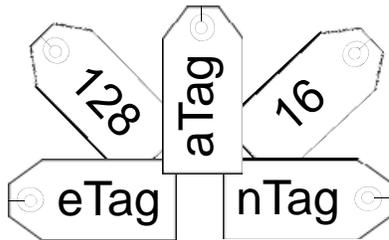


# vTagNet Guide

AeroMate™ WSC  
(Wireless Sensors and Controls)



Virtual wire tag technology.

Collaborative device control.  
Simple and easy to use.

Copyright© 2008 OKC Products, Inc. All Rights Reserved

## Introduction

vTagNet technology was developed in response to a single question - "Why can't individual networked sensors and controls share their data so that any single device will know what all other devices on the network are doing?"

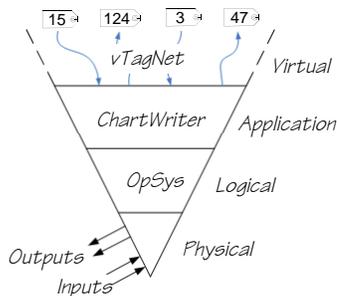
It was soon realized that this question carried more implications than is apparent at a quick glance and that a simple, reliable solution would reap far reaching benefits. The concept of individual networked devices working together as part of a community of sensing and control devices and performing as a single system significantly increases flexibility. Further, such a system can provide much greater functionality than the hardware associated with any single device can ever achieve.

vTagNet technology was implemented as a virtual wire tagging and patch panel system using eTags for digital data and nTags for numeric data.

Action tags (aTag) use the information supplied by eTags or nTags and are referred to as "consumer" tags. aTags are associated with hardware, software or logic related actions. aTags are passive and wait for their corresponding emitted network tag to provide data or to initiate an action, task or process. For example, an aTag may wait for its corresponding eTag to become active (1) before opening a solenoid valve.

## What is vTagNet technology?

vTagNet technology is a simple, but powerful method for passing logical and numeric data between systems and devices connected through a common network. vTagNet adds Open Connectivity to intelligent devices via a virtual "Input/Output" layer and adds device functionality without requiring additional hardware.



vTagNet works much like a wired patch panel where each virtual wire that carries a logic signal or numeric data are assigned a numbered tag. Wire terminations are patched to the same or other remote devices by assigning the virtual tag numbers to hardware inputs or outputs, application variables or action related tasks.

## Event Tags

Event tags (eTag) carry digital or event data. Events can be hardware related such as a switch closure, a valve closing, or a logic state such as an alarm or a set point signal. Since eTags source event information, they are referred to as "emitter" tags. eTags can have only two values, "1" or "0". A vTagNet network can support up to 127 eTags.

## Numeric Tags

Numeric tags (nTag) carry numeric information such as an analog voltage or pressure. nTags are distinguished from eTags by their numeric content. Each nTag carries a 2-byte number representing the scaled value of the numeric information being transported. Since nTags source numeric information, they are referred to as "emitter" tags. nTags can have a value from 0 to 32,768. A vTagNet network can support up to 16 nTags.

## Action Tags

Action tags (aTag) use the information supplied by eTags or nTags and are referred to as "consumer" tags. aTags are associated with logic induced actions or numeric data measurements. aTags are passive and wait for their corresponding emitted network tag to initiate an action or update received data. An aTag may, for example, wait for its corresponding eTag to become active before opening a solenoid valve.

## Tag Management

Simply stated, tags are digital or numeric information injected into a device community or network without regard as to whether any device or devices within the community utilize the information or not. As such, there is no requirement for tag management other than having a means by which a consumer tag (aTag) can identify whether its matching emitter tag (eTag or nTag ) is active and take the appropriate action.

When a Personal Area Network (PAN) provides the connectivity or association between devices within a device community, End Devices connected to the PAN sleep to conserve power, then wake up every 5 seconds to exchange tag information. The PAN Coordinator is awake all the time and has the task of collecting all emitted tags and re-broadcasting them to each End Device as they wake up and exchange data with the PAN Coordinator.

Using a wire patch panel analogy, the PAN Coordinator is the junction box for all tagged wires. It then dynamically routes all connections to all End Devices. Each End Device selectively connects to only those tagged wires that it requires to complete its task, ignoring all other tagged wires. Thus, End Devices can both originate and terminate tagged wire connections to shared data with any End Device connected to the same network.

## Collaboration

One of the most powerful benefits of vTagNet technology is that any vTagNet compatible device, connected to the same device network, can emit event and numeric tags to be shared with any other device on the network. Likewise, any vTagNet compatible device, connected through a common network, may utilize any or all emitted tags as additional analog or digital inputs. Through this simple method of event and numeric tag sharing, any single device on the network acquires the functionality of all other vTagNet compatible devices connected to their common network.

Collaboration is achieved through each individual device determining which of the available emitted event and numeric tags it will use or consume to perform its programmed task and which of its own event or numeric tags it will emit and share with other networked devices.

vTagNet technology provides a collaborative, event driven system where each independent device interacts with all other devices to perform as a single functional unit. The range of functions the overall system can perform is only limited by the number and type of individual, discrete devices connected to the network. The level of collaboration is determined by how many device tags each device contributes to the tag community.

## A Closer Look

vTagNet technology is implemented in the AeroMate WSC products using a 64-byte data packet to store and transport tag information. The first 32-bytes of the data packet contain eTag event data and the last 32-bytes contain nTag numeric data.

Individual eTags are represented by their bit positions within the 32-byte packet segment, providing a snapshot of the active status for all 127 eTags every 5 seconds.

Individual nTags use 2-byte (16-bit) words to transport nTag numeric data. The 2-byte's left most bit is used to indicate the nTag's active status. The remaining 15 bits are the actual nTag's scaled data value. The nTag number is represented by its 2-byte word position in the 32-byte group of 16 nTags.

The entire 64-byte vTagNet data packet is transmitted over a local Bluetooth 802.15.4 wireless network or PAN. Bluetooth 802.15.4 is a standard protocol and provides a high level of communication reliability and security. All shared vTagNet data are accessible as Modbus Coils and Holding Registers via the network Coordinator's serial communications port.

## Open Source Project

The vTagNet technology is a significant advancement in the ability of simple, independent devices to collaborate and perform complex control tasks through tag sharing. To further the development of this technology and advance its application across product boundaries, OKC Products, Inc. is sponsoring an Open Source project and inviting industry engineers and programmers to join and contribute to the project. vTagNet technology is in its infancy but holds the promise of offering a more straight forward and simpler approach to "open connectivity" for industrial controls than is offered by commonly used OPC and SCADA protocols.

SourceForge.net <http://sourceforge.net/> is the worlds largest Open Source software development web site. SourceForge.net provides free hosting to Open Source software development projects with a centralized resource for managing projects, issues, communications, and code.

The OKC products, Inc. sponsored vTagNet project is accessed via <http://sourceforge.net/projects/vtagnet>. From this link all available documentation, discussion, news and other items may be accessed for viewing or and interaction. To join the project team, send an email request through the Open Source project system for review and approval. New team members will be issued a user name and password.