Versus™ Information System
User Guide

WARNING! This product is not designed, intended, authorized or warranted for use in any life support or other application where product failure could cause or contribute to personal injury, death or severe property damage.

This product or its systems are covered by one or more of the U.S. and Europe patents and trademarks listed at www.versustech.com. All patient, staff and asset names in this document are fictional.

Note: Versus Sensory Network (VSN™)

VSN™ uses Infrared and Radio Frequency technology to deliver precise location-specific information. VSN™ is marketed directly to medical facilities and through a network of authorized System Integrators. Because Versus Technology, Inc. is constantly improving its products, specifications within all Versus manuals are subject to change without notice.

Revision Date: February 2018

Proprietary Information – *Do Not Distribute*

FCC STATEMENT: Components comply with part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) These devices may not cause harmful interference, and 2) These devices must accept any interference received, including interference that may cause undesired operation.

FCC CLASS A STATEMENT regarding the Versus Ethernet Concentrator: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC CLASS B STATEMENT regarding the Versus Collector: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio / TV technician for help

Modifying or tampering with the transceivers' or receivers' internal components can cause malfunction, invalidate the warranty and void FCC authorization to use these products.

CANADA STATEMENT:

This device complies with RSS-210 of the Industry Canada 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 undesired operation.

Ce dispositif est conforme à la norme CNR-210 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

⚠ Danger!

■ Handling Alkaline Batteries

- Should fluid from the battery accidentally get into your eyes, there is a threat of loss of eyesight, do not rub them. Immediately rinse your eyes with clean tap water and then consult a physician immediately.

⚠ Caution!

■ Handling Alkaline Batteries

- Immediately remove batteries when they have lost all power. Leaving the batteries in the unit for a long time may cause the batteries to leak fluid, overheat or explode due to gas that is generated by the batteries.
- Remove the batteries from the unit when not using the unit for an extended period of time. The batteries may leak fluid, overheat or explode due to gas that is generated by the batteries.

- Do not apply solder directly to the batteries. The heat may cause the batteries to leak fluid, overheat or explode.
- Do not store the batteries in the direct sunlight or in a car on a sunny day when it is very hot. The batteries may leak fluid, overheat or explode.

- When storing or disposing of the batteries, cover the terminals with tape to insulate them. Mixing them with other batteries or metal objects may cause the batteries to leak fluid, overheat or explode.

- Do not get the batteries wet. Doing so may cause the batteries to overheat.

⚠ Warning!

■ Handling Alkaline Batteries

- Do not put the battery in a fire, expose it to heat, dismantle or modify it. If the insulation or safety valve is damaged, the battery may leak fluid, overheat or explode.
- Do not insert the battery with the poles reversed. Doing so may cause some abnormality or a short and the battery may leak fluid, overheat or explode.

- Keep the battery out of the reach of children. If the battery is swallowed, contact a physician immediately.
- If the alkali fluid gets in your mouth, rinse your mouth with water and contact a physician immediately.
- If the alkali fluid gets on your skin or clothes, it may burn your skin, thoroughly rinse the affected area with tap water.

- Do not store batteries with metal objects such as necklaces or hairpins, doing so may cause the positive and negative poles to be shorted.
- Do not mix new and old batteries or other makes of batteries. The different attributes may cause the battery to leak fluid, overheat or explode.
- This battery was not made to be recharged. Recharging this battery may damage the insulation or internal structure and may cause the battery to leak fluid, overheat or explode.

- Do not damage or remove the label on the exterior of the battery. Doing so may cause the battery to short, leak fluid, overheat or explode.
- Do not drop, throw or expose the battery to extreme impact. Doing so may cause the battery to leak fluid, overheat or explode.
- Do not alter the shape of the battery. If the insulation or safety valve is damaged, the battery may leak fluid, overheat or explode.

Table of Contents

1.   Introduction

A.   Purpose of This Guide

This document is intended to provide information about the basic Versus hardware, sensory network and wiring components of a Versus locating system. This includes the V-Direct™ and V-Link™ hardware platforms as well as other system components. Read this entire document before proceeding with the installation. A general understanding of wiring/telephone installation tools and techniques is assumed.

This manual does not detail hardware components that are no longer available for purchase; however replacement and repair options for retired devices may still exist. User information for retired hardware can be obtained by referring to a previous version of this manual.

B.   Computer Network Overview

Versus software is used to communicate with the hardware devices across the facility network. This software runs in a Microsoft Windows environment and requires a computer system with reasonable capacity and speed. It is the responsibility of the facility to purchase, set up and maintain the required server and workstation computers according to the minimum Versus requirements. For more information, refer to the *Versus System Requirements Sheet*.

Versus requires a dedicated Application Server to be set up and running the core server applications including the Locating Driver and Transaction Engine. In some cases, depending on the badge traffic and rules complexity, the facility may need to provide a second server computer for this purpose to assist with the rules processing load. If necessary, this server computer also can be used as the IIS Web Server.

A separate server must be used to maintain the Microsoft SQL Server database. The SQL Server system may be a dedicated Versus computer or part of an existing SQL Server environment already in use at the facility.

Most relay and paging systems require control computers to be in close physical proximity to the hardware locations. If a facility will be using the Versus system to operate relay or paging hardware, additional server computers may be required in order to control the relevant hardware.

C.   Computer Requirements

The minimum computer specifications listed are based on a single, middle- to large-sized department. Sites deploying multiple departments or a campus-wide solution may consider a higher end hardware platform. The scope of current and future workflow processing, number of concurrent client workstation and integration connections and total count of tracked badges/tags should be taken into consideration when determining the proper hardware platform.
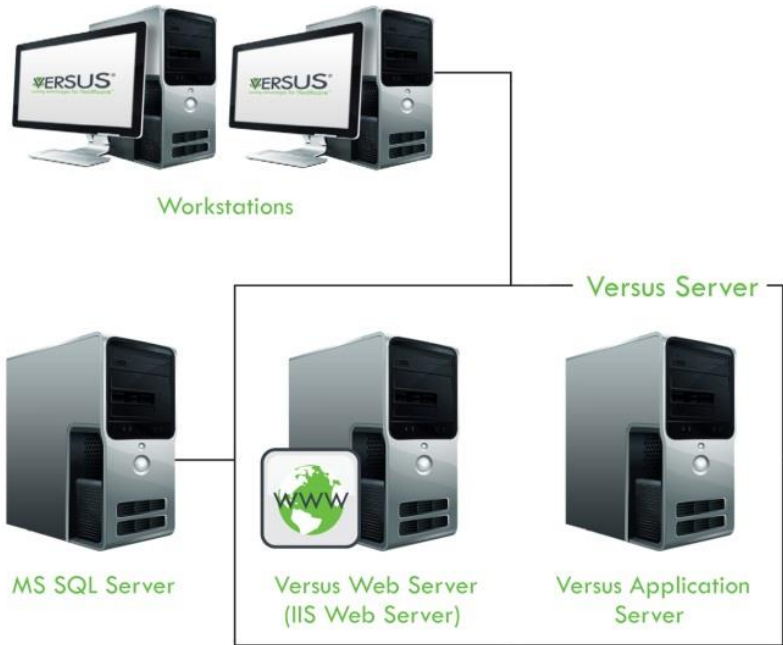
1. Versus Application Server

The application server is a dedicated system (physical or virtual machine) that manages all server-side processing and data communication for the Versus solution.

To support Web service integrations, reporting services and mobile device applications, IIS is enabled in the Versus Application Server; an existing IIS server can be utilized.

In some cases, Versus requires a test server which is a clone of the Versus application server used to help customer support verify proposed modifications to the production server. This computer has the same requirements as the Versus Application Server.

Hardware Minimums	• 3.0GHz proc with 4 cores • 8 GB Memory • 200 GB Hard Disk • 500 MB Per Additional Rules Engine Instance
Software Compatibility	• Microsoft Windows Server 2008, 2008 R2, 2012, 2012 R2 • Microsoft IIS 7 (or higher) • Simple Mail Transfer Protocol (SMTP) • Microsoft .NET 3.5 & 4.5 Framework

2.   Microsoft SQL Server

Microsoft SQL Server maintains historical location and process event information that enables tracking reports and workflow analytics. The Versus reporting services rely on a dedicated SQL Server system.

Facilities are responsible for managing database backups and SQL Server integrity.

Hardware Minimums	• 3.0GHz Proc with 4 cores • 16 GB Memory • 200 GB Hard Disk • Average 20 GB Growth Per Year
Software Compatibility	• Microsoft Windows Server 2008, 2008 R2, 2012, 2012 R2 • Microsoft SQL Server 2008, 2008 R2, 2012, 2014, 2012 R2

3.   Client Workstations

Windows-based desktops, thin-client workstations and laptop computers provide users the ability to run the Versus client-based applications. The client workstation software allows easy Glance-and-Go™ viewing, ability to enter information and clinical grade reporting for tracking and analytical efficiency measurements.

Hardware Minimums	• Pentium 4 @ 2.4 GHz • 4 GB Memory • 100 MB Hard Disk
Software Compatibility	• Microsoft Windows 7, Windows 8, Windows 10 • Microsoft .NET 3.5 Framework • Microsoft .NET 4.5 for web deploy installs • Microsoft Internet Explorer 9 (Compatibility Mode) With Active Scripting Enabled • Adobe Reader 10 (or Higher)

2.   System Description

The Versus locating system is a reliable, flexible platform for locating people and equipment indoors. Through passive and continuous data collection, Versus allows instant visibility of people and assets by providing real-time locations as they move throughout the facility. Badges and asset tags, worn by people or attached to equipment, emit infrared (IR) and radio frequency (RF) signals that contain information about the badge or tag. IR signals are used to determine the precise location of badged individuals or assets in real time. RF signals can act both in a supervisory capacity when IR signals are hidden from view and as a call/alert triggered by a button press.

As badges and tags move throughout the facility, their signals are captured by the Versus Sensory Network™ and passed along to a central application server and associated workstations. The Locating Driver collects and validates packet transmissions from the Versus sensory network devices. Once processed, the Locating Driver passes validated information to the Versus Transaction Engine™ so it can be placed in a real world context for display and reporting.

A.   Infrared (IR) Tracking

Infrared technology in Versus badges and tags uses near-visible light to communicate with IR Sensors. IR is the same technology that a traditional television remote control uses; IR cannot pass through walls and can identify exact locations.

B.   Radio Frequency (RF) Signals

In addition to the IR signal, a low-power radio frequency (RF) signal is incorporated into most badges. RF is used in highway toll E-Z Pass systems; it can pass through walls and can point to general location. Versus considers the communication characteristics inherent in RF signals to be more important than its generalized locating abilities. Because RF signals penetrate walls and ceilings, the signal can act in a supervisory capacity as a general beacon to tell the system that a badge is active if the IR signal is blocked. When the IR signal is blocked and an RF Sensor receives the RF signal, the last known IR location of the badge continues to display.

In addition to their supervisory capacity, RF signals can be used to indicate a low-battery status or to trigger a call/alert message when a badge button is pressed. The RF signals can also induce the Versus system to activate a pre-programmed rules-based response.

Versus badges and their RF components are regulated by the Federal Communications Commission (FCC) and are FCC approved, and also adhere to other regulatory safety standards. Cardiac monitors and other healthcare wireless telemetry devices emit radio waves on a different frequency. Versus badge transmissions have never been shown to interfere with the operation of critical medical equipment. Independent studies confirm the use of this technology is safe in healthcare settings.

3.   Versus Hardware Parts List

The chart below lists all current available Versus hardware components and their part numbers.

Part Number	Description
VER-0005	Badge Tester
VER-0055	Integrator Kit
VER-188x	Mini Asset Tag (black square)
VER-1934 VER-1934-NB	Clearview™ Mini Badge (includes button) *default includes a button; order VER-1934-NB for no button
VER-195x G / B / R / Y	Clearview Badge (clear case) *default color is white; add a letter to indicate **G**reen, **B**lue, **R**ed or **Y**ellow
VER-197x	Asset Tag (black rectangle)
VER-2037	V-Direct Concentrator Plus (V7)

VER-2407	V-Direct Collector (V7)
VER-3050	Ethernet DCC Module
VER-352x	Event Tag
VER-4080	Remote Station (button)
VER-4085	Remote Station (pull chain)
VER-4090	Remote Station (1/4" jack)
VER-4432	V-Direct IR XL Standard Sensor
VER-4435	V-Direct IR XL Sensor Plus
VER-4452	V-Direct RF Sensor
VER-455x	V-Direct ADA Badge Storage Cabinet *available in white (VER-4550) or light oak (VER-4552)
VER-4555	V-Direct ADA Badge Drop Box (in white)
VER-5134	Asset Net Tag
VER-5500	V-Link Gateway
VER-5610	V-Link Link Module
VER-5621	V-Link Wireless Sensor
VER-5650	V-Link ADA Badge Storage Cabinet (in white)
VER-5655	V-Link ADA Badge Drop Box (in white)
VER-6010-x (1 or 25)	CR2477 – Sony/Murata 3.0V Lithium Coin Cell Batteries * use a dash and numbers to indicate **1** single pack or **25** pack
VER-6015-x (1 or 25)	CR2450 – Sony/Murata 3.0V Lithium Coin Cell Batteries *use a dash and numbers to indicate 1 single pack or 25 pack
VER-6018-x (1 or 20)	CR3032 – Sony/Murata 3.0V Lithium Coin Cell Batteries * use a dash and numbers to indicate **1** single pack or **20** pack
VER-6035-2	AA 3.6V Lithium Battery (2 pack)
VER-6025-1	AAA 1.5V Alkaline Battery
VER-6028-1	D 1.5V Alkaline Battery
VER-6092	Sensor Focus Kit
VER-6800	Clearview Badge Opener

4.   Versus Hardware Component Overview

For a complete list of available Versus hardware products and their part numbers, refer to Section 3: Versus Hardware Parts List.
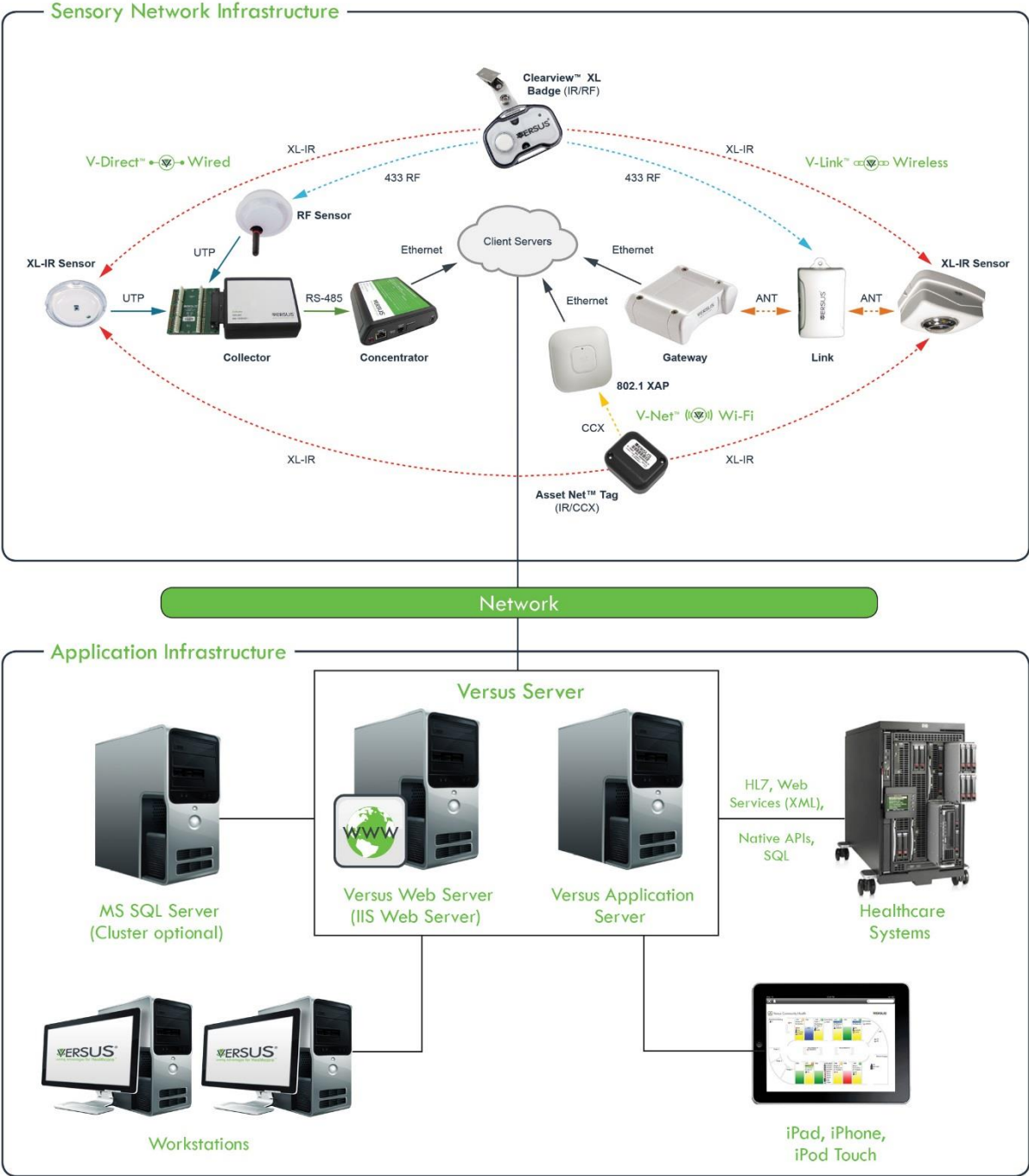
A.   Signaling Devices and Supplies

Versus badges are worn by people, asset tags are attached to equipment and Remote Station or Hand Hygiene Dispenser units are affixed to walls. These devices incorporate IR and RF technology and are selected according to the needs of the facility. IR signals convey the precise location of the badge (and thus of the person or asset to whom or which it is assigned) in real time. RF signals act both in a supervisory capacity when IR signals are hidden from view and as an event or call signal triggered by a button press.

Badges and tags with IR technology have a unique mechanism designed to preserve battery life. These badges and tags contain a motion-sensing device that causes them to transmit IR signals most frequently when in motion and to reduce the transmission frequency when stationary. Proper badge use, care and maintenance are essential components in a system that provides accurate location information for improved safety and efficiency while reducing costs. Good badge practices also mitigate badge loss and help eliminate unnecessary repairs. Failure to follow these recommendations can negatively affect system performance. Consult the individual hardware specification sheets for more information on battery and component functions.

Current badges and asset tags incorporate Versus' eXtended Life (XL) technology which potentially extend battery life expectancy by up to three times that of standard, non-XL badges and tags. All XL badges and tags can be distinguished from standard, non-XL badges and tags by the model number printed on the manufacturer's label. Part numbers assigned to XL badges are denoted by a **2** or a **4** as the final digit.

EXTENDED LIFE (XL) TECHNOLOGY

Badges utilizing XL technology require the use of VER-4430/4432 XL IR Sensors. If a facility has any non-XL Sensors (Sensor model numbers other than VER-4430/4432), Versus recommends the use of non-XL badges and tags throughout the entire facility.

For reference, all V-Direct IR Sensors with green or blue LEDs are XL Sensors; non-XL Sensors either feature another LED color or lack an LED.

All signaling devices, including badges, asset tags, Remote Stations and dispensers emit signals that contain encoded digital information used to identify the device and report on status. Motion, timing, battery state and auxiliary information are all included in the signal. The original Versus signaling technology utilized a 16-bit badge identifier, but current badges utilize a 20-bit badge identifier. This shift significantly expands the badge number pool and virtually eliminates the potential of badge number duplication. All 20-bit badges and tags can be distinguished by the model number printed on the manufacturer's label and are denoted by a **4** as the final digit.

> ### *16- OR 20-BIT SIGNALS*
>
> 20-bit badges, tags and other signaling devices require the use of V6 or V7 generation Collectors (VER-2404-DHCP or VER-2407) and Concentrators (VER-2032-DHCP or VER-2037). If a facility has any 16-bit legacy hardware, Versus recommends upgrading the hardware; alternatively, the facility may use 16-bit signaling devices throughout the entire facility.

Versus badges and tags are easily identifiable by their shapes, but their part numbers provide important information about their signaling technology. The first three digits of the part number indicate the physical badge style or shape and the final digit represents the badge or tag series to which it belongs and important information about the badge or tag signal.

The final digit in each part number denotes the signaling technology, as follows:

- VER-xxx**0** – Badges and tags ending in 0 are **non-XL**, **16 bit** devices
- VER-xxx**2** – Badges and tags ending in 2 are **XL**, **16 bit** devices
- VER-xxx**4** – Badges and tags ending in 4 are **XL**, **20 bit** devices

The Remote Station part number also denotes the device's signaling technology. Remote Stations only emit RF signals, so do not utilize XL/non-XL technology. However, Remote Stations do utilize either 16- or 20-bit signaling technology. The final digit in the Remote Station part number is already used to denote the type of Remote Station (i.e. with button, jack or pull chain), so 20-bit devices are identified differently, as follows:

- VER-xx**6**x and **7**x – Remote Stations ending in 6x and 7x are **16 bit** devices
- VER-xx**8**x and **9**x – Remote Stations ending in 8x and 9x are **20 bit** devices

For more information, refer to Appendix A: Badges, Tags and Remote Stations Compatibility Matrix.

1.   Badges

In addition to sending IR signals, IR/RF combination badges have the added feature of sending radio frequency signals that are received by RF Sensors. RF signals are used in a supervisory capacity in cases when IR signals are obstructed from view. RF is also responsible for sending alarms and call signals triggered by badge button presses.

a)   Clearview™ Mini Badge (VER-1934 and VER-1934-NB)

The VER-1934 and VER-1934-NB Clearview Mini Badge utilizes both IR and RF technologies. The VER-1934 Clearview Mini Badge by default is equipped with a call/alert button that, when pressed, transmits IR and RF signals. These signals can be used to notify the system to activate a configurable, pre-programmed response. If a button is not needed, facilities can order the VER-1934-NB with no button.

IR-LED window

Flanges on both sides of the badge allow for lapel attachment with included clothing clip, or wrist attachment using a standard hospital wrist band (not included).

- Battery Type – 3.0 V lithium coin cell (industry type CR2430, 280 mAh)
- RF Frequency – 433.92 MHz
- IR Wavelength – 875 nanometers, 447.5 kHz modulation
- IR Transmission Rate – approximately every 3 seconds while in motion or approximately every 2 minutes while in sleep mode; if equipped with a button, the badge emits IR signals interleaved with RF at approximately ½ second intervals over 5 seconds on button press
- RF Transmission Rate – 5 rapid transmissions approximately once every 2 minutes in supervisory mode; if equipped with a button, the badge emits IR signals interleaved with RF at approximately ½ second intervals over 5 seconds on button press

Call/alert button (shown above) is optional. If button is not needed, order VER-1934-NB (shown at right).

!

SONY/MURATA BATTERY RECOMMENDED

Versus has tested several brands to determine which batteries deliver the most consistent and reliable performance. Badge performance can vary greatly depending upon the brand of batteries used in the badges. For that reason, Versus highly recommends the use of Sony/Murata CR2430 batteries.

Though not affiliated with Sony/Murata, Versus carries these batteries on its price book as a service to customers, but batteries may be purchased from any reputable source.

Disassembly of badge componentry or the addition of any foreign material into the badge will void the Versus warranty. In addition, the use of any battery that does not meet the technical requirements specified by Versus will also void the Versus warranty.

Clearview Mini Badges are only compatible with XL Sensors (including V-Link™ 2.0). The badges also feature 20-bit ID technology which, on the V-Direct™ system, requires VER-2404-DHCP Collectors or later, and VER-2032-DHCP Concentrators or later.

Optional Silicone Accessories
(Sold Separately)

VER-6850 Patient Wrist
Accessory (right)

VER-6855 Lapel
Accessory (below)

Specify color letter on
order (W, G, P, B)

Available Colors

Silicone accessories are
available in white, dark
gray, pink or blue

Assigned to patients, staff members, and/or visitors, the Clearview Mini Badge offers a small form factor with multiple wearing options. The badge can be attached to the wrist using a standard hospital wrist band (not included); wrist band recommended for patients only.

Alternatively, the facility can purchase silicone accessories (sold separately) for wrist or lapel attachment. Some facilities utilize color-coded accessories to clearly identify patients and staff members, such as white for staff members and gray for patients. Silicone accessories are available in **W**hite, **G**ray, **P**ink or **B**lue.

b)   Clearview™ Badge (VER-195x)

The VER-195x Clearview Badge utilizes both IR and RF technologies. The badge is equipped with a call/alert button that, when pressed, transmits IR and RF signals. These signals can be used to notify the system to activate a configurable, pre-programmed response.

- Battery Type – 3.0 V lithium coin cell (industry type CR2477, 1000 mAh)
- RF Frequency – 433.92 MHz
- IR Wavelength – 875 nanometers, 447.5 kHz modulation
- IR Transmission Rate – approximately every 3 seconds while in motion, approximately every 2 minutes while in sleep mode or 5 rapid transmissions interleaved with RF over 5 seconds upon button press
- RF Transmission Rate – 5 rapid transmissions immediately upon button press or approximately once every 2 minutes in supervisory mode

> ***SONY/MURATA BATTERY RECOMMENDED***
>
> Versus has tested several brands to determine which batteries deliver the most consistent and reliable performance. Badge performance can vary greatly depending upon the brand of batteries used in the badges. For that reason, Versus highly recommends the use of Sony/Murata CR2477 batteries. For more information, refer to Section 13.G.1: Battery Performance.
>
> Though not affiliated with Sony/Murata, Versus carries these batteries on its price book as a service to customers, but batteries may be purchased from any reputable source.
>
> Disassembly of badge componentry or the addition of any foreign material into the badge will void the Versus warranty. In addition, the use of any battery that does not meet the technical requirements specified by Versus will also void the Versus warranty.

Clearview Badges can be distinguished by the product number printed on the back of the badge (e.g. the **4** in VER-1954 denotes a 20-bit XL Clearview Badge).

Some facilities like to utilize color-coded badges to clearly identify patients and staff members, such as white for staff members and yellow for patients. Versus badges are available in white, but can be upgraded to yellow, green, blue or red. Unique colors or pad imprints with the facility name or logo are available for a small additional fee.

2. Asset Tags

a) Asset Tag (VER-197x)

The Asset Tag utilizes both IR and RF technologies. Asset tags are used to identify the current location of portable assets.

- Battery Type –3.0 V lithium coin cell (industry type CR2477, 1000 mAh)
- RF Frequency – 433.92 MHz
- IR Wavelength – 875 nanometers, 447.5 kHz modulation
- IR Transmission Rate – approximately every 3 seconds while in motion, approximately every 2 minutes while in sleep mode
- RF Transmission Rate – approximately every 2 minutes

> ### *SONY/MURATA BATTERY RECOMMENDED*
>
> Versus has tested several brands to determine which batteries deliver the most consistent and reliable performance. Badge performance can vary greatly depending upon the brand of batteries used in the badges. For that reason, Versus highly recommends the use of Sony/Murata CR2477 batteries. For more information, refer to Section 13.G.1: Battery Performance.
>
> Though not affiliated with Sony/Murata, Versus carries these batteries on its price book as a service to customers, but batteries may be purchased from any reputable source.
>
> *Disassembly of badge componentry or the addition of any foreign material into the badge will void the Versus warranty. In addition, the use of any battery that does not meet the technical requirements specified by Versus will also void the Versus warranty.*

> ### *WHAT AFFECTS RF FUNCTION?*
>
> The Asset Tag's RF function may be limited if the tag is affixed to metal—Versus recommends that the tag be used on non-metal surfaces or with a plastic bracket.
>
> A room's geometry and RF propagation characteristics will influence the actual range experienced. Placement of a tag will also impact the system range. Interference from other transmission sources may also decrease the actual range experienced. Refer to the *Asset Tag Mounting Tips and Techniques* guide for more information and mounting instructions.

### b)	Mini Asset Tag (VER-188x)

Like the Asset Tag, the Mini Asset Tag uses IR and RF technologies to identify the current location of portable assets. The smaller size of this tag make it suitable for smaller surface mounts.

- Battery Type – 3.0 V lithium coin cell (industry type CR2477 lithium, 1000 mAh)
- RF Frequency – 433.9 MHz
- IR Wavelength – 875 nanometers, 447.5 kHz modulation
- IR Transmission Rate – approximately every 6 seconds while in motion, approximately every 2 minutes while in sleep mode
- RF Transmission Rate – approximately every 2 minutes

⚠ **SONY/MURATA BATTERY RECOMMENDED**

Versus has tested several brands to determine which batteries deliver the most consistent and reliable performance. Badge performance can vary greatly depending upon the brand of batteries used in the badges. For that reason, Versus highly recommends the use of Sony/Murata CR2477 batteries. For more information, refer to Section 13.G.1: Battery Performance.

Though not affiliated with Sony/Murata, Versus carries these batteries on its price book as a service to customers, but batteries may be purchased from any reputable source.

Disassembly of badge componentry or the addition of any foreign material into the badge will void the Versus warranty. In addition, the use of any battery that does not meet the technical requirements specified by Versus will also void the Versus warranty.

⚠ **WHAT AFFECTS RF FUNCTION?**

The Mini Asset Tag's RF function may be limited if the tag is affixed to metal—Versus recommends that the tag be used on non-metal surfaces or with a plastic bracket.

A room's geometry and RF propagation characteristics will influence the actual range experienced. Placement of a tag will also impact the system range. Interference from other transmission sources may also decrease the actual range experienced. Refer to the *Asset Tag Mounting Tips and Techniques* guide for more information and mounting instructions.

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c) *Asset Net™ Tag (VER-5134)*

The Asset Net Tag combines Versus' accurate, patented infrared (IR) locating technology with Cisco CCX Wi-Fi locating. The tag, affixed to equipment or other assets, emits safe, invisible, IR signals, received by ceiling-mounted IR sensors to precisely identify the asset's location. The tag is also compatible with Cisco CCX, allowing Cisco's Mobility Services Engine (MSE) to identify the general location of an asset when it moves outside the Versus Sensory Network and send that general location information to the Versus system.

- Battery Type – 3.0 V lithium coin cell (industry type CR2477 lithium, 1000 mAh)
- CCX Signal – 802.11 (2.4 GHz) on CCX Channels 1, 6, 11
- IR Wavelength – 875 nanometers, 447.5 kHz modulation
- IR Transmission Rate – approximately every 6 seconds while in motion, approximately every 2 minutes while in sleep mode
- CCX Transmission Rate – every 10 minutes

SONY/MURATA BATTERY RECOMMENDED

Versus has tested several brands to determine which batteries deliver the most consistent and reliable performance. Badge performance can vary greatly depending upon the brand of batteries used in the badges. For that reason, Versus highly recommends the use of Sony/Murata CR2477 batteries. For more information, refer to Section 13.G.1: Battery Performance.

Though not affiliated with Sony/Murata, Versus carries these batteries on its price book as a service to customers, but batteries may be purchased from any reputable source.

Disassembly of badge componentry or the addition of any foreign material into the badge will void the Versus warranty. In addition, the use of any battery that does not meet the technical requirements specified by Versus will also void the Versus warranty.

> ⚠️ ***WHAT AFFECTS WI-FI CCX PERFORMANCE?***
>
> A room's geometry and the facility's MSE configuration settings greatly impact CCX performance. Refer to the Cisco product documentation and Versus information sheet accompanying the tag for more information.
>
> The Asset Net tag's CCX performance may be limited if the tag is affixed to metal—Versus recommends that the tag be used on non-metal surfaces or with a plastic bracket. Placement of a tag will also impact the system range. Refer to the *Asset Tag Mounting Tips and Techniques* guide for more information and mounting instructions.

3. Remote Stations

The Remote Station is a wireless, radio frequency (RF) device that can be mounted on a wall or other non-metal surface. The Remote Station is commonly used in Operating Suites, Resident Care and other applications that require additional system inputs.

The current line of Remote Stations (VER-4080 with button, VER-4085 with pull chain or VER-4090 with ¼" jack) include 20-bit badge identifier technology. For that reason, these Remote Stations are not compatible with legacy Collectors (VER-2402 or VER-2404) and Concentrators (VER-2015 or VER-2032). For more information, refer to Appendix A: Badges, Tags and Remote Stations Compatibility Matrix.

When activated, the device sends an RF signal to initiate a configurable, preprogrammed response (see examples below). An LED illuminates to provide visible feedback; audible feedback is also available via an internal toggle switch.

The Remote Stations can be used in conjunction with the Rules Engine™ software to set room status (i.e. clean, in use, ready for turnover) in order to notify Housekeeping, Registration, Transportation and other departments of the current status of the room. Remote Stations may also be used for staff assistance calls or they may be configured to indicate other patient status, such as signaling the start or end of a procedure.

Radio frequency (RF) signals are used primarily to send notifications to the system. Since Remote Stations are mounted on walls and assigned a permanent location in the system, the unit's location does not have to be determined from its signal. This makes the Remote Station's RF-only signal ideal for conveying button press information to the Versus system.

> ## WHAT AFFECTS RF FUNCTION?
>
> The Remote Station's RF function may be limited if the unit is affixed to metal—Versus recommends that the unit be used on non-metal surfaces or with a plastic bracket.
>
> A room's geometry and RF propagation characteristics will influence the actual range experienced; interference from other transmission may also decrease the actual range. Placement of a unit in the room will also impacts system range. Refer to the Section 10.A: Remote Stations for more information and mounting instructions.

4.   Hand Hygiene Dispensers

Versus software works in conjunction with smart dispensers embedded with IR and RF technology for highly accurate hand hygiene records. Dispensers receive IR badge signals, translate them and send data as RF signals to the sensory network.

Radio frequency signals are used primarily to send notifications to the system. Since dispensers are mounted on walls and assigned a permanent location in the system, the unit's location does not have to be determined from the badge signal. This makes the dispenser's RF-only signal ideal for sending hand wash information to the Versus system.

> ## WHAT AFFECTS RF FUNCTION?
>
> The Hand Hygiene Dispenser's RF function may be limited if the unit is affixed to metal—Versus recommends that the unit be used on non-metal surfaces or with a plastic bracket.
>
> A room's geometry and RF propagation characteristics will influence the actual range experienced. Placement of a unit in the room will also impact the system range. Interference from other transmission sources may also decrease the actual range experienced.

For more information, contact the local Versus representative.

5. Supplies for Signaling Devices

a) Clearview Badge Opener (VER-6800)

The optional Clearview Badge Opener was specifically designed to make Clearview Badge and regular Asset Tag battery changes quick and easy. The separator blades fit snugly and firmly into the slots on the right and left sides of the badge case.

Gently squeezing the handles spreads the blades slightly, loosening the badge's snug, moisture-resistant seal. The Clearview Badge Opener is constructed of durable stainless steel and is fully autoclavable.

b) Badge Tester (VER-0005)

The Badge Tester can be used to check the badge battery state and also to display auxiliary information transmitted by the badge. The device verifies that a valid IR packet is received and displays all badge details. The current version features the Versus logo and lists the following badge information:

- badge number
- mode (XL/non-XL)
- button press state(s)
- motion state
- battery voltage state

The RGB LED in the upper left corner flashes indicates when the Badge Tester has sensed a valid IR transmission, as follows:

- Red = Standard IR Signal
- Green = XL IR Signal
- Blue = 36 kHz IR Signal

! **BADGE TESTER ONLY TESTS IR SIGNAL CAPABILITY**

The Badge Tester only tests IR signal capability and battery status; it is not designed to test RF function.

---

c) Batteries

All signaling devices, including badges, asset tags, Remote Stations and Hand Hygiene Dispensers are battery-operated devices that rely on regular battery changes to maintain optimal performance.

For more information, refer to Section 12.G: Managing Batteries as well as Appendix B: Hardware Battery Requirements.

B.   Sensory Network

1.   V-Direct™ Sensory Network

The Versus software reacts according to the badge and tag information it receives from the Versus hardware and sensory network. The hardware drives the data input and every software decision.

For that reason, the success of a Versus system relies intrinsically on the accuracy of the sensory network. Versus insists on the highest level of accuracy in the sensory layout and installation because it is the foundation for functional results and useful software data.

V-Direct sensory network components are easily identifiable by their physical characteristics and colors, but their part numbers provide important information about their functionality and compatibility. V-Direct IR Sensors with green or blue LEDs are XL Sensors; non-XL Sensors either feature another LED color or lack an LED. All V-Direct Badge Storage Cabinets and Badge Drop Boxes incorporate XL Sensors. All V-Direct Sensors can be used on any V-Direct Collector/Concentrator chain.

However, Collectors and Concentrators are designed to work together to transmit information to the Versus server computer; therefore, different generations of the devices may not be mixed and matched. Currently, the following three generations of V-Direct Collectors and Concentrators exist in the field:

Version	Part Numbers	Description	Compatibility
V5	Collectors VER-2402, VER-2404 Concentrators VER-2015, VER-2032	• 10MB compatible • 16 bit badge capable • Works with any Locating Driver (Badge Server) software • Beige case (VER-2402 and VER-2015) or gray case (VER-2404 and VER-2032)	Use only with other V5 devices
V6	Collectors VER-2404-DHCP Concentrators VER-2032-DHCP	• 10/100MB compatible • 16/20 bit badge capable • Requires Location Driver v3.2.0 or higher software • Gray case	Use with V6 or V7 devices
V7	Collectors VER-2407 Concentrators VER-2037	• 10/100MB compatible • 16/20 bit badge capable • Requires Locating Driver v4.0.0 or higher software • Black case	Use with V6 or V7 devices

For information about compatibility, refer to Appendix A: Badges, Tags and Remote Stations Compatibility Matrix.

a) *V-Direct Sensors*

Sensors receive signals from badges, convert them into electrical signals and pass the data along to Collectors. Sensors are usually mounted in the ceiling tiles of a facility, or they can be placed in standard electrical junction boxes where required by local building codes.

Infrared Sensors receive IR signals from badges and convert them into electrical signals. A single unshielded twisted-pair wire transmits the signals to a Collector and provides the Sensor's operating power. IR Sensors have 360-degree horizontal coverage, 180-degree vertical coverage and reliably detect IR signals from a distance of approximately 15 feet.

For information on Collector backhaul requirements, refer to Section 5.B.3: V-Direct Sensory Network Considerations.

A Focus Ring and optional Focus Disks (sold separately) can be installed under the IR Sensor's clear protective cover to restrict its pickup range to a smaller area. This method can be useful in rooms with multiple patient beds or to pinpoint infusion chairs.

(1)   IR XL Sensors

(a)   *IR XL Standard Sensor (VER-4432)*

The VER-4432 infrared XL Standard Sensor is specifically designed for use with the XL family of badges and tags, yet it is fully backward compatible with existing installations. As a Supervised Sensor, the IR XL Standard Sensor allows the Versus system to monitor data delivery to a Collector by generating its own simulated supervisory badge signal (badge #103). The system can be configured to send an alert if a portion of the sensory network or facility intranet stops sending badge data; the use of this feature requires additional rules processing and notification software.

IR XL Sensors can be identified by their green Activity Indicator LED that lights when an IR signal is received and goes out when the Sensor reports data to the Collector. Since this process often happens very rapidly, the light can appear to blink or flash. The Activity Indicator Light can also serve as a useful troubleshooting tool. The VER-4432 IR XL Standard Sensor can be distinguished from its predecessor, the VER-4430 IR XL Sensor, by the single diode mounted under the unit's clear protective cover.

(b)   *IR XL Sensor Plus (VER-4435)*

The VER-4435 infrared XL Sensor Plus takes the place of the IR XL Standard Sensor and provides an added USB port to provide power to third-party devices, such as Bluetooth Low Energy (BLE) beacons.
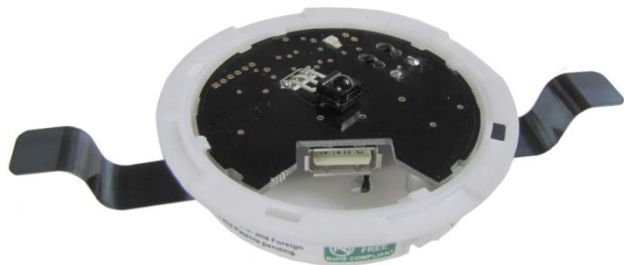
The Sensor Plus can be identified by the small blue plus ⊕ icon as well as by its blue Activity Indicator LED; the blue LED lights when an IR signal is received and goes out when the Sensor reports data to the Collector.

Sensors are strategically installed in designated locations throughout a facility to receive and convert encoded infrared (IR) signals emitted by Versus badges into electronic signals as well as to provide a useful power source for any USB device.

(2)   ADA Badge Storage Cabinet (VER-455x)

The Badge Storage Cabinet provides a controlled environment in which to store badges when they are not in use. Proper badge storage practices preserve battery life, mitigate badge loss and assist in maintaining an accurate reflection of badge location. The current Badge Storage Cabinets are designed

with a 4-inch depth to comply with the Americans with Disabilities Act (ADA) and can accommodate up to 42 badges. They are available in a neutral white exterior finish (VER-4550) or in light oak (VER-4552).

Each cabinet contains an internal IR XL Sensor. The Sensor can be configured to prevent badges that are in the cabinet from displaying on Floorplan Views or List Views or to indicate those badges as "out of the area."

<div align="center">(3)   ADA Badge Drop Box (VER-4555)</div>

The latest Badge Drop Boxes serve as convenient drop-off locations for Versus badges when the patients to which the badges are assigned are discharged. The boxes are designed with a 4-inch depth to comply with the Americans with Disabilities Act (ADA).

An internal IR XL Sensor reads the IDs of badges inserted through a slot on the front of the unit and sends real-time updates to the system. When used in combination with specific business rules, the Badge Drop Box automates many aspects of the patient visit cycle, including removal of patient badge assignments at the conclusion of the visit, automated discharge messages and logging clinical actions and processes.

Radio Frequency (RF) Sensors operate at a 433.92 MHz receive frequency. The Sensors convert encoded RF signals emitted by badges into electrical signals and transmit them to Collectors via a single unshielded, twisted-pair wire.

Planning the location of RF Sensors depends upon the layout or the facility. In most cases, for complete coverage, RF Sensors can be placed approximately 100 feet apart, because they have a sensitivity range radius of approximately 50 feet. However, since concrete and steel may absorb the RF signals and other materials may also affect the strength of RF signals, functional testing using a badge or tag is necessary to determine the best placement of RF Sensors.

Badge signals received by VER-4452 RF Sensors are used to notify the Versus system of badge button presses, Remote Station button presses and badge battery status. RF also acts in a supervisory capacity, prompting the system to continue to display the last known IR location of badges that are not currently being detected by IR sensors.

b)   V-Direct Collector (VER-2407)

After Sensors receive signals from badges and convert them to electrical signals, the data is passed to a Collector. The Collector accepts the input from the Sensors and assembles the data into larger, network-ready packets. The packets are then relayed to the Concentrators.

For information on Collector backhaul requirements, refer to Section 5.B.3: V-Direct Sensory Network Considerations.

A punch-down connector block is included with each Collector. The connector block plugs directly into the 50-pin Amphenol connector on the side of the Collector. Up to four Collectors may be connected to any Concentrator; the Concentrator Plus (VER-2037) includes an internal Collector, so it can support up to three additional external Collectors connected in a daisy-chain fashion.

The 24V power supply for the Collector is also included, as well as a specialized cable and mounting supplies.

The current VER-2407 Collector features a black plastic casing and faster processor. They are fully compatible with the V6 DHCP generation of Collectors and Concentrators and can be mixed or matched on existing DHCP hardware chains.

c) *V-Direct Concentrator Plus (VER-2037)*

Concentrators are network devices that receive all data passed from Sensors through Collectors, format the data and send it as a data packet to a computer over a local area network (LAN). Each Concentrator is assigned an IP address, which is how the data is communicated to the V-Direct Locating Driver. By default, each VER-2037 Concentrator ships with IP address **208.6.140.104**.

Each Concentrator Plus includes one internal Collector and can support up to three additional external Collectors.

> ### CONCENTRATOR PLUS INCLUDES A COLLECTOR
>
> The VER-2037 Concentrator Plus differs from earlier models because it includes one internal Collector, which functions as the first Collector on its chain. Each Concentrator Plus connects to a punch-down block.
>
> Therefore, the shortest chains in any installation will consist of only one (1) Concentrator Plus and no (0) Collectors. When serving as the only Collector in a chain, the Concentrator Plus should be terminated like any other Collector with the included termination shunt. Longer chains will include up to three (3) additional Collectors connected to the Concentrator Plus.

A CD containing the current shipping version of the Versus V-Direct Locating Driver software and the accompanying user manual in .PDF format is included with each Concentrator. The 24V power supply for the Concentrator and mounting supplies for the device are included.

The current VER-2037 Concentrator Plus features a black plastic casing and faster processor. They are fully compatible with the V6 DHCP generation of Collectors and Concentrators and can be mixed or matched on existing DHCP hardware chains.

2. V-Link™ Sensory Network

The V-Link platform uses the same accurate IR-RF technology as the V-Direct system, but communicates location information wirelessly—without burdening the facility's Wi-Fi network. A facility may choose the hardware platform based on need and mix-and-match platforms using the same Versus badges and tags.

The Versus V-Link Gateway collects RTLS location data sent by the Link Modules, via a proprietary radio frequency (RF) wireless protocol, then aggregates location data before sending it via Ethernet to Versus software. The unit receives data via an internal RF antenna. A connection for an external antenna is also provided. The Gateway communicates over a two-way wireless RF channel in the 2.4GHz spectrum, secured by an encryption algorithm. The proprietary, patented V-Link communication protocol is designed to coexist with other networks and will not interfere with existing IEEE 802.1x signals (e.g., Wi-Fi, ZigBee).

Badges and Tags:
Badges worn by people and tags attached to equipment emit infrared (IR) and radio frequency (RF) signals. The Remote Station, a wireless wall-mounted device, emits an RF signal when activated. V-Link 2.0 is compatible with standard Versus badges, tags and Remote Stations.

VER-195x Clearview™ Badge (IR/RF)

VER-197x Asset Tag (IR/RF)

VER-188x Asset Tag (IR/RF)

VER-40xx Remote Station (RF)

433 MHz RF

447.5 kHz IR

Wireless Sensors:
Strategically placed sensors, powered by D-cell batteries, receive IR signals from badges and transmit location data to the nearest Link Module.

VER-5621 Sensor

VER-5610 Link Module

2.4 GHz RF

Link Module:
Plugged into common electrical outlets, Link Modules receive location data from sensors, as well as signals from Remote Stations and overall health information from badges (battery status, etc.). Link Modules communicate data to a Gateway. Two-way communication between the Sensor, Link and Gateway is used during system configuration.

2.4 GHz RF

Gateway:
The primary communicator from the sensory network to the software platform, the Gateway provides two-way communication to the configured Link Modules within its range.

Large Screen Monitors, Workstations, and Mobile Devices on Facility Intranet

VER-5500 Gateway

Ethernet Connection

Location Data

Versus Application Server

a) V-Link Sensor (VER-5621)

The V-Link Sensor receives IR signals from all standard Versus badges and asset tags. Both eXtended life (XL) and non-XL badge technology is supported. The Sensor converts the IR signal information and communicates it to the Link Module over a wireless RF channel in the 2.4GHz spectrum, secured by an encryption algorithm.

The V-Link Sensor is the Infrared (IR) location element of the V-Link Sensory Network, and is installed in all areas where locating coverage is needed. Entirely wireless, battery-operated and easily-mounted, the Sensor receives IR signals from Versus badges and tags.

The latest V-Link Sensor receives IR signals from standard badges and asset tags to establish the badge/tag location. The Sensor has a standard 15-foot pickup radius.

The attached mounting plate is designed to be screwed directly into a hard ceiling surface. Alternatively, it can be mounted easily and securely to a suspended ceiling grid with the included Grid Clip. The inconspicuous white housing blends into the ceiling tile. Consider the weight of the unit with batteries as well as the physical environment and building requirements when choosing an installation mechanism.

! **BADGE STORAGE CABINETS AND BADGE DROP BOXES**

V-Link ADA Badge Storage Cabinets (VER-5650) and V-Link ADA Badge Drop Boxes (VER-5655) are also available.

The wireless V-Link Sensors are battery-operated devices that rely on regular battery changes to maintain optimal performance. For more information, refer to Appendix B: Hardware Battery Requirements.

b)   V-Link Link Module (VER-5610)

The Versus Link Module is the primary data conduit for the V-Link sensory network. In addition to acting as an RF sensor, receiving 433 MHz RF signals from Versus badges and tags, the Link wirelessly receives location data from the V-Link Sensors and sends the data to Gateway devices via the 2.4 GHz RF platform. The Link has a standard pickup radius of 35 feet, and is subject to RF attenuation.

The Link has two important jobs within the V-Link sensory network and gathers two types of sensory information:

- 433 MHz RF signals from Versus badges and tags
- 2.4 GHz RF signals from V-Link Sensors

The Link combines both sets of information into a data packet that it transmits via the 2.4 GHz RF signal to the V-Link Gateway.

A relatively small number of Link devices is required. They are easily installed by plugging directly into AC wall receptacles. They are anchored to the receptacle with an included Torx (star) T-10 screw. The Link can be installed in accessible areas of the facility or mounted above suspended ceilings. The Links communicate over a two-way wireless RF channel in the 2.4 GHz spectrum, secured by an encryption algorithm.

c) V-Link Gateway (VER-5500)

The Gateway is an Ethernet-based device that decodes and validates information from up to 100 locations. It aggregates the location data before sending it via Ethernet to the Versus software.

The Gateway operates within the 2.4 GHz spectrum, receiving data from the Links via an internal RF antenna. A connection for an external antenna is also provided. In general, the Gateway has a 50-foot pickup radius that may be subject to RF attenuation.

The Gateway communicates over a two-way wireless RF channel in the 2.4 GHz spectrum, secured by an encryption algorithm. The proprietary, patented V-Link communication protocol is designed to co-exist with other networks and will not interfere with existing IEEE 802.1x signals (i.e. Wi-Fi, ZigBee).

This device is typically powered over Ethernet (POE), but can also be powered via standard DC power supply, which is included.

C.   Notification Equipment

1.   Relay Hardware

The Ethernet DCC Module (VER-3050) is manufactured for Versus by SIXNET® Industrial Automation. It controls up to 32 discrete Dry Contact Closure (DCC) outputs in any remote location that has network support. The unit handles from 10 to 30 volts of DC power at 1 Amp per output channel. An industrial power supply is included with the device. For more information, refer to the documentation supplied by the manufacturer SIXNET.

2.   Paging Hardware

Versus does not supply or support paging units or hardware. For information on the hardware required for use with the Versus paging interface, refer to Section 10.B: Paging System.