



Pod Detection System™  
User and Operation Manual  
Release 4.3.x.1

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Engineered by  **Naztec**



**POD Detection System™**

**User and Operation Manual**

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# 1 INTRODUCTION

The purpose of this guide is to provide information on the use and operation of the POD Detection System™. It is intended to be used by operators and other users of the system for general operation and information about the system. It includes information on features, functions and specifications. More thorough treatment of system design and installation are provided in other manuals, which are referenced in this document.

A number of topics are covered within this document, which include:

- System features and functions;
- Operation using the Graphical User Interface (GUI);
- System software interface;
- Component modules, their capabilities and specifications;
- Interfaces to traffic control equipment, and between Pod system components

Other manuals are provided as companions to this document. These documents, which provide more detail about specific topics, include:

- Design and Installation Guide
- GUI Setup Guide

## 1.1 NOTICES

### 1.1.1 FCC Compliance

The Radio Module 10971-2000 complies with Part 15.247 of FCC rules and regulations. When the radio module is used, compliance with the labeling requirements, FCC notices and antenna usage guidelines is required. In order to comply with FCC Certification requirements, the Original Equipment Manufacturer (OEM) must fulfill the following requirements. The 10971-2000 Radio modules may only be used with the antenna that has been tested and approved for use with the module. Please refer to the antenna table provided in this section.

**WARNING:** The 10971-2000 Radio modules have been tested by the FCC for use with other products without further certification (as per FCC Section 2.1091). Changes or modifications to this device not expressly approved by Trafficware Group, Inc., could void the user's authority to operate the equipment.

#### 1.1.1.1 FCC Approved Antennas

The 10971-2000 Radio modules are FCC-approved for fixed base station and mobile applications in the ISM 902 to 928MHz frequency band.

**Notice:** To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication. This module has been designed to operate with the antennas listed in the table below, and having a maximum gain greater than the gain

mentioned for a particular type of antenna is strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

<b>Approved FCC Antennas</b>		
<b>Type</b>	<b>Max Gain</b>	<b>Min Separation</b>
Panel Antenna	12 dbi	20 cm
Yagi Antenna	12 dbi	20 cm
Phantom Mobile Antenna	3 dbi	20 cm
Fiber glass Omni Antenna	3 dbi	20 cm
Dipole (quarter wave whip)	0 dbi	20 cm
Helical antenna	0 dbi	20 cm

#### **1.1.1.2 RF Exposure Statement**

The Pod Detection System™ has been tested and meets the FCC RF exposure guidelines. It must be installed and operated with a minimum distance of 20 cm between the radiator of RF energy and the body of users. Improper use or tampering with the device is prohibited and may not ensure compliance with FCC exposure guidelines.

#### **1.1.2 Lithium Thionyl Chloride Cells and Batteries**

The lithium Thionyl chloride batteries described in this MSDS are hermetically sealed units, which are not hazardous when used according to the recommendations of the manufacturer. Under normal condition of use of the batteries, the electrode materials and the liquid electrolyte they contained are non-reactive provided the battery integrity is maintained. Risk of exposure exists only in case of mechanical, electrical or thermal abuse. Thus the batteries should not be subjected to:

- short circuit,
- recharge,
- puncture,
- incineration,
- crushed,
- immersed in water,
- force discharged, or
- Exposed to temperatures above the temperature range of the cell or battery.



In the above cases of abuse, there is risk of fire or explosion.

#### 1.1.2.1 Handling & Storage

The batteries should not be opened, destroyed or incinerated, since they may leak or rupture and release to the environment the ingredients that they normally contained in the hermetically sealed container.

**Handling.** Do not short circuit terminals, or expose to temperatures above the temperature rating of the battery, over charge the battery, forced over-discharge (voltage below 0.0V), or throw into fire. Do not crush or puncture the battery, or immerse in liquids.

**Storage.** Store preferably in cool (below 30°C), dry and ventilated area, which is subject to little temperature change. Do not place the battery near heating equipment, nor expose to direct sunlight for long periods. Elevated temperatures can result in shortened battery life and degrade performance. Keep batteries in original packaging. Do not store batteries in high humidity environment for long periods.

**Other.** Cells and batteries are not rechargeable and should not be charged. Applying pressure and deforming the battery may lead to disassembly followed by eye, skin and throat irritation. Follow Manufacturers recommendations.

For additional information, log onto the Trafficware website and download the MSDS (Material Safety Data Sheets) at:

[http://trafficware.com/MSDS/lithiumThionylChlorideBatteries\\_msds.pdf](http://trafficware.com/MSDS/lithiumThionylChlorideBatteries_msds.pdf)

#### 1.1.2.2 Serviceable Parts

Do not open the Pod modules, Access Points, or Base Stations or attempt to disassemble the internal parts or modify them in any way. The instrument contains no user-serviceable parts. If it should appear to be malfunctioning, discontinue use immediately and have it inspected by a qualified Trafficware or authorized service personnel.

#### 1.1.3 Installation Safety Guidelines

Installation of the POD Detection System™ must follow the requirements of Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) and the agency's Standard Plans and practices for work zone traffic control and safety.

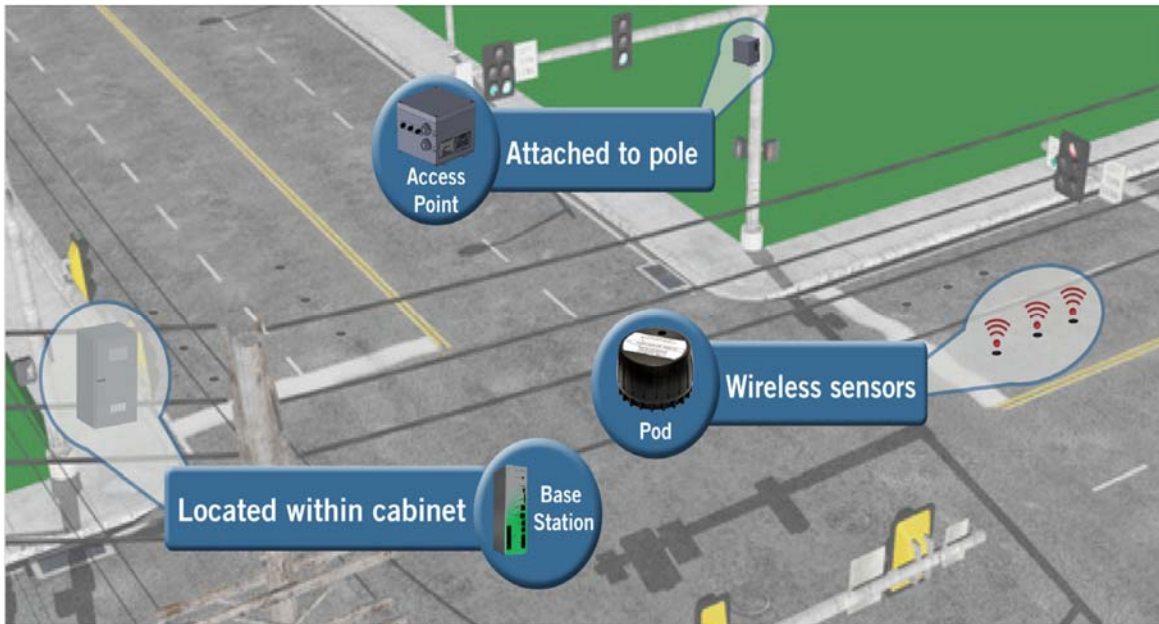


Figure 1: Diagram of Pod System

## 2 Overview - Pod Detection System™

The Pod Detection System™ is a system for detecting vehicular traffic on roadways and at intersections. Detection information from the system is transferred to traffic control equipment at the intersection or to a remote central system. Detection is accomplished by magnetic sensors, or Pods, that are placed in the roadway in the lanes of traffic. As vehicles pass above the Pods, they communicate detection information wirelessly to an Access Point that is mounted on a pole or mast arm hundreds of feet away. The Access Point communicates detection information from many Pods to a Base Station located inside the traffic control cabinet. Communication from the Access Point to Base Station may be by wireless link or by a wired EIA485 connection.

Pods detect vehicles by sensing changes in the direction of the earth's magnetic field that occurs near vehicles. The area of detection is roughly equivalent to that of a 6 foot by 6 foot loop of a loop detector. Pods may be used individually or in groups to form larger detection zones. A 6 foot by 20 foot zone can be formed using three pods spaced 12 feet apart. When used together to form a zone, the zone output is typically configured to be active when any of the Pods forming the zone are detecting a vehicle. This is the same way that multiple 6x6 foot loops combine in loop detection systems. Zones may be confined to a single lane, or cover multiple lanes. They may detect presence or be used for counting.

Pods communicate detection information via messages that are sent to an Access Point which forwards them to the Base Station. The Base Station processes individual detection messages into detection outputs that are received by a traffic controller through its detector inputs. The connection to the traffic controller may be via individual "contact closure" signals or by a serial, SDLC communication link if that is supported by the controller. The Base Station supports NEMA and Caltrans TEES interface standards for connection to traffic controllers.

The Base Station also provides the graphical user interface (GUI) that allows users to setup, to monitor, and to operate the Pod System. It is accessed locally or remotely via Ethernet from users' computers using common web browsers such as Chrome or Internet Explorer.

The Access Point (AP) is the link between the Pods in the roadway and the Base Station that is in the traffic control cabinet. Located on a pole or mast arm, the AP contains three radios to communicate with Pods. In a typical installation, each radio may support 25 or 30 Pods, thereby allowing an Access Point to support 75 or more. Since the Pod System can support multiple APs, it can be used for large configurations. Each radio uses a separate antenna, which may be omnidirectional or directional. Omnidirectional antennas are easy to setup and provide coverage for Pods within 250 feet. Directional antennas are used for longer distances, up to 700 feet.

Communication from the AP to the BS may be by wireless or wired link. A fourth radio and internal antenna in the AP supports wireless communication to the BS. An alternative, wired link is provided via EIA485 interfaces on both the AP and BS. Distances of 500 or 1000 feet are supported between the AP and BS depending upon the communication method used and, in the case of wireless, transmission conditions.

### 3 Using the System – The GUI

In order to begin using the Pod web interface first load the interactive site by using the HTTPS protocol and the IP address of the base station (e.g. <https://10.20.70.51/>). When using the GUI for the first time it may be necessary to confirm security exceptions as they arise in the browser. In Chrome, select “Show Advanced” and then “Proceed”. In Firefox click “Advanced”, “Add Exception”, and “Confirm Exception”. In Internet Explorer select “Continue to this Website.” Once the login screen appears select the username “User” and enter the password for this account. The default password is “password” and should be changed after login by following the instructions in section 3.6.

Once login is complete, the GUI is loaded. Pod Connect consists of four separate panes as shown below.

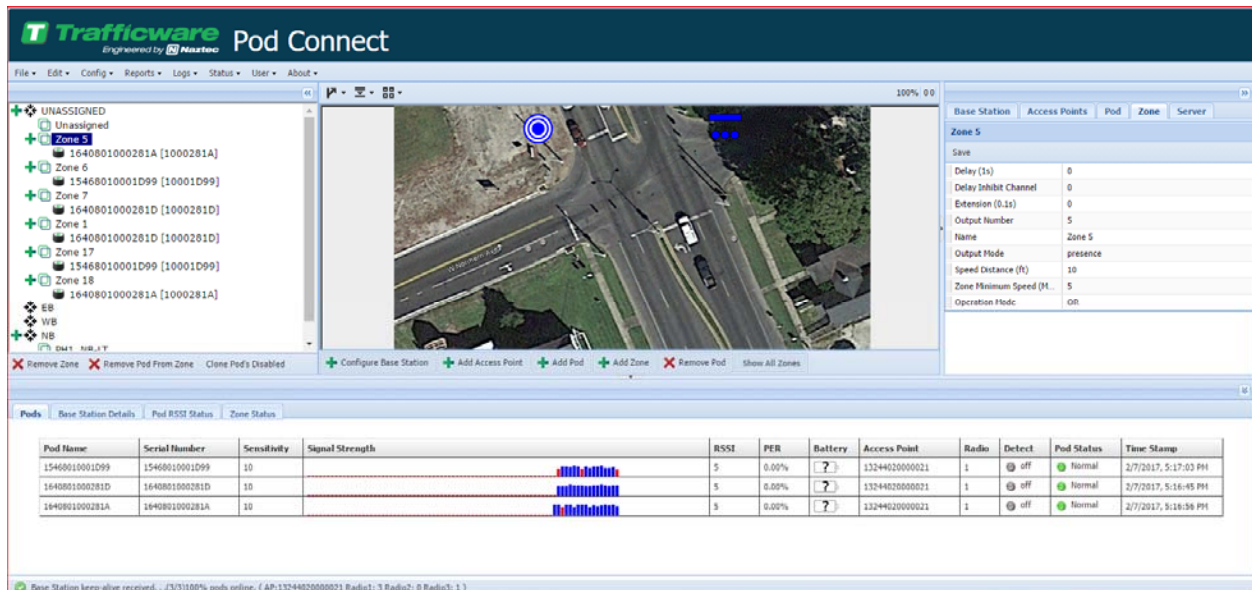


Figure 2 - Pod Connect Panes

Beginning in the top left and moving clockwise, they are:

1. Tree pane – A tree view of Approaches, Pods, and Zones.
2. Map pane – Visual overview of Base Station, Access Points, Pods, and Zones (when highlighted).
3. Property grid pane – Detailed parameters and settings for selected devices.
4. Spreadsheet pane – Pod status overview, Base station details, Pod RSSI information and zone volume occupancy information.

The tree pane reflects the organization of Pods in Zones and, optionally, by approaches to the intersection. The graphical intersection display provides real-time detection status and allows the user to arrange placement of Pod icons on the graphic background. The property grid pane displays and allows editing of user-programmable parameters for each component of the Pod system. Tabs are provided for Pods, Zones, Access Points, Base Station, etc. The spreadsheet pane displays summary Pod status and parameters in a compact spreadsheet format, one Pod per row, so that data of multiple Pods may be viewed at the same time.

The Pod Connect main menu is above the tree pane. The main menu contains options for saving and opening system configurations, reloading configuration into devices, clearing configuration, setting time, downloading support logs, and upgrading.

### 3.1 Tree Pane

The tree pane organizes Pods into Zones and Zones into Approaches. See figure 2 for an overview. The tree pane is collapsible and expandable by clicking the chevron icons. Pods can be dragged between Zones to group a Pod into a different Zone. Using the clone pod feature the same pod can be placed in multiple Zones. Zones can be dragged between Approaches to organize the Zones.

To create a Zone first select a Pod then click Add Zone in the map pane. The new Zone can then be dragged to an appropriate Approach. Other Pods can be dragged into the new Zone.

Newly added Pods appear in the Unassigned Zone where they can be used to add a new Zone or dragged to an existing Zone. Newly added Zones appear in the Unassigned Approach. The Unassigned Approach and Zone are always present in the tree pane even when there are no Zones or Pods in them.

The Pod name in the tree pane corresponds with the Pod name in the first column of the spreadsheet pane and the Pod name in the property grid.

### 3.2 Map Pane

The map pane provides a visual diagram of the intersection or site. The map pane grows and shrinks to the available space left over from the other panes. A map or image of the site provides the background to the pane. Newly added Pods appear in the far upper left of the pane

and can be dragged to their actual locations on the map. The Base Station icon is shown on the upper left and turns blue when there is an active link between the browser and the Base Station. Access Point icons are displayed on the upper right and lower right of the map. The base (rectangular) part of the Access Point icon is blue when there is communication from the Access Point to the Base Station. The three radio (round) parts of the icon are blue when they are running normally. The radio (round) and base (rectangular) parts of the Access Point turn yellow when there is either no communication or a malfunction. Optionally all of the zones can be displayed on the map, or the zone associated with the current selection.






**Figure 3 - Map Pane**

Pre-designed intersections and uploading of images can be selected from the “arrow” icon Load/Upload menu (1) above the map pane.

To upload an image to the map pane click on upload. This will open a file dialog box. Navigate to the directory that contains the image and then double-click on the image to select. Click okay to insert the image into the upload queue. Click “Finished” to begin uploading the image to the server.

The color of the Pod icon represents the Pod state. Grey indicates the Pod is healthy but there is no presence. Blue indicates the presence of a vehicle over the Pod. Yellow indicates no communication or a malfunction.



Color	Indication	Status
 (Grey)	Healthy	No presence.
 (Blue)	Healthy	Presence.
 (Yellow)	Problem	No communication or malfunction.

### 3.3 Property Grid Pane

When a Base Station, Access Point, Pod, or Zone is selected in the map, tree, or spreadsheet pane, its settings are displayed in the property grid pane to the right of the map pane. These settings are divided under the following tabs.

#### 3.3.1 Base Station tab

The following fields can be set: Interface Type (TS-1/TS-2), Description, History period, Name, Network ID, Serial Number, and Volume occupancy period.

#### 3.3.2 Access Points tab

The following fields can be set: Description, Name, Comm. Type, Comm. ID, and Serial Number.

#### 3.3.3 Pod tab

- **Extension:** When an detect occurs, extend the detect time to the given value (set in 0.1 second increments).
- **Sensitivity:** Allows the magnetic sensor sensitivity to be selected, from 1 being the least sensitive to 12 being the most sensitive.
- **Pod Name:** The Pod name can be configured in the field or from the browser to reflect the needs of the traffic operations center. For example, a Pod might be named “SBA-RL-SB 1” for Southbound Approach, Right Lane, Stopbar Pod #1.
- **Sensor Fail State:** Failure mode for the Pod. When there is no communication or a malfunction of a Pod, the “Always On” setting produces a “vehicle present” indication to the Zone. The “Ignore State” setting produces a “no vehicle present” indication to the Zone.
- **Serial Number:** This read-only value is set at the factory and represents a hex value. Every Pod has a unique serial number.
- **Radio:** Access Point Radio mapping can be modified here.

### 3.3.4 Zone Tab

Certain Zone properties/fields can be set based on the zone type, the following fields can be set for all zone types: Zone Pods, Delay, Extension, Output Number, Name, Operation Mode, and Output Mode.

For a speed/directional/wrong way zone types, Min Samples Required, Output Pulse Width, Speed Green Channel, Startup Loss Time, Minimum Speed can be changed/set. They will be explained more in future sections.

#### 3.3.4.1 Delay Inhibit:

This functionality is only valid for RMBS.

Delay Inhibit Channel number, when the output is over SLDC needs to be entered. The Channel numbers go from 1 to 16.

If the output is over EX cards, the delay inhibit connected physically to the back of the EX card is used.

### 3.3.5 Server Tab

Two sections are provided for setting the IP address information for the “Controller Enet” port and the “Laptop Enet” port. The following fields can be set: Address, Network, Netmask, Broadcast address, and Gateway address.

## 3.4 Spreadsheet Pane

### 3.4.1 Pods

The spreadsheet pane lists all the Pods in the system. These items are read-only. Briefly, these include:

- **Pod Name:** The Pod name can be configured in the field or from the browser to reflect the needs of the traffic operations center. For example a Pod might be named SBA-RL-SB 1 for Southbound Approach, Right Lane, Stopbar Pod #1. To edit, double-click on the field, enter your values, and click Update or Cancel.
- **Serial number:** This value is set at the factory and represents a hex value. Every Pod has a unique serial number.
- **Sensitivity:** Allows the magnetic sensor sensitivity to be selected, from 1 being the least sensitive to 12 being the most sensitive.
- **Signal Strength:** The RSSI, or received signal strength indicator, is a generic radio receiver technology metric. It is displayed as a read-only sparkline graphic in the Pod spreadsheet. It is color coordinated bar graph where any value below an RSSI of 80 is displayed in red bar, RSSI value between 80 and 120 is displayed in blue bar, and an RSSI value above 120 is displayed in green bar.

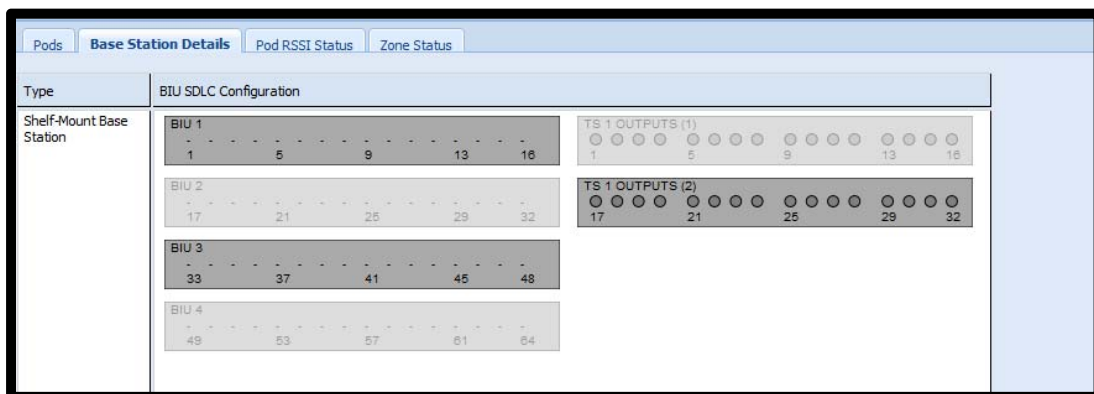
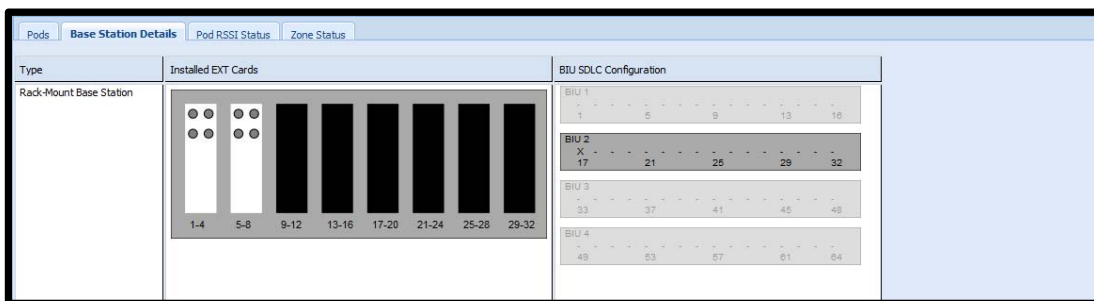


- **Battery:** Gives an indication of the current battery levels.
- **Access Point** and **Radio:** Some installations use multiple radios or antennas; consequently, Pods can be associated with an antenna/radio that provides the best reception or performance.
- **Detect status:** Pod detect state indication. Vehicle detected (blue icon), or no detect (grey icon). Gold indicates no communications with this pod.
- **Pod Status:** Pod communication status. Gold, no communications with pod. Green, normal state. Red pod indicates a warning message for the pod in question.
- **PER:** Display the packet error rate (PER)
- **RSSI:** Displays RSSI metric value between 1 and 15.
- **Time Stamp:** Displays the last time the pod communicated with the base station.

Pod Name	Serial Number	Sensitivity	Signal Strength	RSSI	PER	Battery	Access Point	Radio	Detect	Pod Status	Time Stamp
15468010001D99	15468010001D99	10		8	0.00%	[?]	13244020000021	1	off	Normal	2/7/2017, 5:39:11 PM
1640801000281D	1640801000281D	10		10	0.00%	[?]	13244020000021	1	off	Normal	2/7/2017, 5:39:03 PM
1640801000281A	1640801000281A	10		10	0.00%	[    ]	13244020000021	1	off	Normal	2/7/2017, 5:38:51 PM

### 3.4.2 Base Station Details:

This gives an overview of the type of base station it is, and type of connection method to the controller.



### 3.4.3 Pod RSSI Status

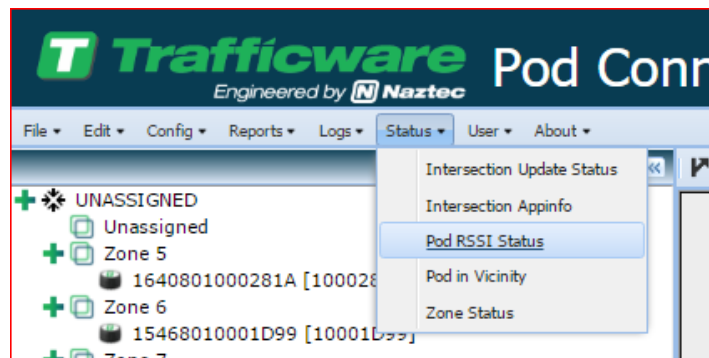
This window gives an overview of Pod's RSSI status, Receive and Transmit PER values, a histogram of RSSI values for last 10 packets.

Also Pod's Volume/Occupancy counts can be seen in this window, RSSI status and Volume/Occupancy status are mutually exclusive events.

PodSerial	PodName	Status	Detect	AP	Radio	TxRSSI	TxMetric	RxRSSI	RxMetric	TxPER	RxPER	TimeStamp
15468010001D99	15468010001D99	Enabling RSSI	<input checked="" type="checkbox"/>	13244020000021	1	91	0	0	5	2.63	5.26	2/8/2017, 10:20:59 AM
1640801000281A	1640801000281A	RSSI	<input checked="" type="checkbox"/>	13244020000021	1	105	10	0	5	1.77	0.78	2/8/2017, 10:21:32 AM
1640801000281A	1640801000281A	RSSI	<input checked="" type="checkbox"/>	13244020000021	1	103	9	0	5	1.65	0.54	2/8/2017, 10:21:25 AM

PodSerial	PodName	Status	Detect	AP	Radio	TxMetric	TxPER	VOL	OCC	TimeStamp
15468010001D99	15468010001D99	Vol/Occ	<input checked="" type="checkbox"/>	13244020000021	1	0	2.63	6	0	2/8/2017, 10:22:39 AM
1640801000281A	1640801000281A	Vol/Occ	<input checked="" type="checkbox"/>	13244020000021	1	10	1.77	7	0	2/8/2017, 10:22:38 AM
1640801000281A	1640801000281A	Vol/Occ	<input checked="" type="checkbox"/>	13244020000021	1	9	1.65	7	0	2/8/2017, 10:22:39 AM

This page can also be accessed through the top GUI menu

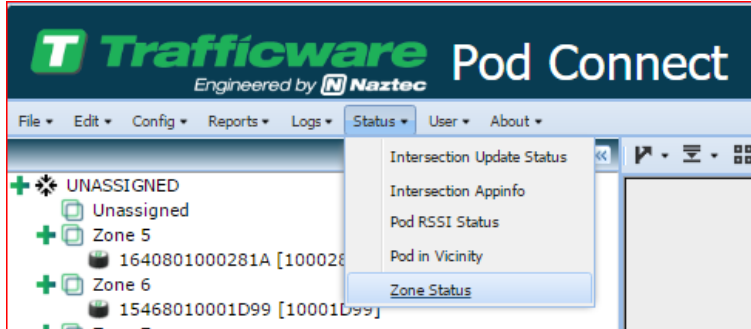


### 3.4.4 Zone Status

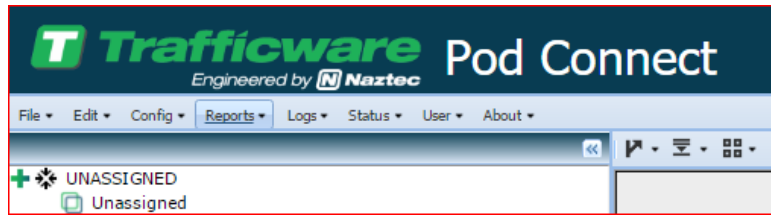
Zones Volume/Occupancy counts can be seen in this window, Average Speed is displayed in MPH and KMPH.

Zone Number	Output	Mode	Status	Zone Status	Vol	Occ	AvgSpeed (mph)	AvgSpeed (kmph)	TimeStamp	
Zone - Front	1	0	presence	Vol/Occ	<input checked="" type="checkbox"/>	0	0	0	0.00	6/5/2017, 4:14:35 AM
Zone 1	2	17	presence	Vol/Occ	<input checked="" type="checkbox"/>	0	0	0	0.00	6/5/2017, 4:14:35 AM
Zone 1-1	3	21	presence	Vol/Occ	<input checked="" type="checkbox"/>	0	0	0	0.00	6/5/2017, 4:14:36 AM
Zone 1-2	4	25	presence	Vol/Occ	<input checked="" type="checkbox"/>	0	0	0	0.00	6/5/2017, 4:14:36 AM

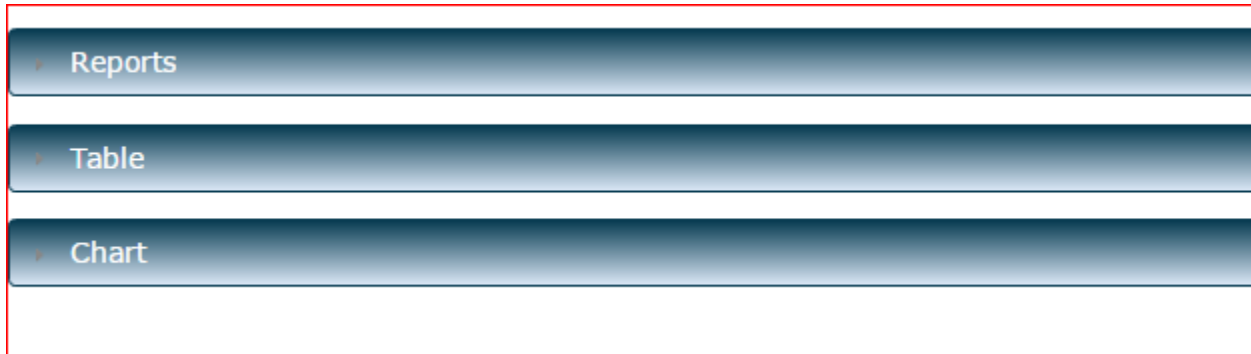
This page can also be accessed through the top GUI menu.



### 3.5 Reports



From this version of the software pod reports page contains 3 major portions



From the reports subsection you can select a report type, the response received back from the base station is displayed in table subsection, and chart subsections plots the data based on the filtered data in table subsection.



### 3.5.1 Volume/Occupancy Report

Volume/Occupancy reports can be requested per pod/zone or for all detectors outputs.

Select Report: **Pod Volume/Occupancy**

Start Date Time: 02/08/2017 12:00 AM Get Report End Date Time: 02/08/2017 Midnight

Pods:  All/None

- 15468010001D99 (15468010001D99)
- 1640801000281D (1640801000281D)
- 1640801000281A (1640801000281A)

Select Report: **Zone Volume/Occupancy/Speed**

Start Date Time: 02/08/2017 12:00 AM Get Report End Date Time: 02/08/2017 Midnight

Zones:  All/None

- Zone 5 (1, 5)
- 1640801000281A (1640801000281A)
- Zone 1 (4, 1)
- 1640801000281D (1640801000281D)
- PH1\_NB-LT (7, 28)
- Zone 6 (2, 6)
- 15468010001D99 (15468010001D99)
- Zone 17 (5, 17)
- 15468010001D99 (15468010001D99)
- Zone 7 (3, 7)
- 1640801000281D (1640801000281D)
- Zone 18 (6, 18)
- 1640801000281A (1640801000281A)

Select Report: **Detector Volume/Occupancy**

Start Date Time: 02/08/2017 12:00 AM Get Report End Date Time: 02/08/2017 Midnight

Zones:

- Zone 5 (1, 5)
- 1640801000281A (1640801000281A)
- Zone 1 (4, 1)
- 1640801000281D (1640801000281D)
- PH1\_NB-LT (7, 28)
- Zone 6 (2, 6)
- 15468010001D99 (15468010001D99)
- Zone 17 (5, 17)
- 15468010001D99 (15468010001D99)
- Zone 7 (3, 7)
- 1640801000281D (1640801000281D)
- Zone 18 (6, 18)
- 1640801000281A (1640801000281A)

The data received as a response to a volume occupancy request can be filtered

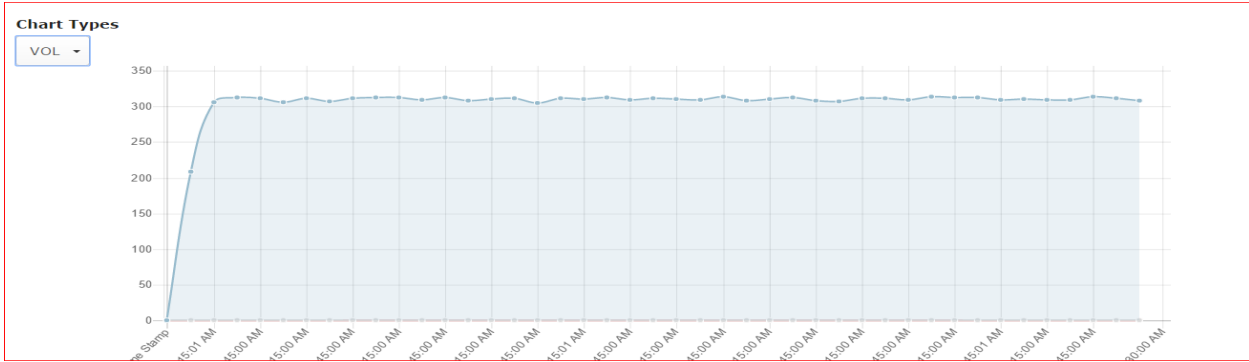
**Filters**

15468010001D99, 1640801000281D, 1640801000281A

Download data as CSV

Time Stamp	Period	15468010001D99		1640801000281D		1640801000281A	
		Vol	Occ	Vol	Occ	Vol	Occ
1/17/2017, 12:00:00 AM	899	0	0	0	0	0	0
1/17/2017, 12:15:01 AM	900	208	66	0	0	0	0
1/17/2017, 12:30:00 AM	899	306	100	0	0	0	0
1/17/2017, 12:45:00 AM	900	312	100	0	0	0	0
1/17/2017, 1:00:00 AM	900	311	99	0	0	0	0
1/17/2017, 1:15:00 AM	900	306	99	0	0	0	0
1/17/2017, 1:30:00 AM	900	311	99	0	0	0	0
1/17/2017, 1:45:00 AM	900	307	99	0	0	0	0
1/17/2017, 2:00:00 AM	900	311	100	0	0	0	0
1/17/2017, 2:15:00 AM	900	312	100	0	0	0	0
1/17/2017, 2:30:00 AM	900	312	99	0	0	0	0

And the filtered data can be plotted in the Charts subsection



This applies to zone and detector volume occupancy reports.

### 3.5.2 Pod Health Status Report

**Reports**

Select Report: Pod Health Status

Start Date Time: 01/16/2017 12:00 AM

End Date Time: 01/16/2017 Midnight

Pods: 15468010001D99 (15468010001D99) 1640801000281D (1640801000281D) 1640801000281A (1640801000281A)

[Get Report](#)

**Table**

Filters: 15468010001D99, 1640801000281D, 1640801000281A

Download data as CSV

Time Stamp	Serial	PER(TX)	PER(RX)	Total TX Pkts	RSSI(TX)	RSSI(RX)	10%RSSI(TX)	10%RSSI(RX)	Detect Timeout	Temperature(F)	Battery(Voltage)	TxFullCtr	DaysInOperation
1/17/2017, 12:08:40 AM	15468010001D99	1.19	0.00	84	96	0	85	80	0	-	1023	-	-
1/17/2017, 12:08:40 AM	1640801000281D	0.00	1.45	69	109	0	100	50	0	-	1023	23797	-
1/17/2017, 12:08:40 AM	1640801000281A	1.37	0.00	73	112	0	100	50	0	-	1023	23539	-
1/17/2017, 12:23:40 AM	15468010001D99	-	-	-	95	93	80	80	0	-	-	-	-
1/17/2017, 12:23:40 AM	1640801000281D	0.00	0.00	71	109	0	105	50	0	-	-	-	-
1/17/2017, 12:23:40 AM	1640801000281A	-	-	-	112	0	100	50	0	-	-	-	-
1/17/2017, 12:38:40 AM	15468010001D99	1.17	0.08	1278	95	93	80	80	0	-	-	-	-
1/17/2017, 12:38:40 AM	1640801000281D	-	-	-	109	0	105	50	0	-	-	-	-
1/17/2017, 12:38:40 AM	1640801000281A	1.45	0.00	69	112	0	100	50	0	-	-	-	-
1/17/2017, 12:53:40 AM	15468010001D99	-	-	-	95	93	80	80	0	-	-	-	-

**Filters**

15468010001D99, 1640801000281D, 1640801000281A

Select All  Select None

Search...

- 15468010001D99 15468010001D99
- 1640801000281D 1640801000281D
- 1640801000281A 1640801000281A

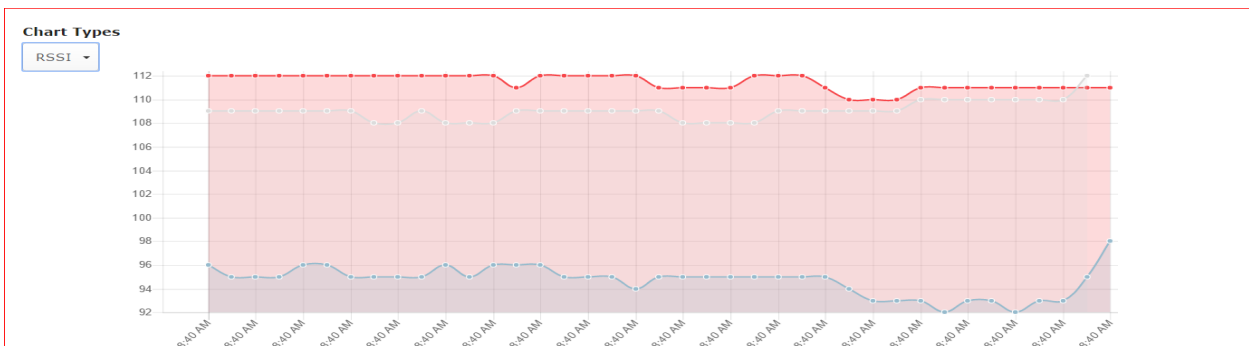
**Chart Types**

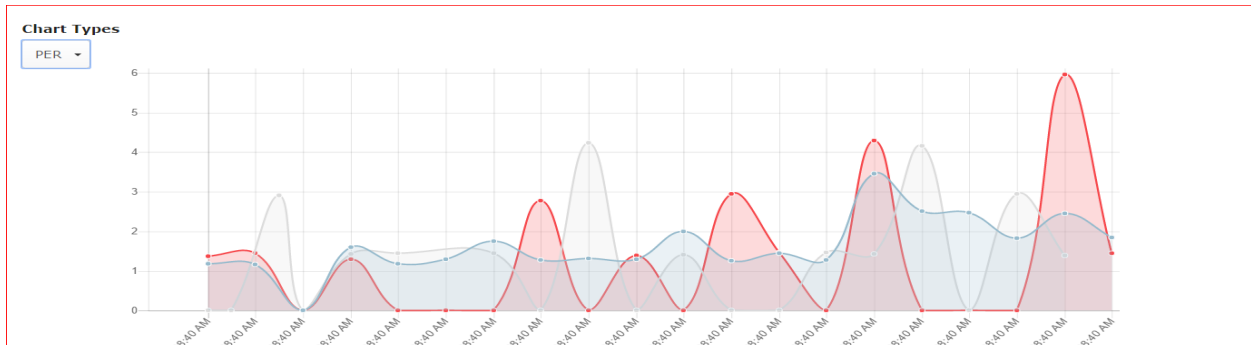
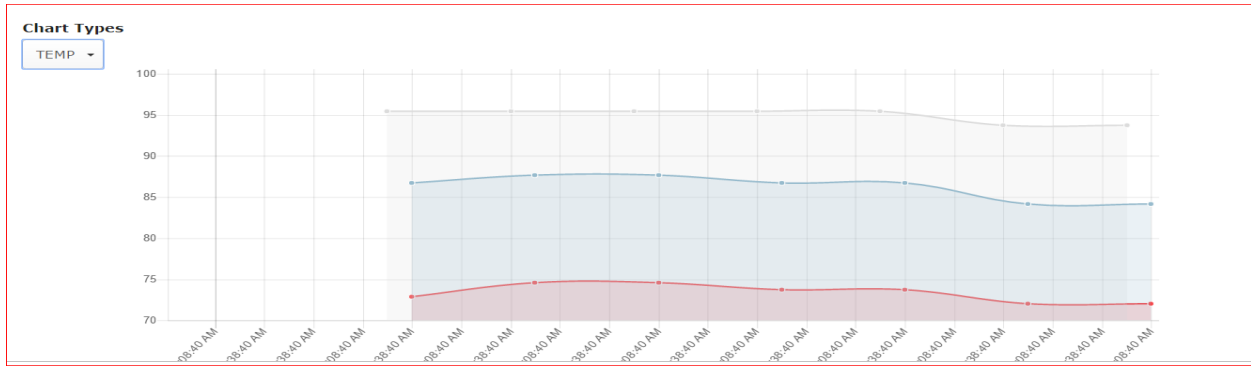
PER

Search...

- NONE
- PER
- RSSI
- BATTERY
- TEMP

PER(RX)	Total TX Pkts
0.00	84
1.45	69
0.00	73
0.00	71
0.08	1278
0.00	69





The temperature value displayed and plotted are non-calibrated values.

### 3.5.3 Access Point Health Status Report

Reports

Select Report: AP Health Status

Start Date Time: 01/16/2017 12:00 AM

End Date Time: 01/16/2017 Midnight

Get Report

Table

13244020000021

Download data as CSV

Time Stamp	Serial	wireless_per	wireless_tx	wireless_rx	wireless_retries	wireless_failures	wireless_cca_failures	wireless_lack_of_buf	wireless_payload_too_large	connect_attempts	wired_tx	wired_rx
1/16/2017, 4:49:14 PM	20000021	0.00	543	2244	0	0	0	0	0	46	130	0
1/16/2017, 5:04:14 PM	20000021	0.00	124	18	0	0	0	0	0	46	130	0
1/16/2017, 5:19:14 PM	20000021	0.00	231	36	0	0	0	0	0	46	130	0
1/16/2017, 5:35:00 PM	20000021	0.00	469	78	0	0	0	0	0	46	130	0
1/16/2017, 6:10:00 PM	20000021	0.00	258	36	0	0	0	0	0	46	130	0
1/16/2017, 6:25:00 PM	20000021	0.00	135	18	0	0	0	0	0	46	130	0
1/16/2017, 6:40:00 PM	20000021	0.00	273	36	0	0	0	0	0	46	130	0
1/16/2017, 7:10:00 PM	20000021	0.00	411	54	0	0	0	0	0	46	130	0
1/16/2017, 7:25:00 PM	20000021	0.00	209	36	0	0	0	0	0	46	130	0

Chart

Chart Types

NONE

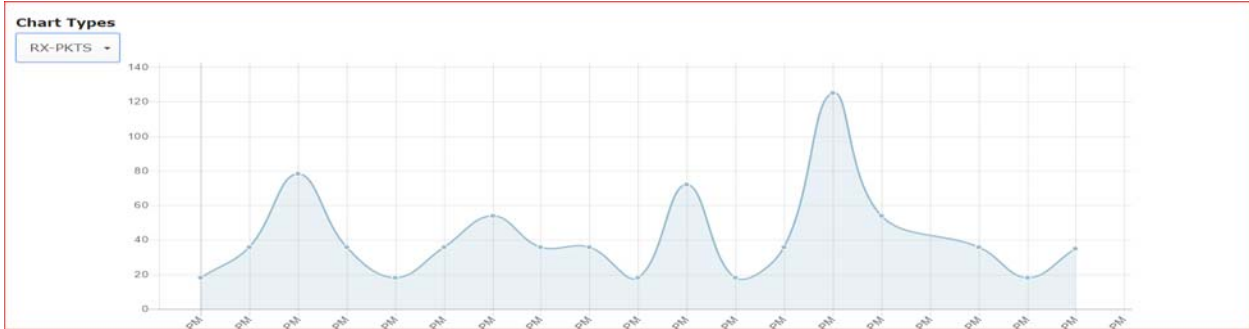
Reset

Search...

NONE ✓

TXPER

RX-PKTS



### 3.5.4 Base station Health Status Report

Select Report: **Basestation Health Status**

Start Date Time:    End Date Time:

**Filters**  
Test BS

Download data as CSV

Time Stamp	Serial	wireless_per	wireless_tx	wireless_rx	wireless_rssi	wireless_retries	wireless_failures	wireless_cca_failures	wireless_lack_of_bufs	wireless_payload_too_large	xbee_network_reconnect
1/17/2017, 12:23:40 AM	40001130	0.00	239	2163	28	0	1	0	0	0	0
1/17/2017, 12:38:40 AM	40001130	0.00	30	825	28	0	1	0	0	0	0
1/17/2017, 12:53:40 AM	40001130	0.00	30	837	28	0	1	0	0	0	0
1/17/2017, 1:08:40 AM	40001130	0.00	31	832	28	0	1	0	0	0	0
1/17/2017, 1:38:40 AM	40001130	0.00	60	1666	28	0	1	0	0	0	0
1/17/2017, 1:53:40 AM	40001130	0.00	30	828	28	0	1	0	0	0	0
1/17/2017, 2:08:40 AM	40001130	0.00	30	841	28	0	1	0	0	0	0
1/17/2017, 2:23:40 AM	40001130	0.00	30	824	28	0	1	0	0	0	0
1/17/2017, 2:53:40 AM	40001130	0.00	60	1628	28	0	1	0	0	0	0
1/17/2017, 3:08:40 AM	40001130	0.00	31	809	28	0	1	0	0	0	0
1/17/2017, 3:23:40 AM	40001130	0.00	30	812	28	0	1	0	0	0	0
1/17/2017, 3:38:40 AM	40001130	0.00	30	807	28	0	1	0	0	0	0
1/17/2017, 4:08:40 AM	40001130	0.00	60	1752	28	0	1	0	0	0	0

**Chart**

NONE

Reset

Search...

NONE ✓

TXPER

RSSI

RX-PKTS

### 3.5.5 Access Point Radio Health Status Report

Select Report: **AP Radios Health Status**

Start Date Time:    End Date Time:

**Filters**  
300000a4, 30000054, 3000007c

Download data as CSV

Time Stamp	Serial	utilization(%)	rf_tx	rf_crc	spL_tx_overnun	rf_tx_err	spL_tx_overflow
1/17/2017, 12:23:40 AM	300000a4	0.00	1238	40	0	0	0
1/17/2017, 12:23:40 AM	30000054	-	-	0	0	0	0
1/17/2017, 12:23:40 AM	3000007c	-	-	0	0	0	0
1/17/2017, 12:38:40 AM	300000a4	0.32	693	45	0	0	0
1/17/2017, 12:38:40 AM	30000054	-	-	0	0	0	0
1/17/2017, 12:38:40 AM	3000007c	-	-	0	0	0	0
1/17/2017, 12:53:40 AM	300000a4	0.32	697	54	0	0	0
1/17/2017, 12:53:40 AM	30000054	-	-	0	0	0	0
1/17/2017, 12:53:40 AM	3000007c	-	-	0	0	0	0
1/17/2017, 1:08:40 AM	300000a4	0.32	693	75	0	0	0
1/17/2017, 1:08:40 AM	30000054	-	-	0	0	0	0

**Chart**

**Chart types**

NONE

Reset

Search...

NONE ✓

UTILIZATION

RX-PKTS



Utilization gives you an indication on how loaded or RF time slots are used by pods assigned to it.

### 3.5.6 Events Report

**Trafficware Pod Reports**  
Engineered by Naztec

Reports

Select Report: Events Report

Start Date Time: 01/16/2017 12:00 AM

Get Report

End Date Time: 01/16/2017 Midnight

**Reports**

**Table**

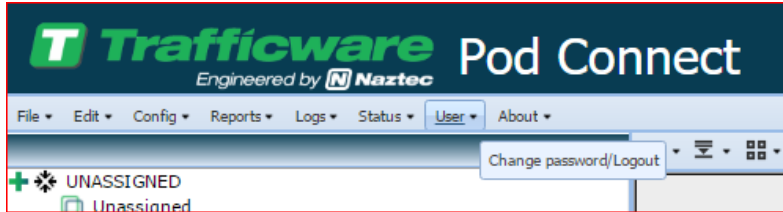
Download data as CSV

1/16/2017, 4:30:49 PM	eLOG_CXU_PXM_TIMEOUT PXM32=20000021
1/16/2017, 4:30:49 PM	eLOG_CXU_PXM_TIMEOUT PXM32=300000A4
1/16/2017, 4:30:49 PM	eLOG_CXU_PXM_TIMEOUT PXM32=30000054
1/16/2017, 4:30:49 PM	eLOG_CXU_PXM_TIMEOUT PXM32=3000007C
1/16/2017, 4:30:49 PM	eLOG_CXU_SENSOR_TIMEOUT POD32=10001D99
1/16/2017, 4:30:49 PM	eLOG_CXU_SENSOR_TIMEOUT POD32=1000281D
1/16/2017, 4:30:49 PM	eLOG_CXU_SENSOR_TIMEOUT POD32=1000281A
1/16/2017, 4:30:59 PM	eLOG_CXU_SENSOR_ACTIVE_AFTER_TIMEOUT POD32=10001D99
1/16/2017, 4:31:10 PM	eLOG_CXU_SENSOR_ACTIVE_AFTER_TIMEOUT POD32=1000281D
1/16/2017, 4:31:16 PM	eLOG_CXU_SENSOR_ACTIVE_AFTER_TIMEOUT POD32=1000281A
1/16/2017, 4:32:32 PM	eLOG_CXU_INTERSECTION_UPDATE_START starting
1/16/2017, 4:34:53 PM	eLOG_CXU_RECONFIG CONFIG_PXM_ONLY PXM8=224 CfgPxm=2
1/16/2017, 4:34:53 PM	eLOG_CXU_RECONFIG REQ BEGIN PXM8 PRM8=E0 (0=ALL)



### 3.6 User Settings

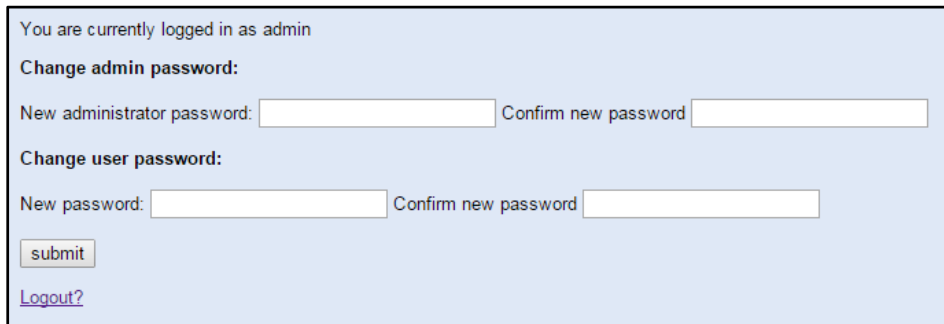
The user settings page allows the user to change the password and logout. Click the User item in the pulldown menu to load the user settings page.



To change the password, enter matching passwords in both fields and submit. Click “Logout” in order to log out.

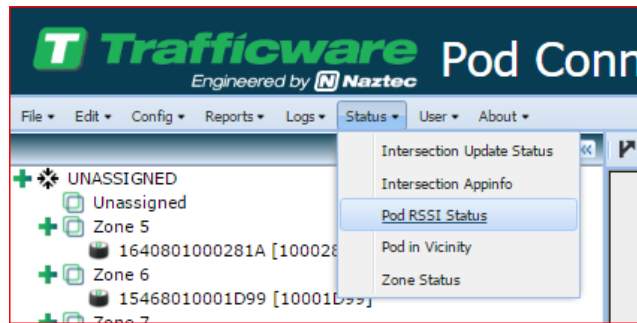


If logged in as Admin the user settings page allows setting the passwords for both the “User” account and the “Admin” account. In order to change a password, enter matching passwords in the two fields for either the “User” account or the “Admin” account and submit.



## 4 RSSI Status Page Usage

To open the RSSI Status page, select from the menu Status->Pod RSSI Status.



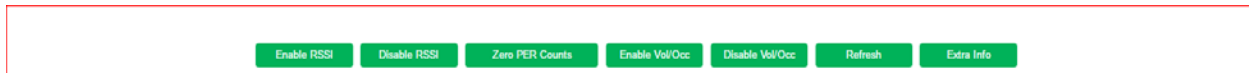
When viewed on a separate webpage, the Pod RSSI status page has extra columns for histogram, and other information.

This will open the Pod RSSI Status page:

The screenshot shows the 'Pod RSSI Status' webpage. It features a table with columns for PodSerial, PodName, Status, Detect, AP, Radio, TxRSSI, TxMetric, RxRSSI, RxMetric, TxPER, RxPER, Rssi Histogram, and TimeStamp. There are also 'All' and 'None' buttons above the table.

PodSerial	PodName	Status	Detect	AP	Radio	TxRSSI	TxMetric	RxRSSI	RxMetric	TxPER	RxPER	Rssi Histogram	TimeStamp
1546801000D99	1546801000D99	RSSI	📶	1324402000021	1	88	8	86	9	3.69	3.40	-89.87,88.81,91.69,89.82	2/8/2017, 11:05:11 AM
1546801000D99	1546801000D99	RSSI	📶	1324402000021	1	129	10	126	10	3.77	0.78	-104.209,112.111,111.209,118.110	2/8/2017, 11:04:45 AM
1546801000D99	1546801000D99	RSSI	📶	1324402000021	1	106	10	103	10	3.65	0.84	-83.104,107.110,91.111,107.109	2/8/2017, 11:05:09 AM

Select a pod and click “Enable RSSI”.



As the pod transitions (detect/un-detect) the RSSI values will be updated.

- RX RSSI is a measure of RF signal strength as received at the access point from the pod.
- Tx RSSI is a measure of RF signal strength as received at the pod from the access point.
- Time/Date stamp, when the values were received
- TxMetric & RxMetric indicates a metric value based on the RX RSSI value (the metric ranges from 0-15, with 0 being bad/no signal to 15 as a strong signal).
- Rssi Histogram, indicates a histogram of recently received values.
- TxPER (percentage), packets transmitted from pod vs packets received at access point.
- RxPER (percentage), measure of lost connectivity (lost packets) at pod.
- When you press Extra Info button
  - TxPkts, RxPkts, NoSync, Nacks & TxRxNacks are the raw count values.

Important things to note about the packet error rate values is that they update relatively infrequently (about every 45 minutes), and the PER values should be discounted if the raw

count values are small. If left for long periods, recent packet activity can be obscured by the total count. As a result, if you are interested in current values, you should click the “Zero PER Counts” button and then come back and observe the values after a few hours (to a few days).

Ideally this page can be used after initial setup to determine if there are issues with RF communications between the Access point(s) and the pods. Low RSSI values are an indication of improper antenna selection, usage, or placement. High PER values can be an indication of antenna issues, and can also be an indicator of interference from other transmitters in the area.

Clicking the Vol/Occ button with a pod selected will present pods volume and occupancy numbers for current report period

PodSerial	PodName	Status	Detect	AP	Radio	TxPwr	TxPER	VOL	OCC	Rssi Histogram	TimeStamp
<input checked="" type="checkbox"/> 12468010001D99	12468010001D99	Vol/Occ		13244020000021	1	9	2.39	0	0	.82,93,88,95,79,97,96,95	2/8/2017, 11:10:13 AM
<input checked="" type="checkbox"/> 1640801000281D	1640801000281D	Vol/Occ		13244020000021	1	10	1.77	0	0	.110,105,110,117,108,111,116,108	2/8/2017, 11:10:11 AM
<input checked="" type="checkbox"/> 1640801000281A	1640801000281A	Vol/Occ		13244020000021	1	10	1.65	0	0	.106,106,109,112,105,112,110,106	2/8/2017, 11:10:05 AM

- Volume is the number of vehicles detected over the set Vol/Occ period (Configured in the base station property grid).
- Occupancy gives a percentage of the time the pod was in detect state during the reporting period (in .5% increments).
- Time/Date stamp is the time of the last update.

The Disable buttons turn off the display (but not the collection of all of these values).

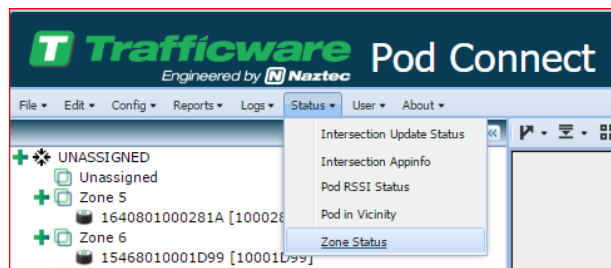
You may not select both RSSI and Volume/Occupancy display at the same time. Clicking enable for either one will select *that* display (de-selecting the other).

The refresh button can be used to refresh the page and clear the timestamps making it easier to see when updates arrive.

The Select all and Clear all buttons will respectively check or uncheck all of the pods listed, and is only present on the full page view.

## 5 Zone Status

To open the Zone Status page, select from the menu Status->ZoneStatus.



This will open the Zone Status page:

	Zone Number	Output	Mode	Status	Zone Status	Vol	Occ	AvgSpeed (mph)	AvgSpeed (kmph)	TimeStamp
<input type="checkbox"/>	Zone - Front	1	0	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:00 AM
<input type="checkbox"/>	Zone1	2	17	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:00 AM
<input type="checkbox"/>	Zone1-1	3	21	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:01 AM
<input type="checkbox"/>	Zone3	4	25	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:01 AM
<input type="checkbox"/>	Zone5-1	5	29	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:01 AM
<input type="checkbox"/>	Zone9	6	33	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:01 AM
<input type="checkbox"/>	Zone2	7	18	presence	Vol/Occ	2	2	0	0.00	6/5/2017, 7:08:17 AM
<input type="checkbox"/>	Zone3-1	8	22	presence	Vol/Occ	2	1	0	0.00	6/5/2017, 7:08:17 AM
<input type="checkbox"/>	Zone8	9	26	presence	Vol/Occ	2	2	0	0.00	6/5/2017, 7:08:17 AM
<input type="checkbox"/>	Zone6-1	10	30	presence	Vol/Occ	2	1	0	0.00	6/5/2017, 7:08:18 AM
<input type="checkbox"/>	Zone10	11	34	presence	Vol/Occ	2	1	0	0.00	6/5/2017, 7:08:18 AM
<input type="checkbox"/>	Zone3	12	19	presence	Vol/Occ	1	0	0	0.00	6/5/2017, 7:08:06 AM
<input type="checkbox"/>	Zone3-1	13	23	presence	Vol/Occ	1	1	0	0.00	6/5/2017, 7:08:06 AM
<input type="checkbox"/>	Zone7	14	27	presence	Vol/Occ	1	1	0	0.00	6/5/2017, 7:08:06 AM
<input type="checkbox"/>	Zone7-1	15	31	presence	Vol/Occ	1	1	0	0.00	6/5/2017, 7:08:09 AM
<input type="checkbox"/>	Zone11	16	35	presence	Vol/Occ	1	1	0	0.00	6/5/2017, 7:08:06 AM
<input type="checkbox"/>	Zone4	17	20	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:02 AM
<input type="checkbox"/>	Zone4-1	18	24	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:02 AM
<input type="checkbox"/>	Zone8	19	28	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:02 AM
<input type="checkbox"/>	Zone12	20	32	presence	Vol/Occ	0	0	0	0.00	6/5/2017, 7:08:02 AM

Selecting a zone and clicking the enable button will turn on the display of the current volume/occupancy/average speed values for the selected zone.

For this page:

- Volume indicates the number of times this zone has activated in the current volume occupancy time period (set in the base station property grid)
- Occupancy gives a percentage of the time the zone was in detect state during the reporting period (in .5% increments).
- AvgSpeed (only valid if this is a speed zone) gives the current average speed value for this zone. This is displayed in MPH and KMPH.
- Time/Date stamp is the time of the last update

The table also includes the enable/disable status of this display, and the current state of the zone (blue circle is zone output on, grey circle is zone output off).

The disable button will stop the display updates for the selected zone(s).

The refresh button will refresh the page and clear the timestamps making it easier to see when updates arrive.

Speed Display button shows histogram of last previous speed values.

## 6 Speed Zone setup

Speed can be measured using two or more pods, more pods in the zone gives more accuracy in speed measurement.

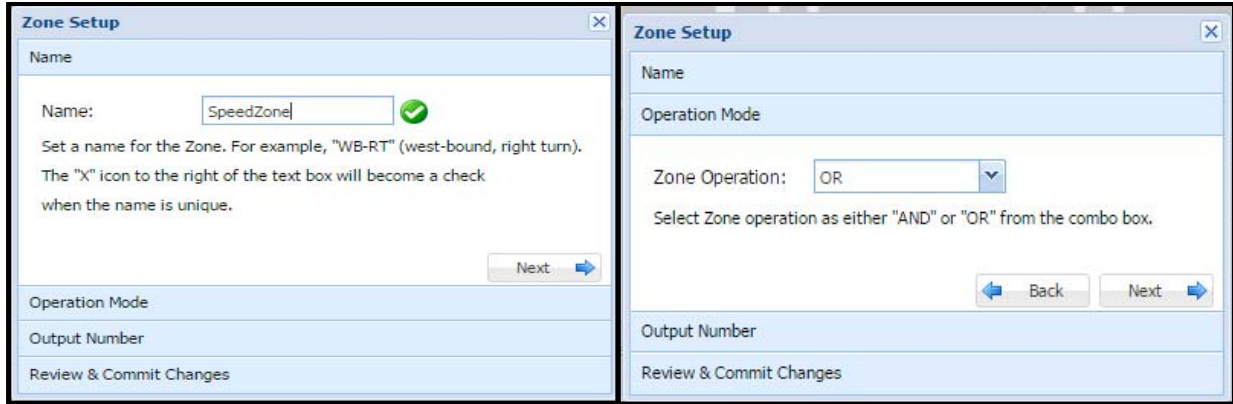
Speed measuring prerequisites:

- Zone configured for "speed".
- Two or more pods placed in this zone, each pod within the zone needs to be configured
  - "order" of the pods within the zone,
  - "Gap" within the zone. This value is the space from the previous "order" pod in the zone, this is entered in ft. the spacing between pods should be chosen based on the average speed of the vehicles expected, to give more accuracy.
- Minimum Speed: minimum expected speed needs to be specified in MPH, any speed value below this will be ignored.
- Speed Green Channel: (1 to 16), if the pods are installed close to the stop bar, specifying the Green Phase/Channel of the approach, allows system to measure speed only when the channel/phase is active.
- Startup Loss Time: if the pods are installed close to the stop bar, if Speed Green Channel has been specified along with Startup Loss Time, this allows system to measure speed only when the channel/phase is active, after Startup Loss Time has expired. This value is entered in multiple of 100ms, i.e. a value of 10 equals to 1 sec.
- Min Samples Required: this value is used to specify the minimum samples to calculate speed. For example, if a zone has 3 pods, with order's 1, 2 and 3, and if the Min Samples Required is set to 3, all 3 pods need to be activated in the correct order to measure a valid speed, and if the Min Samples Required is set to 2, any two pods activated within zone will be used to calculate speed.
- Calibrate the sensitivity of the pods, so that they have similar response to a car, this allows for more accurate speed measurement.

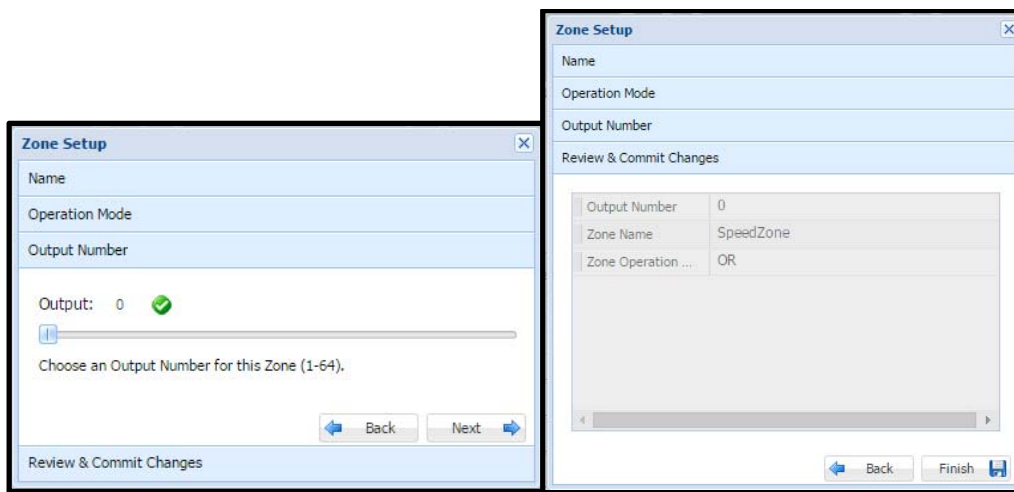
To add a new zone to be used for speed measurements:

Click "Add Zone"

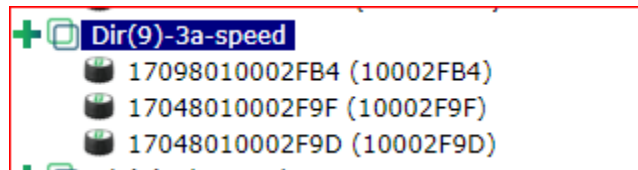




The output number should be left at 0, for a speed zone.



Using the tree view, drag the pods into this zone, speed zone can have 2 or more pods.



Select the zone in the tree view to bring its configuration to the property grid view

In the property grid view, select the output mode of zone to “speed”

**Dir(9)-3a-speed**

Save

Delay (1s)	0
Delay Inhibit Channel	0
Extension (0.1s)	0
Min Samples Required	2
Output Number	0
Name	Dir(9)-3a-speed
Zone Number	200
Output Mode	speed
Speed Green Channel	Pulse
Startup Loss Time (0.1s)	Presence
Minimum Speed(MPH)	Speed
Operation Mode	Health
Zone Pods	Directional
	WrongWay

Enter the Order and Gap between pods measured in feet in Zone Pods drop down, and also enter the minimum speed for zone in question.

Operation Mode	OR
Zone Pods	3

**Update Zone Pod**

Serial	Order	Gap(ft)
17098010002FB4	3	8
17048010002F9F	2	8
17048010002F9D	1	0

Cancel OK

Zone Number	200
Output Mode	speed
Speed Green Channel	0
Startup Loss Time (0.1s)	50
Minimum Speed(MPH)	5
Operation Mode	OR
Zone Pods	3

Similarly change Speed Green Channel and Startup Loss Time based on if the speed zone is at stop bar or not.

Using the spreadsheet pane, select "zone status" (or from the main menu select Status->zone Status)

	Zone Number	Output	Mode	Status	Zone Status	Vol	Occ	AvgSpeed (mph)	AvgSpeed (kmph)	TimeStamp
<input type="checkbox"/> Zone - Front	1	0	presence	Vol/Occ	<input type="radio"/>	0	0	0	0.00	6/7/2017, 4:02:25 AM
<input type="checkbox"/> Zone 1	2	17	presence	Vol/Occ	<input type="radio"/>	0	0	0	0.00	6/7/2017, 4:02:25 AM
<input type="checkbox"/> Zone 1-1	3	21	presence	Vol/Occ	<input type="radio"/>	0	0	0	0.00	6/7/2017, 4:02:25 AM
<input type="checkbox"/> Zone 1-2	4	25	presence	Vol/Occ	<input type="radio"/>	0	0	0	0.00	6/7/2017, 4:02:25 AM

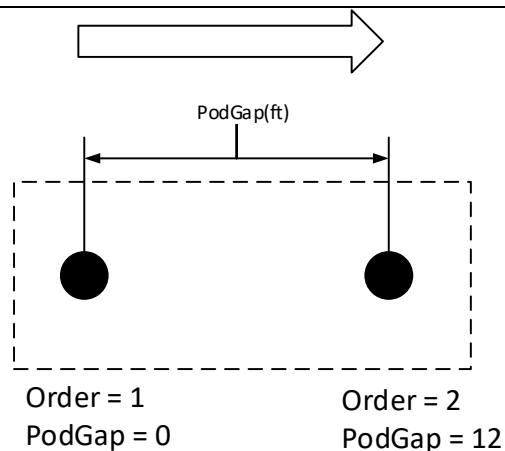
Click the checkbox next to the zone selected for speed operation and click the enable button. As vehicles cross through the zone, the zone's average speed will be indicated in the "AvgSpeed" column. You can also press "Speed Display" to look at histogram of last few instantaneous speed values.

## 6.1 Speed Zone pattern examples

Speed precision (+/- %) based on pod spacing, this is the inherent error based on the 8msec sampling of the magnetic sensors.

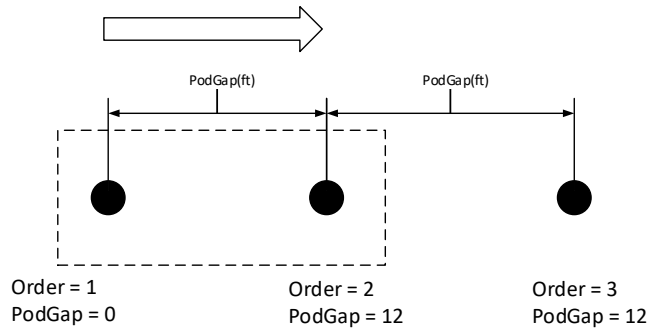
AvgSpeed(MPH)	Pod Spacing (feet)							
	6	8	10	12	16	20	24	30
5	0.98	0.73	0.59	0.49	0.37	0.20	0.24	0.20
10	1.96	1.47	1.17	0.98	0.73	0.59	0.49	0.39
20	3.91	2.93	2.35	1.96	1.47	1.17	0.98	0.78
30	5.87	4.40	3.52	2.93	2.2	1.76	1.47	1.17
40	7.82	5.87	4.69	3.91	2.93	2.35	1.96	1.56
50	9.78	7.33	5.87	4.89	3.67	2.93	2.44	1.96
60	11.73	8.8	7.04	5.87	4.4	3.52	2.93	2.35
70	13.69	10.27	8.21	6.84	5.13	4.11	3.42	2.74
80	15.64	11.73	9.39	7.82	5.87	4.69	3.91	3.13

Speed Zone requirements	Number of pods	Zone configuration
<ol style="list-style-type: none"> <li>Average speed of a lane,</li> <li>Pods installed at set back location (or) in a free flowing lane (HWY)</li> <li>Pick the spacing between pods on accuracy required from above table</li> </ol>	2	minSamplesRequired = 2 minimumSpeed = 5MPH
<ol style="list-style-type: none"> <li>Current speed of a cars,</li> <li>Pods installed at set back location (or) in a free flowing lane (HWY)</li> <li>Pick the spacing between pods on accuracy required from above table</li> </ol>	3	minSamplesRequired = 3 minimumSpeed = 5MPH
<ol style="list-style-type: none"> <li>Average speed of a lane,</li> <li>Pods installed at the stop bar</li> <li>Pick the spacing between pods on accuracy required from above table</li> </ol>	2/3/4	minSamplesRequired = 2 minimumSpeed = 5MPH speedGreenChannel = startupLossTime = 50 (5sec)

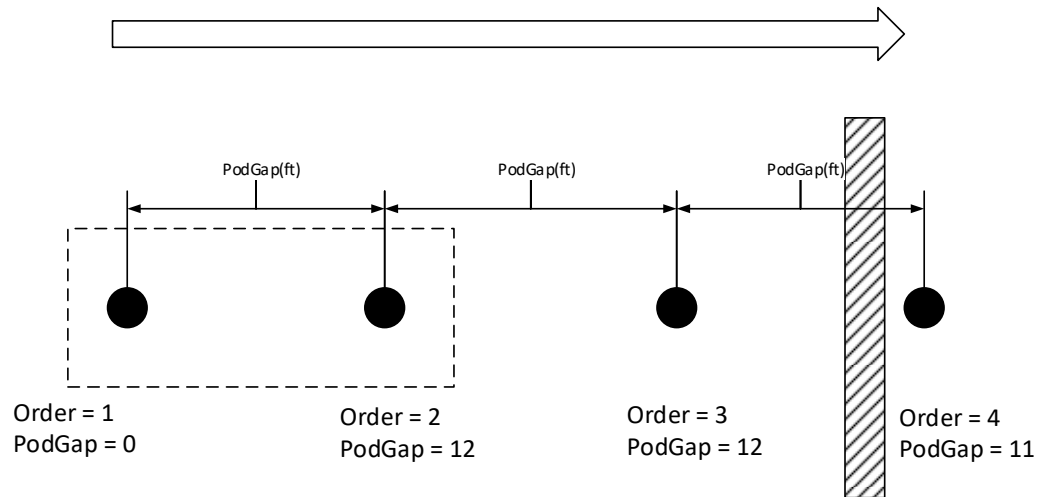


minimumSpeed = 5 MPH  
 minSamplesRequired = 2  
 speedGreenChannel = if a stop bar zone, and you want to measure speed only during flowing traffic  
 startupLossTime = 50 (5sec), starts measuring speed after 5 sec into the green phase.





minimumSpeed = 5 MPH (based of spacing)  
 minSamplesRequired = 2 or 3  
 speedGreenChannel = if a stop bar zone, and you want to measure speed only during flowing traffic  
 startupLossTime = 50 (5sec), starts measuring speed after 5 sec into the green phase.

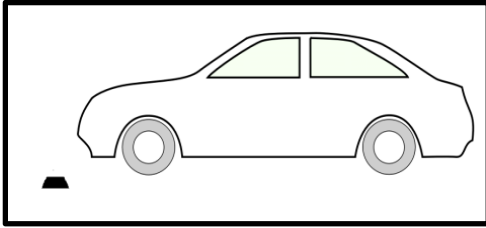


minimumSpeed = 5 MPH (based of spacing)  
 minSamplesRequired = 2 or 3 or 4  
 speedGreenChannel = Green Active phase channel, as you want to measure speed only during flowing traffic  
 startupLossTime = 50 (5sec), starts measuring speed after 5 sec into the green phase.

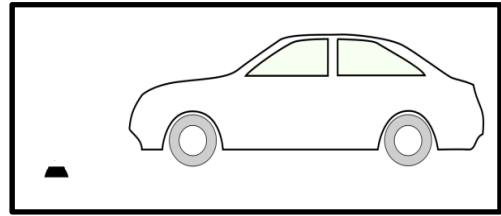
## 6.2 Speed Calibration

To achieve more accurate results for speed measurement, detection sensitivity of the pods being used should be calibrated to be roughly equal. There are numerous methods of achieving this, one method is to drive a vehicle slowly towards each pod, and as the GUI indicates a detection (pod turns blue in the GUI) stop the vehicle and observe the distance from the front of the vehicle to the pod. Do this repetitively for pods, by increasing or decreasing the sensitivity setting for the pods until pods detect the vehicle at approximately the same distance.

**Pod#1**

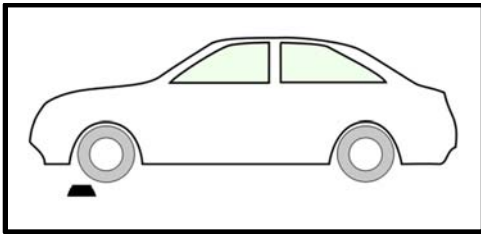


**Pod#2**

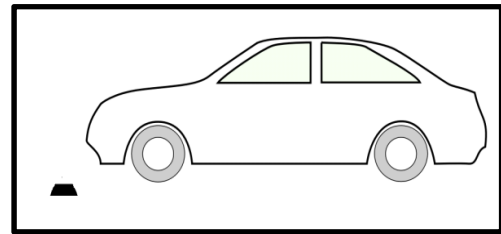


in the above situation you would want to decrease the sensitivity setting of pod #2 (perhaps changing it from the default 10 to 9), and then repeat the test.

**Pod#1**

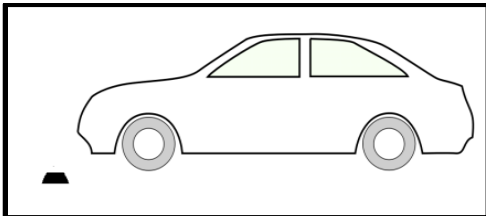


**Pod#2**

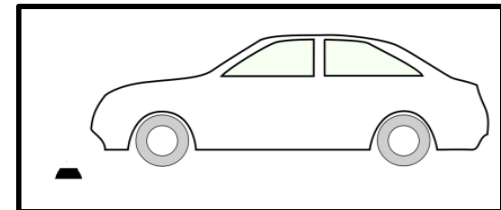


In the above situation you would want to increase the sensitivity setting of pod #1 (perhaps changing it from the default 10 to 11) and then repeat the test.

**Pod #1**

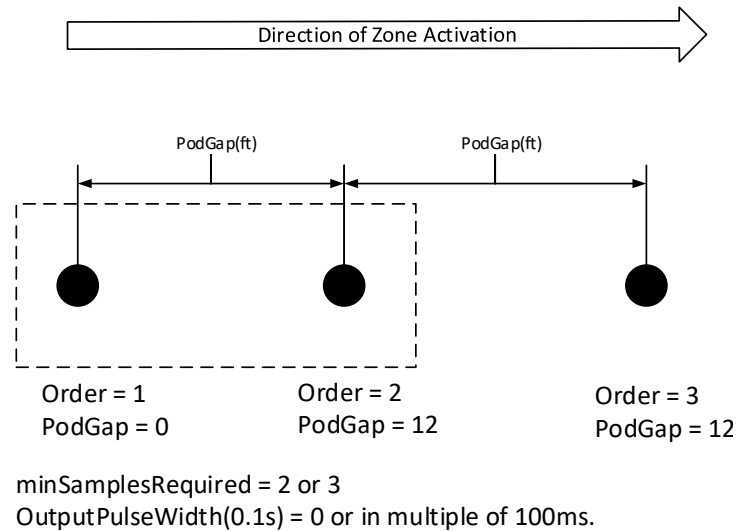


**Pod #2**



Success! When the two pods detect at approximately the same distance, speed measurements will now be more accurate.

## 7 Directional/Wrong Way Zone Setup



Directional and Wrong Way zones need to be configured the same way as the speed zone, apart from the below mentioned differences,

- Output Number can be set between 1 to 64,
- Output Pulse Width (0 or in multiples of 100ms)
  - Default value is zero, which enables the output based on the zone occupancy, or
  - Set to (multiple of 100ms), which gives a fixed output pulse width based on the zone activation.
- The Failsafe output for a directional zone is high, whereas for a wrong way zone is low.

“minSamplesRequired” is used to tune the zone. If a user wants to tune the zone towards lower number of “False Calls”, set the minSamplesRequired to the maximum pod order. If the user is ok with fewer “False Calls” and do not want to miss any calls, then minSamplesRequired should be set to (maximum pod order-1).

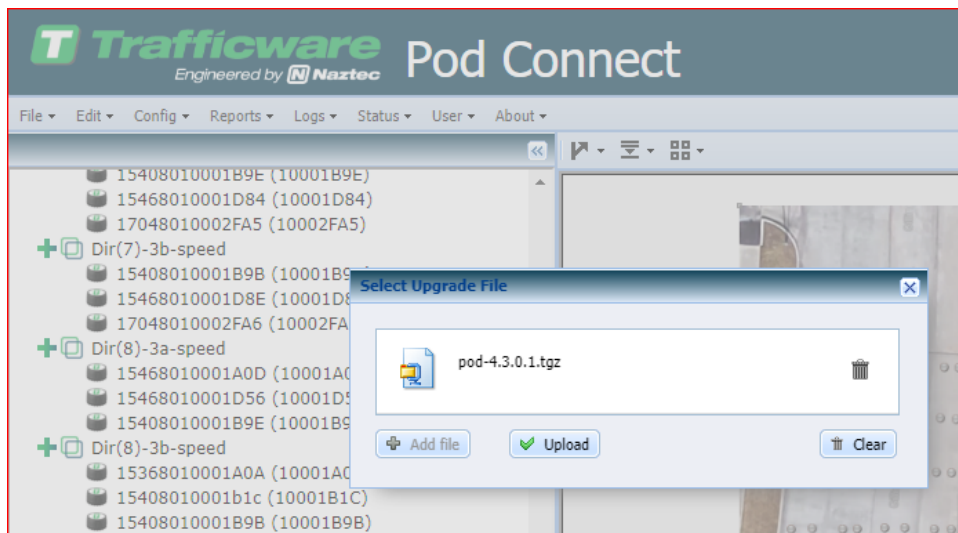
Directional/Wrong Way Zone requirements	Num pods	Zone configuration
1. Pods installed in a lane with free flowing traffic and just used for counting traffic in a particular direction. 2. Pick the spacing between pods based average speed expected. 3. Ok with a small level of wrong counts	2	minSamplesRequired = 2 minimumSpeed = 5MPH outputPulseWidth =
1. Pods installed in a lane with free flowing traffic and just used for counting traffic in a particular direction. 2. Pick the spacing between pods based average speed expected. 3. Accurate counts required, and with certain missed counts	3	minSamplesRequired = 3 minimumSpeed = 5MPH outputPulseWidth =

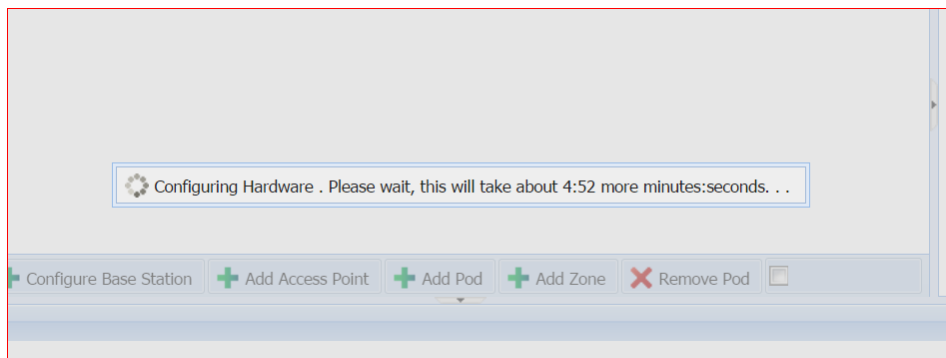
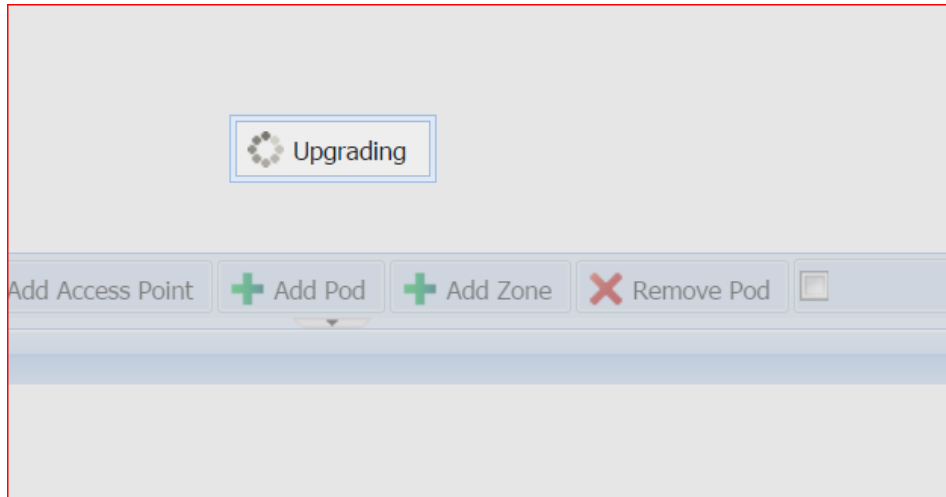
<ol style="list-style-type: none"><li>1. Pods installed at the stop bar</li><li>2. Pick the spacing between pods based average speed expected.</li><li>3. Used as directional presence detector, and ok with a certain level of False calls</li></ol>	3/4	minSamplesRequired = 2/3 minimumSpeed = 5MPH outputPulseWidth =
---	-----	---

## 8 Whole Intersection Update

This is used to update Pod and Access Point Firmware. It also provides live status of the update.

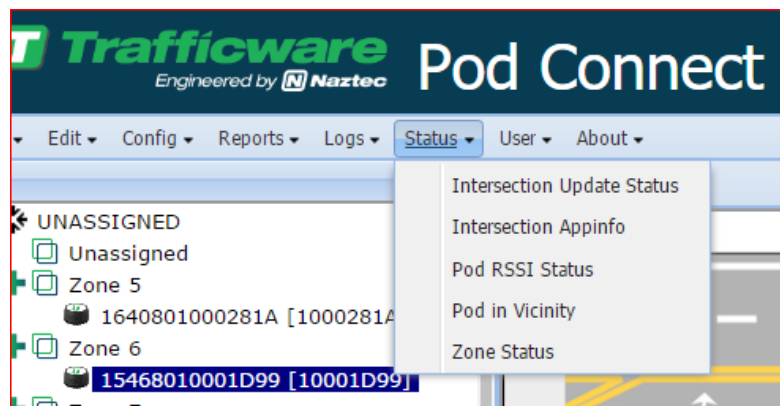
We need to upgrade the base station to the latest version to use this feature. Look below for screen shots on how to upgrade the base station.





Check to see if the base station is upgrade by using the “About” option. After the base station upgrade allow some time for all the Pods and Access Point to come online.

After the Pods and the Access Points are online and in communication, open the Intersection Update Status Window as shown below.



It should bring up a page like below, and you can click on “Start Update” to commence the process.

**Trafficware** Engineered by **Naztec** Intersection Update Status

**Intersection Update Not Running**

Start :  
Finish:

Ready to go!  
Retrieving Config  
Connection is opened...

Start Update Show Last Update Clear output

After the intersection update is complete, the status will be similar to the window shown below. The intersection update may takes few hours based on number of pods in the intersection during this time the intersection is operating normally, i.e. the firmware update is not interfering with the normal operation.

**Trafficware** Engineered by **Naztec** Intersection Update Status

**Intersection Update Running ... Reconnect Delay**

Start :Mon Jan 16 2017 16:32:32 GMT-0600 (Central Standard Time)  
Finish:

Access Point:20000021	Running	Bundle: A:6412	Loaded: A:6412	Bundle: B:6412	Loaded: B:6412						
Access Point:20000021:Radio 1	Running	Bundle: 6412	Loaded: .								
Access Point:20000021:Radio 2	Running	Bundle: 6412	Loaded: .								
Access Point:20000021:Radio 3	Running	Bundle: 6412	Loaded: .								
POD:10001D99	Queued	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .
POD:1000281D	Queued	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .
POD:1000281A	Queued	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .	Bundle: .	Loaded: .

Start Update Show Last Update Clear output

Mon Jan 16 2017 16:42:14 GMT-0600 (Central Standard Time), 40001138, undefined, undefined, Status:PRM Reboot & Sensor ReConnect delay START  
 Mon Jan 16 2017 16:42:14 GMT-0600 (Central Standard Time), 20000021, PRM-APP, REBOOT-END, Status:SVN:6412??  
 Mon Jan 16 2017 16:41:58 GMT-0600 (Central Standard Time), 20000021, PRM-APP, REBOOT-START, Status:SVN:6412??  
 Mon Jan 16 2017 16:41:58 GMT-0600 (Central Standard Time), 3000007C, PRM-APP, UPLOAD-PASS, Status:SVN:6412??  
 Mon Jan 16 2017 16:40:44 GMT-0600 (Central Standard Time), 3000007C, PRM-APP, UPLOAD, Status:SVN:6264->6412,TRY:1  
 Mon Jan 16 2017 16:40:44 GMT-0600 (Central Standard Time), 3000007C, PRM, START, Status:manifest SVN:6412  
 Mon Jan 16 2017 16:40:44 GMT-0600 (Central Standard Time), 30000054, PRM-APP, UPLOAD-PASS, Status:SVN:6412??  
 Mon Jan 16 2017 16:39:29 GMT-0600 (Central Standard Time), 30000054, PRM-APP, UPLOAD, Status:SVN:6264->6412,TRY:1  
 Mon Jan 16 2017 16:39:29 GMT-0600 (Central Standard Time), 30000054, PRM, START, Status:manifest SVN:6412  
 Mon Jan 16 2017 16:39:29 GMT-0600 (Central Standard Time), 300000A4, PRM-APP, UPLOAD-PASS, Status:SVN:6412??  
 Mon Jan 16 2017 16:38:15 GMT-0600 (Central Standard Time), 300000A4, PRM-APP, UPLOAD, Status:SVN:6264->6412,TRY:1  
 Mon Jan 16 2017 16:38:15 GMT-0600 (Central Standard Time), 300000A4, PRM, START, Status:manifest SVN:6412

**Trafficware** Engineered by **Naztec** Intersection Update Status

**Intersection Update Complete**

Start :Mon Jan 16 2017 16:32:32 GMT-0600 (Central Standard Time)  
Finish:Mon Jan 16 2017 16:47:37 GMT-0600 (Central Standard Time)

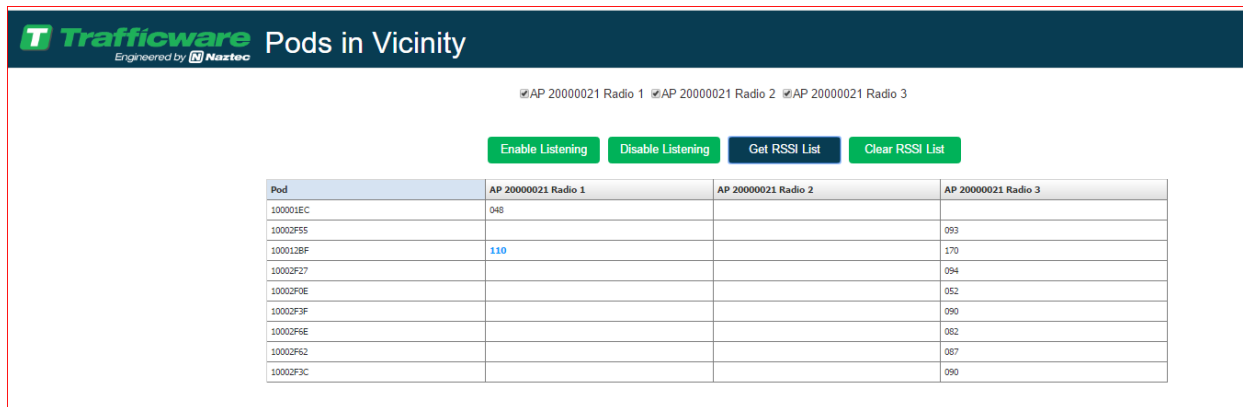
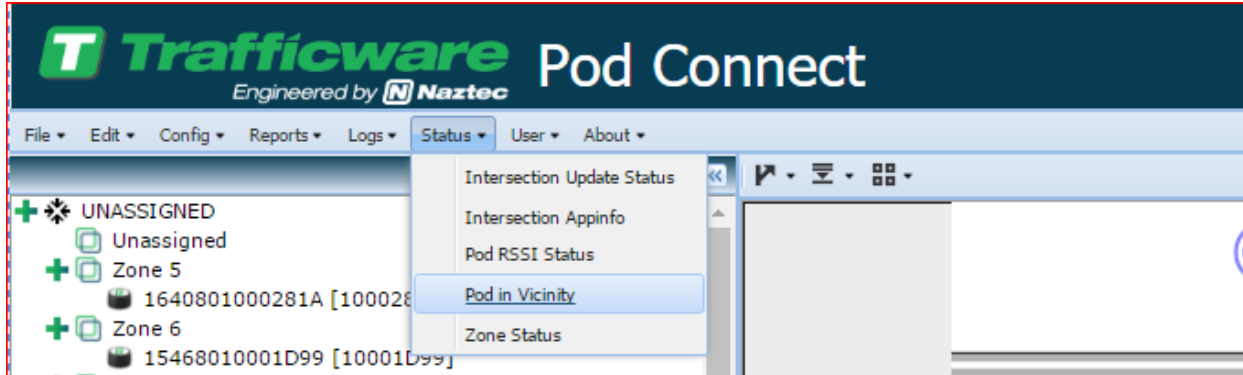
Access Point:20000021	Running	Bundle: A:6412	Loaded: A:6412	Bundle: B:6412	Loaded: B:6412				
Access Point:20000021:Radio 1	Running	Bundle: 6412	Loaded: 6412						
Access Point:20000021:Radio 2	Running	Bundle: 6412	Loaded: 6412						
Access Point:20000021:Radio 3	Running	Bundle: 6412	Loaded: 6412						
POD:10001D99	Running	Bundle: C:6412	Loaded: C:6412	Bundle: A:6412	Loaded: A:6412	Bundle: FP:6412	Loaded: FP:6412	Bundle: 2:6412	Loaded: 2:6412
POD:1000281D	Running	Bundle: C:6412	Loaded: C:6412	Bundle: A:6412	Loaded: A:6412	Bundle: FP:6412	Loaded: FP:6412	Bundle: 2:6412	Loaded: 2:6412
POD:1000281A	Running	Bundle: C:6412	Loaded: C:6412	Bundle: A:6412	Loaded: A:6412	Bundle: FP:6412	Loaded: FP:6412	Bundle: 2:6412	Loaded: 2:6412

Start Update Show Last Update Clear output

Mon Jan 16 2017 16:47:37 GMT-0600 (Central Standard Time), 40001138, undefined, undefined, Status:INTERSECTION UPDATE END  
 Mon Jan 16 2017 16:47:36 GMT-0600 (Central Standard Time), 1000281A, POD, FINISH, Status:SVN C:6412,A:6412,FP:6412,2:6412  
 Mon Jan 16 2017 16:47:36 GMT-0600 (Central Standard Time), 1000281A, POD, FINISH-S, Status:SVN C:6412,A:6412,FP:6412,2:6412  
 Mon Jan 16 2017 16:47:36 GMT-0600 (Central Standard Time), 1000281A, MCU1-APPA, SF UPLOAD-SKIP, Status:SVN:6412??  
 Mon Jan 16 2017 16:47:36 GMT-0600 (Central Standard Time), 1000281A, MCU1-CORE, SF UPLOAD-SKIP, Status:SVN:6412??  
 Mon Jan 16 2017 16:47:36 GMT-0600 (Central Standard Time), 1000281A, MCU2-APP, UPLOAD-SKIP, Status:SVN:6412??

## 9 Pods in Vicinity

This is tool used during installation, this gives the signal strength of pods if they are allowed to all the radios on the current base station.



The above window shows last 8 digits of pod's serial number and its expected signal strength if they talk to Radio 1, 2 or 3 of the installed AP.



## 10 Features and Components

This chapter provides more information about system features as provided by the main system components: Base Station, Access Point, and Pod.

### 10.1 Base Station

The base station is the “brains” of the Pod System. It contains a powerful, 500 MIP CPU module running the Linux Operating System and Pod control software. The Base Station is usually located in the traffic control cabinet and provides all the interfaces external to the Pod System, including: for the user, to the traffic controller, and to the central system. It receives vehicle detection events and other messages from Pods and Access Points, processes the information, and presents it to the traffic controller and to operators. Two modes of detection output are supported: Presence and pulse, per NEMA TS2-2003, section 6.5.2.17.

There are two different models of Base Station, Shelf Mount and Rack Mount.

The various interface points on the front panel of Base Station are described below.

#### 10.1.1 Shelf Mount Base Station

##### 10.1.1.1 Antenna

The antenna connector is used with a small cabinet-mounted antenna to communicate with the access point wirelessly. Each intersection is assigned a network identifier to prevent interference with nearby systems that may be within radio reception range.

See Pod Design & Installation Guide for Antenna Mounting options.

##### 10.1.1.2 PWR LED

The PWR LED lights up when power is applied to the base station.

##### 10.1.1.3 ERR LED

Constant ON – implies the base station did not power up properly or the base station application is not running.

##### 10.1.1.4 USB

The USB port is used by an installer or field maintenance person. The USB port can be used with a storage device (thumb drive) for performing updates, up-loading or down-loading configurations, and collecting log data. A storage device or thumb drive may be inserted at any time.

##### 10.1.1.5 SD Card

The SD Card port is not supported in the current version of software.

##### 10.1.1.6 Laptop Enet

The Laptop Ethernet port is typically used by an on-site person to connect a laptop computer to the base station for initial installation and field maintenance. The Laptop Ethernet port may also be used as a separate network connection independent of the Controller Ethernet port.

At time of initial setup, this port usually used to configure both Ethernet ports. See Chapter 4 for details on initial connection and configuration of the Laptop Ethernet port.

#### **10.1.1.7 Controller Enet**

The Controller Ethernet port is typically used for connection to the central network or to a controller. The Controller Ethernet will usually be connected to an Ethernet switch device in the traffic cabinet but may be connected directly to a controller.

The Laptop Ethernet port is typically used first to configure both Ethernet ports. See Chapter 4 for details on initial connection and configuration of the Controller Ethernet port.

#### **10.1.1.8 Access Point (Port)**

The Access Point port provides an EIA485 interface to make a wired connection to an Access Point. The Access Point port is independent of the wireless link, so two Access Points may be supported simultaneous by using both links.

TX and RX indicators are provided for the Access Point port to indicate when data is transmitted to, or received from, the Access Point.

See Pod Design & Installation Guide for details on wiring and lightning suppression for the RS-485 Access Point connection.

See GUI Manual for details on configuring the Access Point port and the “base station” radio in the wired Access Point.

#### **10.1.1.9 EXP**

The Expansion port may be used to provide a second wired connection for an AP. It is also available for connection to future Pod expansion devices within the cabinet.

#### **10.1.1.10 SDLC**

The SDLC port is used to emulate one or more detector BIUs on the traffic controller TS2 Port 1 bus. When an SDLC bus is available in the cabinet, it is the recommended method for connection to the traffic controller. The other method that is provided to interface to the controller is the Output port.

The SDLC port has TX and RX indicators that light up when data is transmitted from the Base Station or received from the traffic controller.

See Pod Design & Installation Guide for details on wiring the SDLC port.

See GUI Manual for details on configuring SDLC detector, BIU identifiers and outputs.

#### **10.1.1.11 Output 1-32**


The Output port is used to provide up to 32 discrete detector output circuits (solid state “contact closure”) for connection to NEMA TS1, TS2 Type 2, or Caltrans 33x style cabinets. The Output port is available to be used when there is no SDLC serial bus in the cabinet. It allows connection to virtually any standard traffic control cabinet by utilizing the detector card rack inputs or terminal block connections within the cabinet.

See Pod Design & Installation Guide for wiring details.

See GUI Manual for details on configuring outputs.

### 10.1.2 Rack Mount Base Station

Rack Mount Base station is intended to be used in Detector Rack which supplies 24 VDC to the Base station.

	4CH	Displays if the EX card is acting as a 4 Channel or 2 Channel Detection.
	CH1 to CH4	Shows the current state of the Detection channel
	ERR	If any Detection Channel (1-4) are in Fault, the STATUS LED will flash, along with the detection channel LED. But the actual state of the detection channel is High.

#### 10.1.2.1 Antenna

The antenna connector is used with a small cabinet-mounted antenna to communicate with the access point wirelessly. Each intersection is assigned a network identifier to prevent interference with nearby systems that may be within radio reception range.

See Pod Design & Installation Guide for Antenna Mounting options.

#### 10.1.2.2 PWR LED

The PWR LED lights up when power is applied to the base station.

#### 10.1.2.3 ERR LED

Constant ON – implies the base station did not power up properly or the base station application is not running.

#### 10.1.2.4 USB

The USB port is used by an installer or field maintenance person. The USB port can be used with a storage device (thumb drive) for performing updates, up-loading or down-loading configurations, and collecting log data. A storage device or thumb drive may be inserted at any time.

#### 10.1.2.5 Laptop Enet

The Laptop Ethernet port is typically used by an on-site person to connect a laptop computer to the base station for initial installation and field maintenance. The Laptop Ethernet port may also be used as a separate network connection independent of the Controller Ethernet port.

At time of initial setup, this port usually used to configure both Ethernet ports. See Chapter 4 for details on initial connection and configuration of the Laptop Ethernet port.

#### 10.1.2.6 Controller Enet

The Controller Ethernet port is typically used for connection to the central network or to a controller. The Controller Ethernet will usually be connected to an Ethernet switch device in the traffic cabinet but may be connected directly to a controller.

The Laptop Ethernet port is typically used first to configure both Ethernet ports. See Chapter 4 for details on initial connection and configuration of the Controller Ethernet port.

#### **10.1.2.7 AP1 (Access Point Port 1)**

The Access Point port provides an EIA485 interface to make a wired connection to an Access Point. The Access Point port is independent of the wireless link, so two Access Points may be supported simultaneously by using both links.

TX and RX indicators are provided for the Access Point port to indicate when data is transmitted to, or received from, the Access Point.

See Pod Design & Installation Guide for details on wiring and lightning suppression for the RS-485 Access Point connection.

See GUI Manual for details on configuring the Access Point port and the “base station” radio in the wired Access Point.

#### **10.1.2.8 AP2 (Access Point Port 2)**

The AP2 port may be used to provide a second wired connection for an AP. It is also available for connection to future Pod expansion devices within the cabinet.

#### **10.1.2.9 SDLC**

The SDLC port is used to emulate one or more detector BIUs on the traffic controller TS2 Port 1 bus. When an SDLC bus is available in the cabinet, it is the recommended method for connection to the traffic controller. The other method that is provided to interface to the controller is the Output port.

The SDLC port has TX and RX indicators that light when data is transmitted from the Base Station or received from the traffic controller.

See Pod Design & Installation Guide for details on wiring the SDLC port.


See GUI Manual for details on configuring SDLC detector BIU identifiers and outputs.

#### **10.1.2.10 EXP (Expansion Port)**

The Expansion Port supports up to 32 discrete detector output circuits (solid state “contact closure”) for connection to NEMA TS1, TS2 Type 2, or Caltrans 33x style cabinets. This allows connection to virtually any standard traffic control cabinet by utilizing the detector card rack inputs or terminal block connections within the cabinet.

The Expansion card VDX-EX is an optional plug-in module which allows the base station to drive inputs to the controller using the detector rack.

Each Expansion card supports 4 detector inputs and provides 4 status outputs. The Rack Mount Base station can drive up to 7 Expansion cards which are daisy chained. The Rack Mount Base station can itself drive 4 inputs on the detector slot it is plugged into. Hence in total, Rack Mount Base station can drive 32 inputs to the controller.

	4CH	Displays if the EX card is acting as a 4 Channel or 2 Channel Detection.
	CH1 to CH4	Shows the current state of the Detection channel
	STATUS	If any Detection Channel (1-4) are in Fault, the STATUS LED will flash, along with the detection channel LED. But the actual state of the detection channel is High.

## 10.2 Access Point

The Access Point (AP) is a communication hub that performs the central wireless communication tasks for the Pod system. It communicates wirelessly with up to 100 Pods, or more, collecting their transmitted messages and forwarding them to the Base Station for processing. The AP contains three radios for communicating to PODs, one for communicating with the Base Station, and an EIA485 interface for an alternative, wired interface to the Base Station. The Access Point is powered from 120VAC. Five connections are provided on the Access Point for physical interfaces as described below. Also, an antenna internal to the AP enclosure provides the radio interface to the Base Station.

### 10.2.1 120V AC

120 VAC power is provided through a 3-pin, IP67 weatherproof connector. An AC power connection is usually available on a signal pole by using spare signal conductors or by making a connection to a nearby signal head.

### 10.2.2 Radio 1-3

Three Reverse TNC connectors are available to make a coaxial cable connection to an antenna for each of the internal 900MHz radios. These are the radios that communicate with Pods. Omni-directional and directional antennas may be used within the FCC authorized gain limits. Refer to the Design and Installation Guide for more information.

### 10.2.3 EIA485 Link to Base Station

Connection to an EIA/RS485 serial link is provided by means of a 6pin, IP67 weatherproof connector. The link uses three twisted-pairs to provide for transmit, receive and ground circuits. The EIA485 link may be used instead of the wireless link to the Base Station.

### 10.2.4 Wireless Link to Base Station

A 2.4 GHz wireless link is provided for communication with the Base Station. This link may be used instead of the wired, EIA485 Link described above. The antenna for this link is internal to the enclosure, so there is no connection for it on the outside of the AP.

Refer to the Pod System Design and Installation Guide for detailed information on designing a system, locating the components, and installing the AP, its antennas and cabling.

### **10.3 Pod**

The Pod is the sensing and detecting device of the system. It is installed in the roadway and senses disturbances in the earth's magnetic field caused by vehicles that are nearby. The Pod uses magneto-resistive sensors and an ultra-low-power microcontroller to implement the sensing function. The Pod is self-monitoring and automatically adjusts to changing conditions that might affect detection.

Also within the Pod is a 900MHz, frequency-hopping spread-spectrum radio. The radio is controlled by a separate microcontroller that handles bi-directional communication with an Access Point. The radio and microcontroller are specifically designed for low-power, battery applications. The wireless protocol is also custom designed for the Pod system and suits its purpose closely. It provides low-latency, high efficiency, and low power consumption. The 900MHz ISM frequency band provides a good combination of data throughput, transmission robustness, and distance; allowing for a simple system architecture that does not require repeaters.

A long-life, high-efficiency lithium battery, specifically designed for operation over the full temperature range of the Pod, provides power. The battery is replaceable.

The Pod components are entirely encased in a hermetically sealed enclosure. The Enclosure is strong, designed to withstand top loads of 4500 lbs and tested to more than twice that amount. A shell is available that encases the Pod and allows it to be easily removed from the roadway if desired.

### **10.4 Accessories**

The Pod System accessories include the following:

#### **10.4.1 System Power Panel:**

This Power Panel provides 120 VAC to the Access Point and Base Station. This panel is mounted in the cabinet and is protected by a 10 amp breaker. It allows for up to three Access Points and one Base Station to be powered independently to 120 VAC. The 120 VAC input to this panel must be connected to clean 120 VAC in the cabinet.

#### **10.4.2 EIA-485 Lightning Suppression:**

The EIA-485 Lightning Suppression is mounted in the cabinet and provides protection on the EIA-485 lines between the Base Station and the Access Point. One side of this device is connected to the Base Station and the other side to the EIA-485 field wires to the Access Point on the pole.

### **10.4.3 Expansion Cards:**

The Expansion cards are used in TS1 or Caltrans facilities to get the detect input back to the controller. The expansion cards reside in the detector rack and each card has four channels and indicators for input status. There is a cable that connects between the Base Station and Expansion cards.

### **10.4.4 Pod Clamshell:**

The Pod clamshell is used when installing the Pods in locations where they may need to be removed at a later date. The Pod is enclosed in the Clamshell before installing in the ground. This allows the user to core thru the sealant to the Clamshell. Once the Clamshell top has been removed the Pod can be removed from the ground.

## 11 Browser Information and Setup

### 11.1 Browser Requirements for Pod Connect

Although web browsers are primarily intended to use the World Wide Web, they can also be used to access information provided by stand-alone web servers on private networks and devices. The Pod Base Station contains such a server, which is used in conjunction with your browser to set up the Pod Base System. The major web browsers we recommend include, in descending order of preference,

- Mozilla Firefox (version 19 or greater);
- Google Chrome (version 24.0.0.1312.57 m or greater);
- Internet Explorer (version 9, 10, 11)

Navigate to one of the following sites to download the latest version of their software:

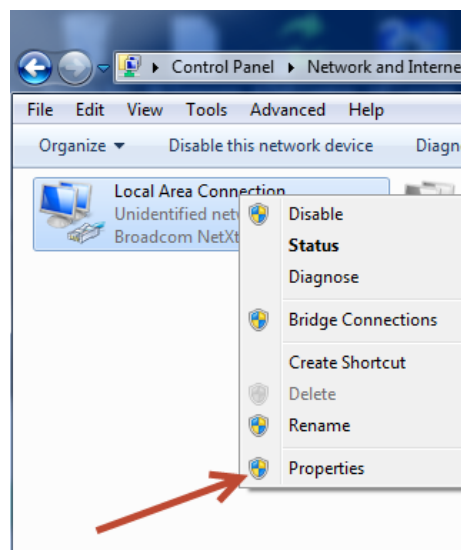
Chrome: <http://www.google.com/intl/en/chrome/>

Firefox: <http://www.mozilla.com/firefox/>

### 11.2 Connecting Laptop to Pod Connect

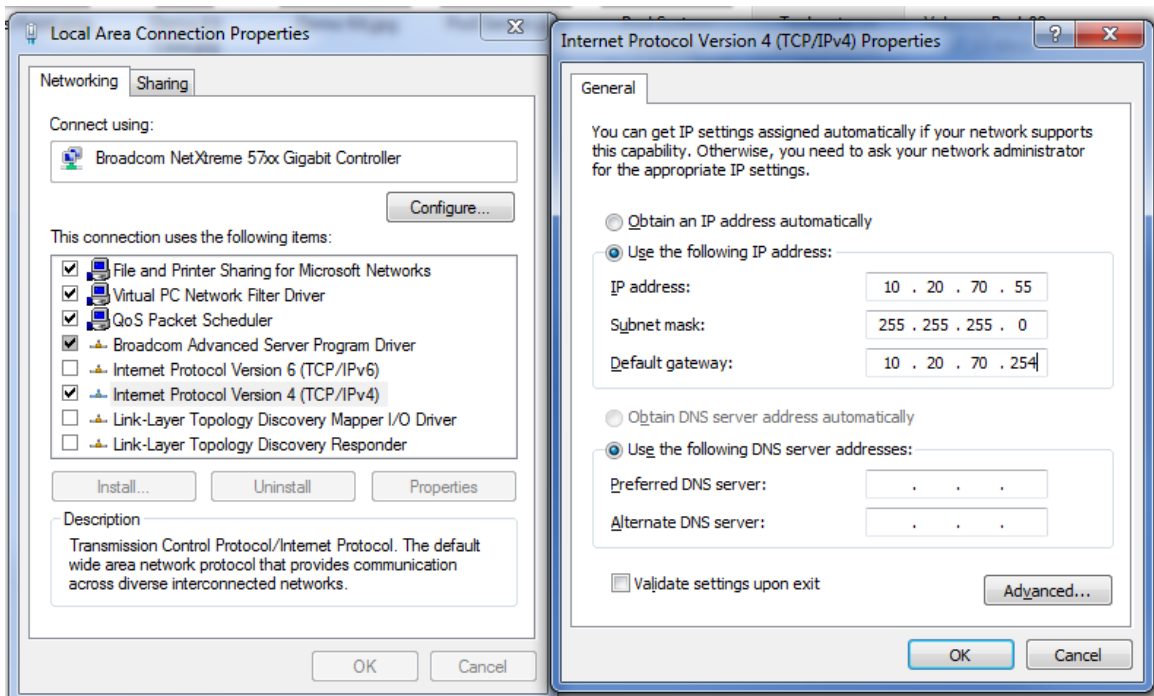
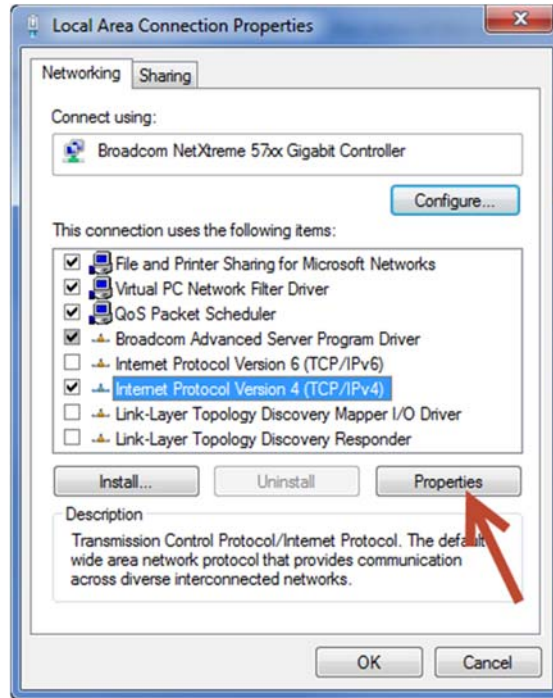
The default factory IP address for the Pod Base Station port is 10.20.70.51. To access the Base Station Gateway plug a RJ45 Cat5e Ethernet patch cable into the Cat 5 port in the back of the Base Station labeled “LAPTOP ENET” and the other end to the Cat 5 port of your laptop. Change Default Fixed IP address on your Laptop using the following steps

1. Go to Network connections
2. Choose Properties



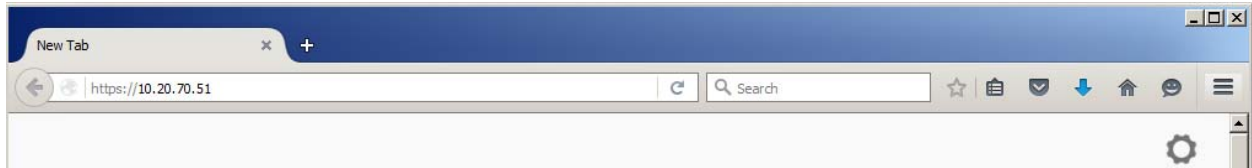


a. Choose (Highlight) Internet Protocol Version 4 (TCP/IPv4) Properties



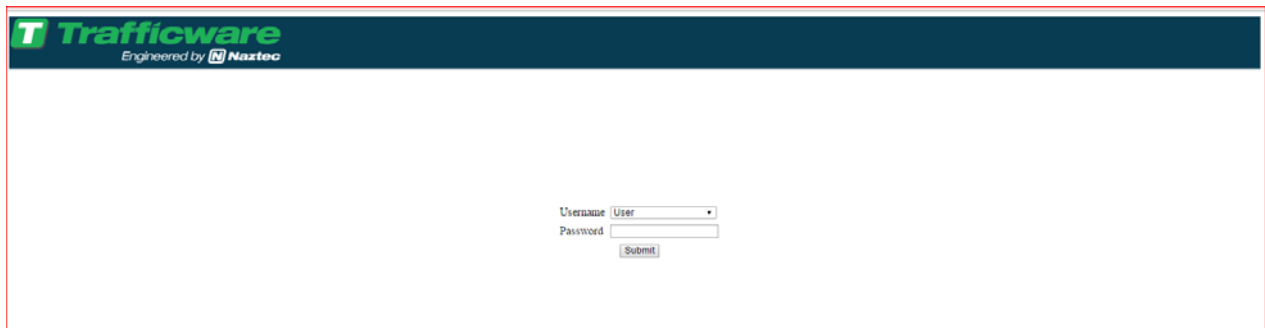
*Note: No special plug-ins are required to run the Pod Connect program, however, to work correctly the browser must be enabled for HTML 5. See "Browser Requirements for Pod Connect" above for more information.*

3. In order to begin using the Pod web interface first load the interactive site by using the HTTPS protocol and the IP address of the base station, <https://10.20.70.51/>. When using the GUI for the first time it will be necessary to confirm security exceptions as they arise in the browser. In Chrome, select “Show Advanced” and then “Proceed”. In Firefox click “Advanced”, “Add Exception”, “Confirm Exception”. In Internet Explorer select “Continue to this Website.”



4. After confirming any necessary security exceptions, the login screen appears. Select the username “Admin” and enter the password for this account. The default password is “password” and should be changed after login by following the instructions in section entitled “Resetting the Pod Connect GUI Passwords.”

The browser should automatically load the Pod Connect Interface, which is located at this address.



## 13 Network Configuration and Port Forwarding

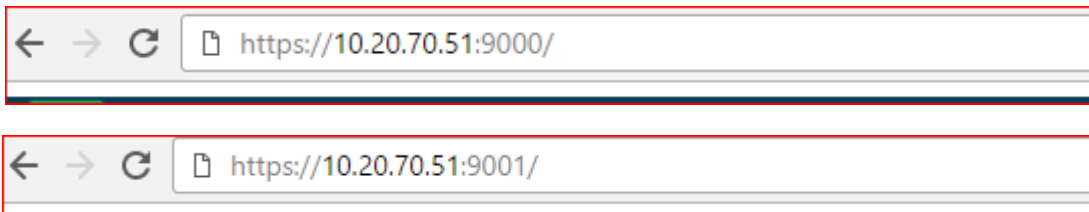
### 13.1 Minimum network configuration

In order to connect to the Pod base station over a network (through the controller ENET port), at a minimum TCP ports 443 (https), 9000 and 9001 on the base station IP address must be accessible to the client computer. Depending on the particular existing network configuration, this may involve creating specific firewall rules, editing network address translation tables, or both.

### 13.2 Testing network connection to the base station

After configuring the local network to accommodate TCP ports 443 and 9000, first attempt to connect to the Pod GUI system by using a browser to navigate to <https://ip-address/> (note the s in https). Complete the login procedure as described in Section 3. If this test does not work, use ping to test the connection to the base station. The base station will respond to ping attempts if a route exists between the client computer and base station. If this ping is successful, recheck the network configuration to ensure that ports 443, 9000 & 9001 are not being blocked.

If you have trouble connecting to a base station, you might have to add few more security exceptions by trying to open 9000 and 9001 ports on the base station.



Accept all the security exceptions as before and the response should be “Hello World!”. Now trying to open the main GUI.

## 14 Specifications

### 14.1 Base Station:

SPECIFICATIONS	
Dimensions	Shelf-Mount: 10.6"H x 3.0"W x 6.9"D Rack-Mount: 4.5"H x 2.3"W x 6.97"D
Memory	64MB DRAM, 1MB SRAM and 512 MB Flash.
Operating System	Linux
Ethernet	(2) 10/100 TIA/EIA 568 Ethernet ports
USB	(1) 2.0 Full-speed port
Serial Ports	(1) TS2 SDLC port, (2) EIA-TIA-485 Asynchronous port,
Discrete Outputs (Shelf Mount BS)	(1) 37-pin Connector with 32 Detection Outputs meeting NEMA TS2-2003, Sec 6.5.2.26
Discrete Outputs (Rack Mount BS)	Using Optional EX cards Rack Mount BS can provide 32 Detection Outputs meeting NEMA TS2-2003, Sec 6.5.2.26
SD Card (Shelf Mount BS)	Future
Supply Voltage & Current	120 V AC at 80mA
Ambient operating temperature range	-35°F to 167°F (-37°C to 75°C)
Access Point Wireless Link	
Frequency band	2400 to 2483.5 MHz
Frequency channel	16
Channel bandwidth	2 MHz
Security	IEEE 802.15.4 Compliant

### 14.2 Access Point:

SPECIFICATIONS	
Dimensions	6.3"H x 7.9"W x 7.9"D
Serial Ports	(1) EIA/TIA-485 port
Enclosure Rating	IP67 (including connectors)
Supply Voltage & Current	120 V AC at 50mA
Ambient operating temperature range	-35°F to 167°F (-37°C to 75°C)
Certification	FCC part 15.247
Base Station Wireless Link	
Frequency band	2400 to 2483.5 MHz
Frequency channels	16
Channel Bandwidth	2 MHz
Security	IEEE 802.15.4 Compliant
Pod Wireless Link	
Frequency band	902 to 928 MHz (ISM unlicensed band)
Frequency channels	60
Channel Bandwidth	430 KHz

### 14.3 Pod:

<b>SPECIFICATIONS</b>	
Dimensions	2"H x 3.6"D
Ambient operating temperature range	-40°F to 185°F (-40°C to 85°C)
Enclosure Ratings	4500 lbf (Top Load), IP68
Battery Size	D-size Lithium battery
Battery Life	10 years (Average Traffic Volume)
Certification	FCC part 15.247
<b>Access Point Wireless Link</b>	
Frequency band	902 to 928 MHz
Frequency channel	60
Channel bandwidth	430 KHz
Maximum output power	20 dB m