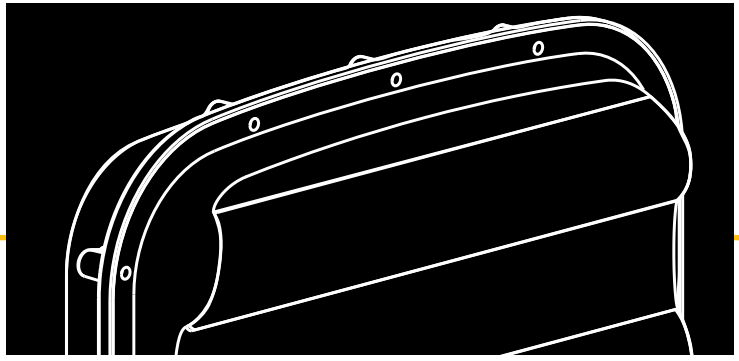

SmartSensor Advance

USER GUIDE

WAVETRONIX

SmartSensor Advance

USER GUIDE

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FCC Part 15 Compliance: The Wavetronix SmartSensor sensors comply with Part 15 of the Federal Communications Commission (FCC) rules which state that 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 undesirable operation. FCC compliance statements for applicable optional modules are to be found in the module specifications. Unauthorized changes or modifications not expressly approved by the party responsible for compliance with the FCC rules could void the user's authority to operate this equipment.

Disclaimer: The advertised detection accuracy of the Wavetronix SmartSensor sensors is based on both external and internal testing, as outlined in each product's specification document. Although our sensors are very accurate by industry standards, like all other sensor manufacturers we cannot guarantee perfection or assure that no errors will ever occur in any particular applications of our technology. Therefore, beyond the express Limited Warranty that accompanies each sensor sold by the company, we offer no additional representations, warranties, guarantees or remedies to our customers. It is recommended that purchasers and integrators evaluate the accuracy of each sensor to determine the acceptable margin of error for each application within their particular system(s).

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CONTENTS

Introduction

Welcome to the Wavetronix SmartSensor Advance user guide.

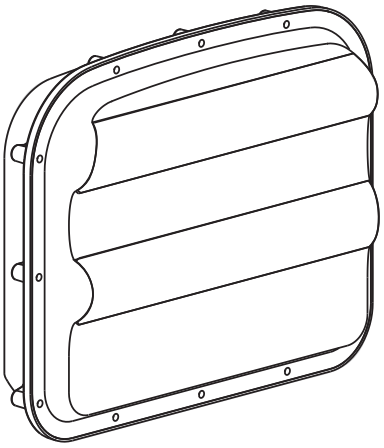

Figure 1. SmartSensor Advance

This guide will cover selecting a mounting location, installing, and configuring a SmartSensor Advance. To find the instructions for specific tasks, see the table of contents or index. If your questions aren't answered in this guide, visit www.wavetronix.com/support for access to supplemental materials, like technical documents, knowledge base articles and troubleshooting information.

What you'll need

The sensor package includes the following:

- A SmartSensor Advance
- A SmartSensor Advance quick start guide

The following aren't automatically included, but are necessary for installation:

- Sensor mount
- SmartSensor 6-conductor cable

To support the sensor installation, you may need to order devices for power conversion, surge protection, and communication, including some or all of the following:

- Click 104 four-channel DIN rail contact closure module
- Click 112/114 detector rack card(s) with patch cable(s)
- Click 201/202/204 AC to DC converter
- Click 210 circuit breaker
- Click 221 DC surge protector
- Click 222 system surge protector
- Click 230 AC surge protector
- Click 301 serial to Ethernet converter

You can also get these devices preassembled and prewired in cabinet backplates, or use a Click 600, Click 650, or Click 656, which provide the same functionality in a single module.

Service information

Don't try to service or repair this unit; none of its components or parts are serviceable in the field. Attempting to open this unit, unless expressly directed by Wavetronix, will void the customer warranty. Wavetronix is not liable for any bodily harm or damage caused if unqualified persons attempt to service or open the back cover of this unit. Refer all service questions to Wavetronix or an authorized distributor.

Important note

Failure to follow the installation guidelines laid out in this guide could result in decreased performance. If you believe it is necessary to deviate from these guidelines, contact a Wavetronix application engineer or technical support for assistance and recommendations.

1

Choosing a Mounting Location

Mounting location, height and offset

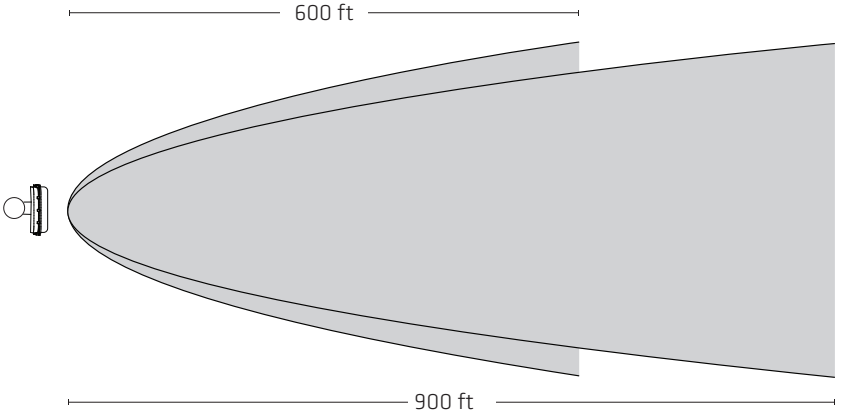

Figure 2. The SmartSensor Advance and Advance Extended Range footprint

- The SmartSensor Advance and SmartSensor Advance Extended Range detect moving traffic out to a maximum range of 600 ft. (182.9 m) and 900 ft. (274.3 m) respectively. Place the sensor at least 50 ft. upstream from the edge of the first detection zone.

- Make sure the sensor has a clear view of the area you want to detect. Pay particular attention to signs, poles, signal heads and mast arms.
- Make sure the sensor will detect vehicles for several feet before the first detection zone.
- Keep in mind that the greater the offset, the more you'll have to roll the sensor to align it.
- Keep cable lengths in mind when you pick mounting locations; when you use the Wavetronix cable, cables can be as long as 1500 ft. (457.2 m) if you're using 24 VDC and RS-485 communications; for longer connections, consider alternate wired and wireless options.
- The mounting location will vary based on your intersection and your needs. The four locations in the image below are recommended because of their clear view of the detection area.

Definition. Offset is the distance between the sensor and the center of the lanes of interest.

Note. If your intersection is the type where the signal heads attach to two vertically aligned span wires, you can mount the sensor on this span wire using the Wavetronix span wire mount and other equipment. For more information, see *Using the Span Wire Mount with the SmartSensor Advance* in the knowledge base on the Wavetronix website.

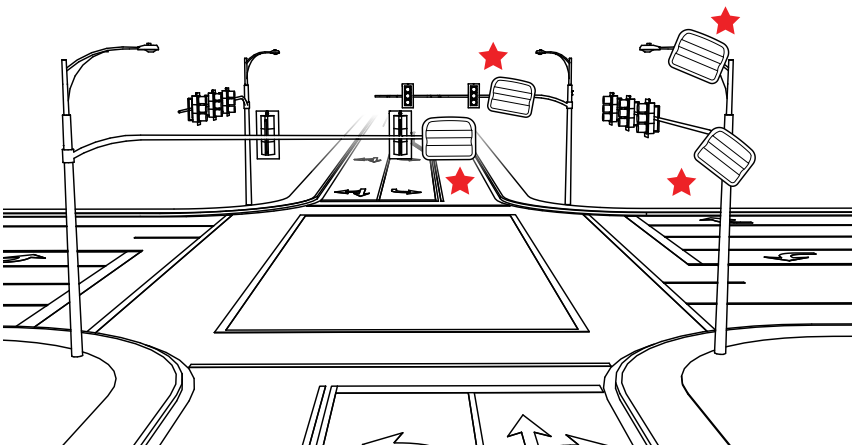

Figure 3. Recommended mounting locations in a mast arm intersection

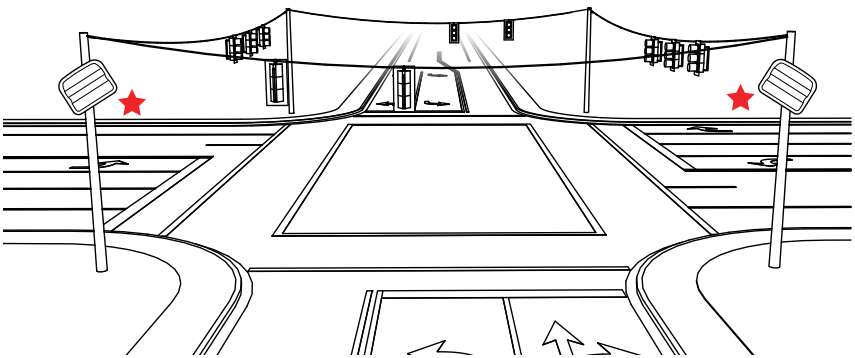

Figure 4. Recommended mounting locations in a span wire intersection

Mounting on a vertical pole

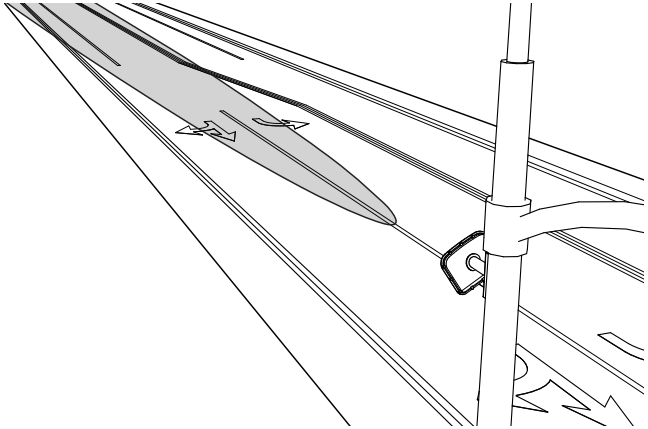

Figure 5. Vertical pole

- Lets you place the sensor near the stop bar.
- Allows the sensor to be mounted high enough to reduce occlusion.
- Mount close to the lanes of interest to prevent departing traffic from occluding approaching vehicles.

Mounting on a luminaire

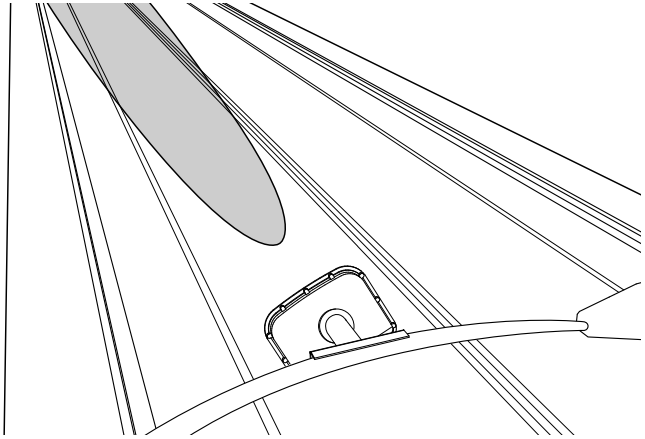

Figure 6. On a luminaire

- Allows you to place the sensor within the maximum offset and increase the mounting height.
- Mount close to the lanes of interest to prevent departing traffic from occluding approaching vehicles.

Mounting on the back side of the mast arm

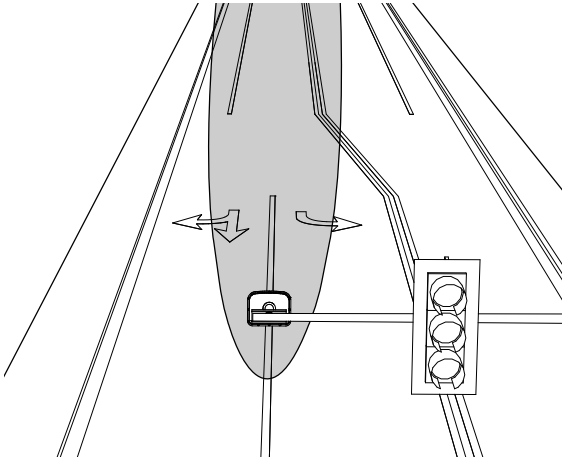

Figure 7. Back side of the mast arm

- Allows you to place the sensor near the lanes of interest without having to roll the sensor.
- Mount as far out on the mast arm as possible to avoid potential occlusion issues with stopped vehicles turning left.
- Use a vertical extension if the mast arm is not high enough.
- Make sure there are no poles, mast arms or signal heads that could potentially cause occlusion.

Mounting on the front side of the mast arm

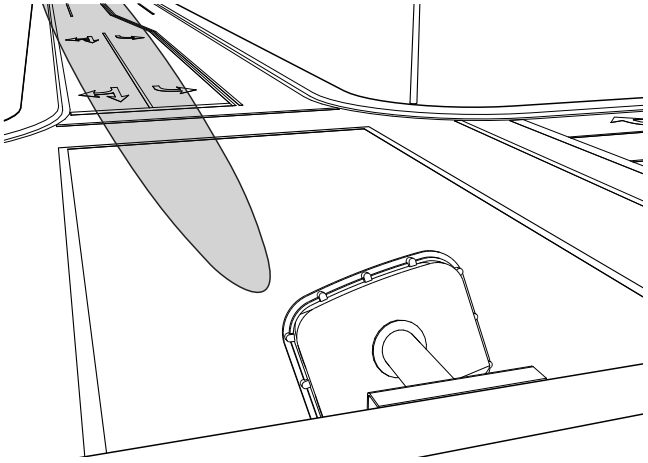

Figure 8. Front side of the mast arm

- The SmartSensor Advance Extended Range is recommended at this location, because some of the sensor's range is used to cross the intersection.
- Allows you to aim the sensor directly at the lanes of interest without rolling.
- Great for applications like queue management where a zone at the stop bar is needed.
- Effective for medium-speed approaches or where dynamic red extension will be used in tandem with green extension.
- Watch out for poles, mast arms or signal heads that could potentially cause occlusion.

Mounting on a pole upstream from the stop bar

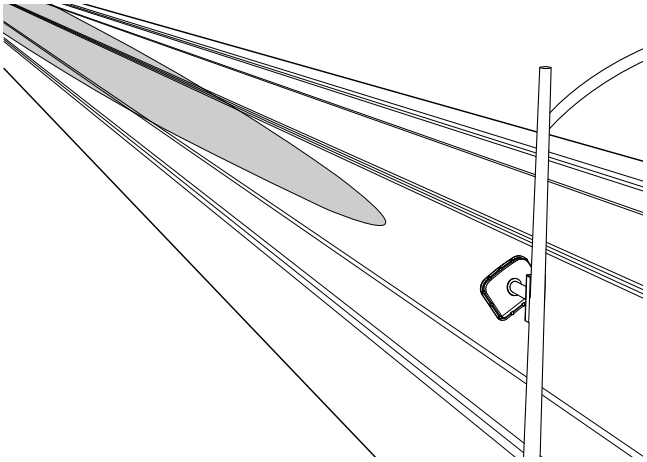

Figure 9. Upstream from the stop bar

- Allows you to detect behind the dilemma zone.
- Great for advanced warning signs.
- Convenient if power is supplied to an existing pole/luminaire and a wireless communication link can be established.

Choosing a mounting height

The minimum recommended mounting height is 17 ft. (5.2 m) and the maximum is 40 ft. (12.2 m). Mount the sensor as high as possible to reduce the chance of same-lane occlusion.

Definition. Mounting height is the distance between the sensor and the road's height, not the bottom of the pole. If installing a new pole, remember that part of the pole will likely be below ground.

Troubleshooting your installation

- Mount the sensor as high as possible to help avoid occlusion.

- If the sensor is higher than 30 ft. (9.1 m), detection will be more accurate with an offset less than 50 ft. (15.2 m).
- Mounting the sensor closer to the lanes of interest will usually increase accuracy.
- The sensor should always be mounted at least 50 ft. (15.2 m) upstream from the edge of the closest detection zone to the sensor.
- The sensor is designed to work in the presence of suspended power lines and other electrical cables. However, these cables should be at least 10 ft. (3 m) away from the front of the sensor.

Occlusion and Multipathing

These are two problems you might face while using a radar detector.

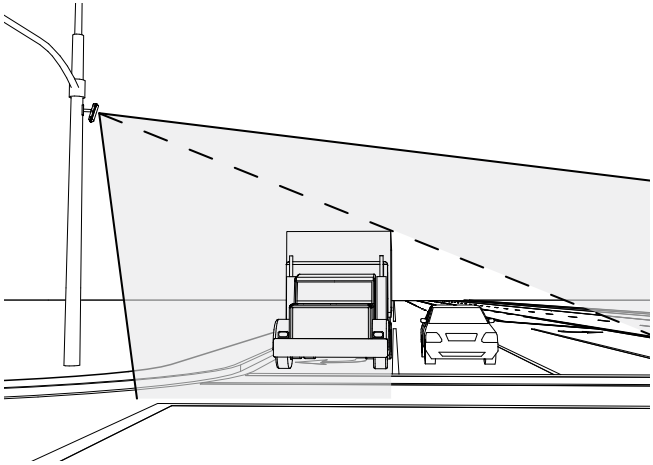

Figure 10. Occlusion

Occlusion occurs when one object blocks another object from the sensor's view, as shown above. This can happen with

- Tall vehicles like semi trucks
- Signs
- Barriers and sounding walls
- Trees and more

Multipathing occurs when a large flat surface near the sensor interferes with detection. A radar signal can bounce around several times

between the surface and the vehicles before returning to the sensor. This can make the sensor detect a vehicle where there is none.

This can happen with

- Buildings
- Signs
- Guard rails
- Sounding walls and more

Fixing occlusion problems

- Move the sensor higher on the pole (keeping it within the recommended mounting heights).
- Move the sensor to another spot if possible, away from obstructions.

Note. A good rule of thumb is that 50% of a vehicle must be visible above any barrier in order to be detected.

Fixing multipath problems

- Move the sensor if possible; make sure it is separated from overhead signs, overpasses, parallel walls, etc. A 30-ft. (9.1-m) lateral separation would be ideal, but even just a few feet can make a difference.
- Adjust the sensor's sensitivity thresholds in SmartSensor Manager Advance, as covered in chapter 6.

2

Installing the SmartSensor Advance

Mounting the sensor

Note. Before attaching the mount to the pole, make sure your cables are long enough to reach the sensor height and to stretch across the distance from the sensor to the cabinet; see *SmartSensor Advance Cable Length Recommendations* in the knowledge base on the Wavetronix website.

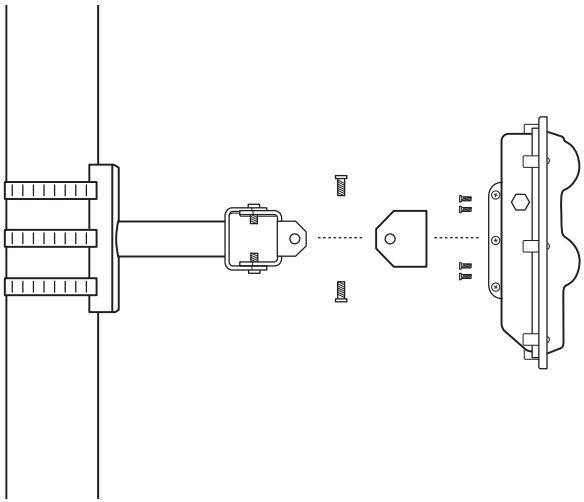

Figure 11. Attaching the mount

For more information. This process will be different if you're using the span wire mount; see *Using the Span Wire Mount with the SmartSensor Advance* in the Wavetrronix knowledge base.

1. Prepare the sensor while still on the ground: remove the large bolts holding the end knuckle to the mount, then use the four small bolts and lock washers to attach the knuckle to the sensor backplate.
2. Once you're ready to mount the sensor on the pole, insert the mounting straps through the slots on the mount.
3. Position the mount on the pole in the spot you chose from the previous chapter.
4. Tighten the straps.
5. Attach the knuckle you prepared earlier to the mount using the large bolts (the cable connector should be pointed down). Don't tighten completely yet, as you still need to align the sensor to the roadway.

Note. Be sure to keep the straps adjustable, because once you've used the alignment tool in the software, you may need to fine-tune the sensor's positioning.

Sensor alignment

Aligning the sensor to the roadway

1. Determine the distance to the target. The target is the exact spot on the road that the sensor should be pointing at. Find the target distance by using the sensor's height and offset in the following table(s).

Note. In some cases, it is possible to increase performance at far ranges by increasing the target distance by 25-50 ft.

Offset \ Height	17	20	25	30	35	40
0	40	45	55	60	70	75
5	45	45	60	65	70	80
10	50	50	60	65	75	80
15	50	55	65	70	75	80
20	55	55	65	75	80	90
25	60	65	65	75	80	90
30	65	70	75	80	85	95
35	70	75	85	85	95	95
40	80	90	90	95	95	100
45	95	100	100	100	100	105
50	100	100	105	110	115	120

Table 1. Target distance in feet

Offset	Height					
	5.2	**6.1**	**7.6**	**9.1**	**10.7**	**12.2**
0	12.2	13.7	16.8	18.3	21.3	22.9
1.5	13.7	13.7	18.3	19.8	21.3	24.4
3	15.2	15.2	18.3	19.8	22.9	24.4
4.6	15.2	16.8	19.8	21.3	22.9	24.4
6.1	16.8	16.8	19.8	22.9	24.4	27.4
7.6	16.8	19.8	19.8	22.9	24.4	27.4
9.1	19.8	21.3	22.9	24.4	25.9	28.9
10.7	21.3	22.9	25.9	25.9	28.9	28.9
12.2	24.4	27.4	27.4	28.9	28.9	30.4
13.7	28.9	30.4	30.4	30.4	30.4	32
15.2	30.4	30.4	32	33.5	35	36.6

Table 2. Target distance in meters

2 Tilt the sensor down so its center is aimed at the target.

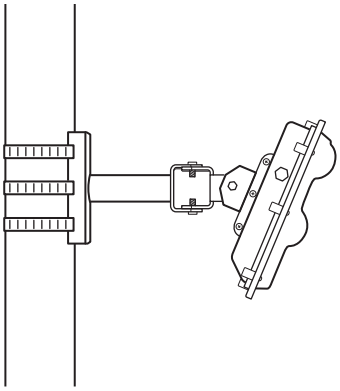

Figure 12. Aiming the sensor

For more instructions. If you need more detailed alignment instructions, see *Target Roll Angles for Aignment* in the knowledge base on the Wavetronix website.

3 Roll the sensor so that the radar beam footprint lines up with the road.

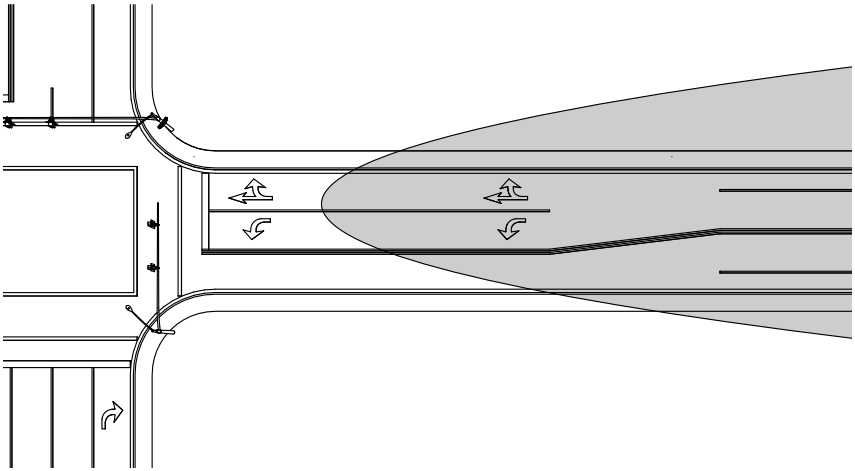

Figure 13. Detection area

Note. When installing on a curved road, aim the sensor so that it bisects the road and still detects the nearest and farthest ranges of interest.

Note. You will complete the alignment process by connecting to SmartSensor Manager Advance and verifying sensor detections (see chapters 5–7).

Using the viewfinder tool

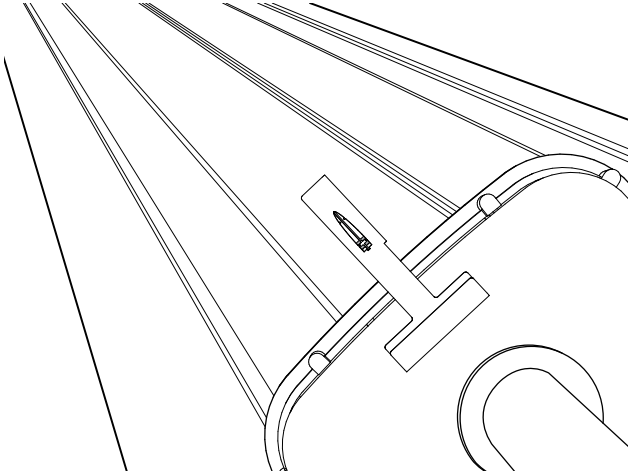

Figure 14. Viewfinder tool

For more information. If you need additional information about the Advance viewfinder tool, see *Using the Advance Viewfinder Aiming Tool* in the knowledge base on the Wavetronix website.

1. Hold the bottom of the viewfinder to the back of the sensor.
2. Look directly through the crossbars to the roadway.
3. Tilt the sensor until the space between the crossbars is at the level of the target.
4. Pan the sensor left or right until the target distance is centered between the notches in the target crossbars.
5. Roll the sensor until the long, narrow bar is parallel with the center of the lanes of interest.

Cable connection

Applying silicon dielectric compound

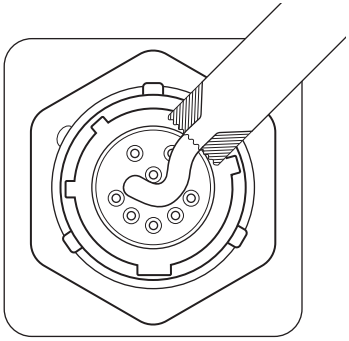

Figure 15. Applying the compound

1. Tear the tab off the tube of silicon dielectric compound that came with the sensor.
2. Squeeze about half of the compound on the connector at the base of the sensor.

Connecting the cable

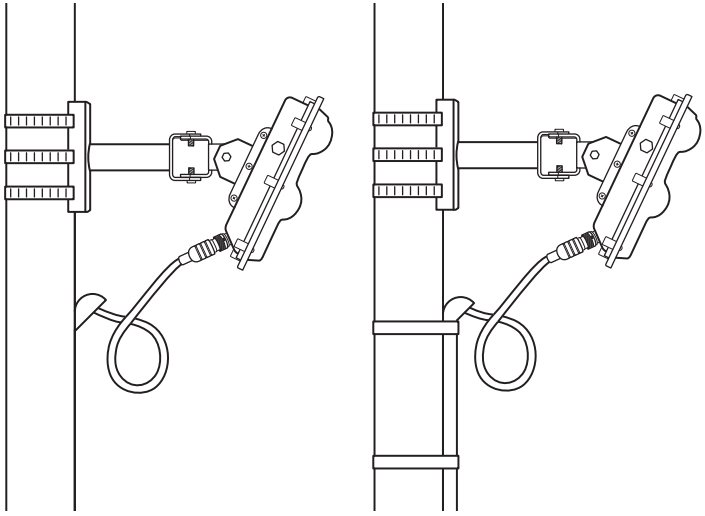

Figure 16. Cable run through pole (left) and through conduit (right)

1. Insert the cable connector into the sensor connector. Be aware that it is a keyed connector.
2. Twist the cable connector clockwise until you hear it click into place.
3. Run the cable through the pole. Leave a small amount of slack at the top; this reduces strain, allows you to create a drip loop as shown above, and gives you something to work with should you need to move the sensor's spot on the pole in the future.
4. If there's excess cable, don't cut it, as you may need it in the future; leave it in the pole.

Note. If you can't run the cable through the pole, run it instead through a conduit affixed to the pole.

Grounding the sensor

1. Connect a 12 AWG grounding wire to the grounding lug on the bottom of the sensor.
2. If the intersection is bonded, connect the other end of the grounding wire to the earth ground for the pole that the sensor is mounted on.

Note. Be careful of electrostatic discharge (ESD) when handling the SmartSensor Advance before and during installation. ESD triggered by the sensor handler, particularly on the outer grounding lug before being properly grounded, may cause harmful effects to the Advance components.

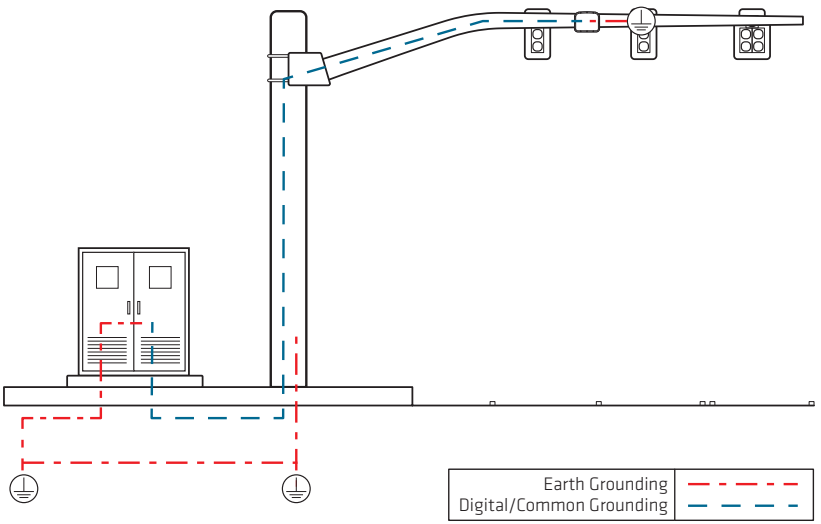

Figure 17. Grounding a bonded intersection

For more information. To see more complete grounding schematics, see *Intersection Grounding Schematics* in the knowledge base on the Wavetronix website.

3 If the intersection is not bonded, run the grounding wire down the pole, alongside the cable, back to cabinet ground.

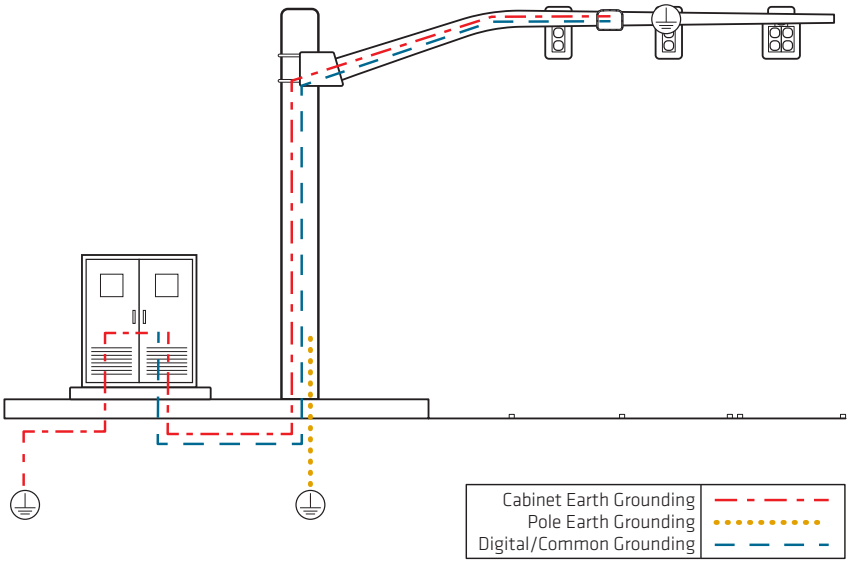

Figure 18. Grounding a non-bonded intersection.

Wiring the junction box

1 Insert the sensor cable (the pigtail cable coming from the sensor) through one of the cable grip. Twist the cable grip to tighten.

Note. For best results, you may want to put a ferrule on the end of the drain, or twist the strands of the drain together tightly, before terminating it in the terminal block.

2 Land the conductors and drain in the terminal blocks inside the box: Insert each conductor into the round hole on the plug portion of the terminal block (do not strip the insulation). Insert a small screwdriver into the square hole above it, and rock upwards to secure the conductor in place.

3 Insert one end of the homerun cable (the cable that runs to the traffic cabinet) into the leftmost cable grip. Twist the cable grip to tighten.

4 Follow the instructions in step 2 to land each conductor and drain into the correct spots in the terminal blocks.

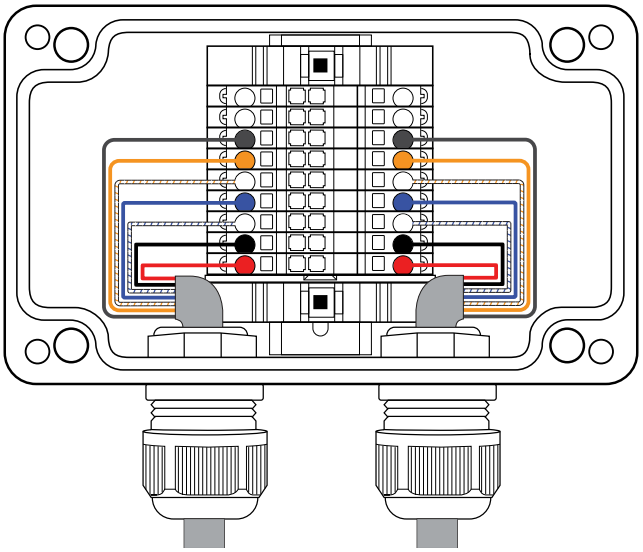

Figure 19. Junction box wiring

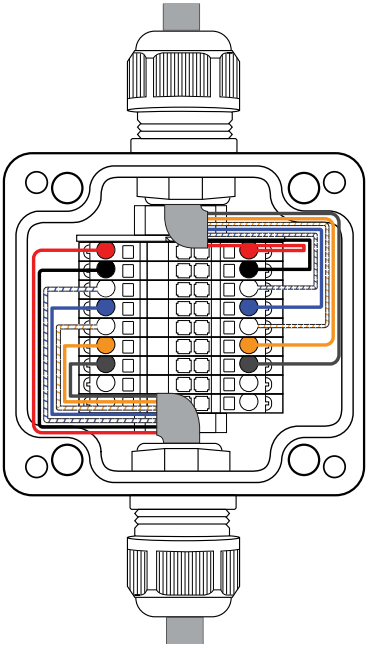

Figure 20. Mini junction box wiring

3

Installing Cabinet Solutions

Warning. We strongly recommend you follow the guidelines in this chapter, especially as they relate to surge protection. Failure to properly protect your sensors from surges will void the sensor warranty. If you need more information, contact support@wavetronix.com.

How you install power, surge protection and communication modules varies based on what equipment you are using.

Using the Click 650/656

Using this method, power, surge, and communication are provided to a combination of four (Click 650) or six (Click 656) Matrix and Advance sensors all in one device. If your cabinet supports SDLC, you can connect the Click 65x straight to the controller; if your cabinet doesn't support SDLC, you can connect the Click 65x to contact closure cards.

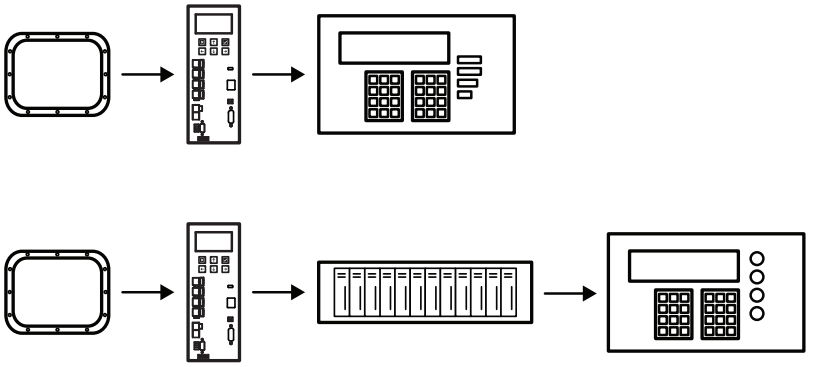

Figure 21. Click 650/656 using SDLC (above) and contact closures (below)

1. If you haven't already, run the sensor cable back to the traffic cabinet.
2. Place the Click 65x in the cabinet on a shelf or use U-channel mounting brackets to attach it to the cabinet wall.
3. Start connecting the sensor conductors to the terminal blocks on the sensor plug on the back of the Click 65x. Terminate them by inserting each conductor into the corresponding round hole on the plug (match each conductor to the label of the same color on the plug). Insert a small screwdriver into the square hole above it, and rock upwards to secure the conductor in place. Repeat with each conductor.
4. Repeat step 3 to land each sensor conductor into the correct terminal block on the sensor plug.
5. Power the unit by using the switch in the back; power each connected sensor by toggling the appropriate switches on the front of the Click 65x.
6. Connect communication cables (Ethernet, SDLC, and/or RJ-11 jumper cables to contact closure RS-485 outputs) into their respective ports on the front of the Click 65x.

For more information. For more information on the Click 65x products, see *Click 65x Series User Guide*.

Using the Click 600

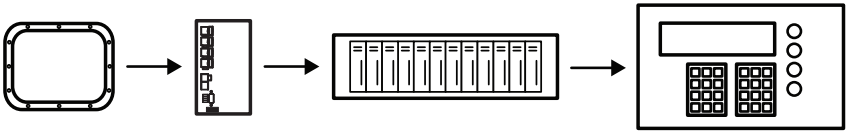

Figure 22. Installation with Click 600

1. If you haven't already, run the sensor cable back to the traffic cabinet.
2. Place the Click 600 in the cabinet on a shelf or use U-channel mounting brackets to attach it to the cabinet wall.
3. Start connecting the sensor conductors to the terminal blocks on the sensor plug on the back of the Click 600. Terminate them by inserting each conductor into the corresponding round hole on the plug (match each conductor to the label of the same color on the plug). Insert a small screwdriver into the square hole above it, and rock upwards to secure the conductor in place. Repeat with each conductor.
4. Repeat step 3 to land each conductor into the correct terminal block on the sensor plug.

For more information. For more information on the Click 600, see *Click 600 Quick Start Guide*.

5 Power the unit by using the switch in the back; power each connected sensor by toggling the appropriate switches on the front of the Click 600.
6 Connect jumper cables from the RJ-11 jacks on the front of the Click 600 to your contact closure devices.

Using a preassembled backplate

Note. This section assumes you are using the Intersection Preassembled Backplate from Wavetronix; if you bought individual Click modules instead, see *Click 100–400 Series User Guide* and *Assembling the Click Power Plant* in the knowledge base on the Wavetronix website.

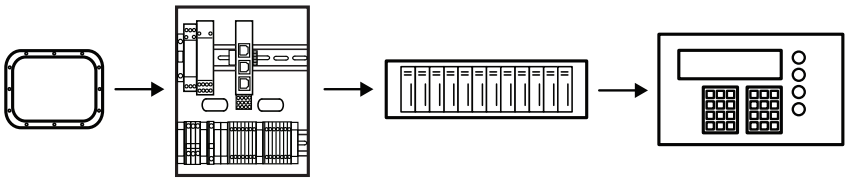

Figure 23. Installation with a preassembled backplate

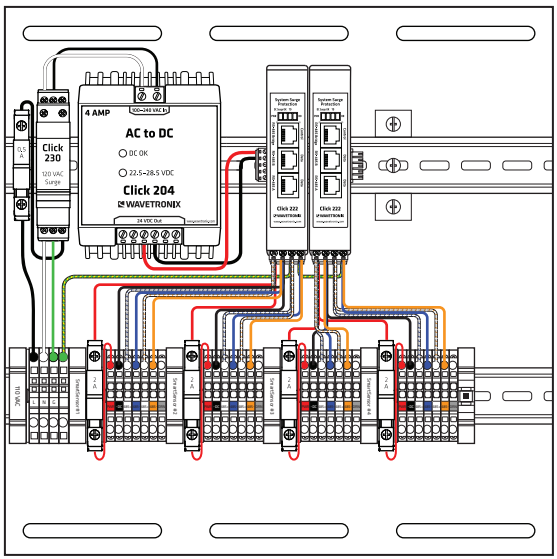

Figure 24. Intersection Preassembled Backplate (for traffic cabinet)

Note. Additional Click modules can be added to the backplate by placing a T-bus to the DIN rail and then rocking the module onto the T-bus.

1 If you haven't already, run the sensor cable back to the traffic cabinet.
2 Use the included screws to mount the Intersection Preassembled Backplate in the traffic cabinet.

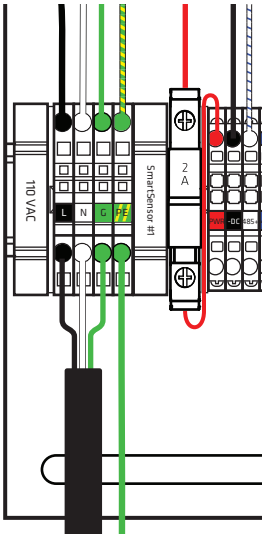

Figure 25. Connecting power cable to terminal blocks

3 Start by connecting the power cable. This backplate is shipped from Wavetronix with the conductors in the cable already terminated in a terminal block plug. Insert this plug into the power terminal blocks.

4 If for some reason the conductors aren't terminated into the terminal block plug, terminate them by inserting each conductor into the corresponding round hole on the plug (match each conductor to the label of the same color on the plug). Do not strip the insulation. Insert a small screwdriver into the square hole above it, and rock upwards to secure the conductor in place. Repeat with each conductor.

5 Connect a 12 AWG wire from the earth ground terminal block to the cabinet's earth ground.

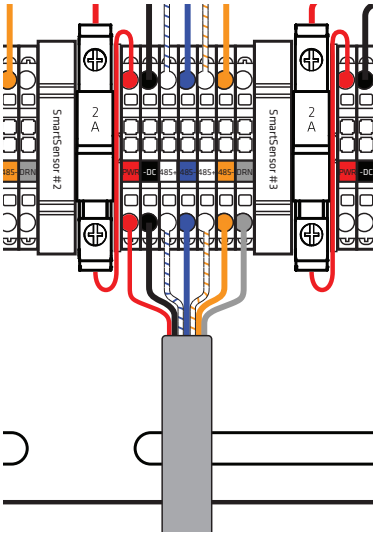

Figure 26. Connecting sensor cable to terminal blocks

Note. All electronic components should be grounded.

6 Now wire the sensor cable: follow the instructions in step 4 to land each conductor into the correct terminal block.

More information about this setup

This backplate is designed to be mounted in a traffic cabinet and to provide everything your sensor needs:

- The Click power plant, consisting of a circuit breaker, AC surge protector, and AC to DC converter.
- The Click 222, which is a lightning surge protector. This device is where the sensor cable is landed (via the terminal blocks). It protects the rest of the traffic cabinet from surges coming from the sensor cable. It's also where you can plug in to communicate with and configure the sensor.

There are no communication options besides the RS-485 on the Click 222. An additional communication device can be easily added to communicate with the installation remotely or over RS-232.

4

Connecting to the Sensor

Download and installation

SmartSensor Manager Advance (SSMA) is software that lets you configure and interact with the Advance sensor. It can only be installed on a PC.

Downloading SSMA

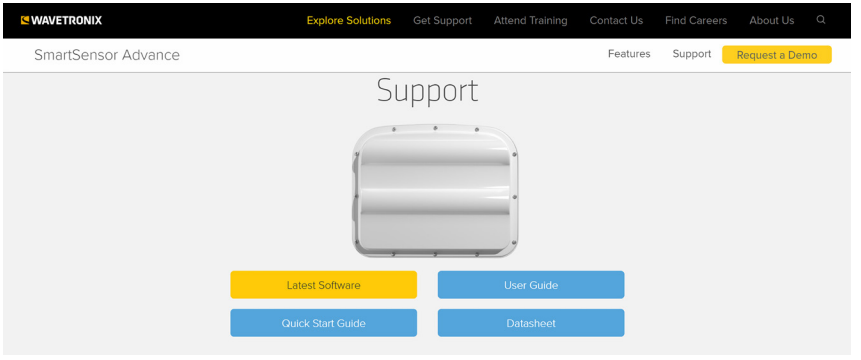

Figure 27. Finding the SSMA download on the Wavetronix website

1 In a browser, navigate to www.wavetronix.com/en/support.
2 From the **Detection** drop-down menu, select **SmartSensor Advance**.

3 The Advance page will appear. Under Software, click **SmartSensor Manager Advance vX.X.X Setup** or click the **Software** button.

Note. You must have administrator rights to install the program, as well as Microsoft .NET Framework version 3.5.

Installing SSMA

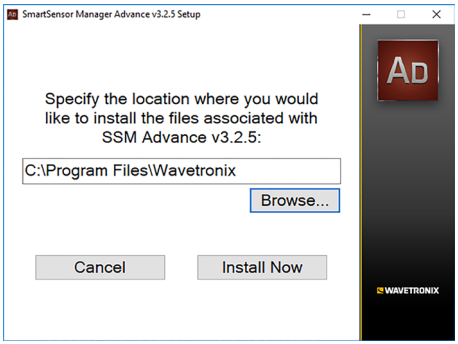

Figure 28. SSMA install wizard

1 Double-click on the setup file.
2 Follow the instructions on your screen to choose where to install, and then to choose which shortcuts to create.
3 Click **Finish** when you're done.

SSMA main screen

Open SSMA to see the screen below.

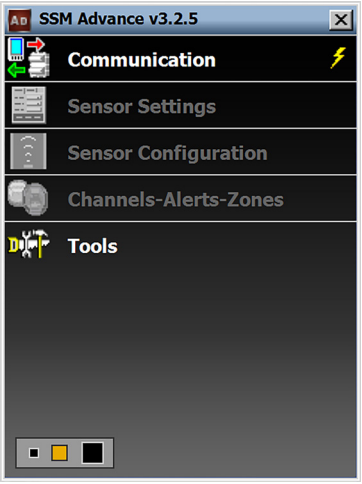

Figure 29. SSMA main screen

Changing the software size

Click one of the three boxes at the bottom of the screen to choose between the small, medium, and large display sizes.

SSMA communication basics

Note. Click the lightning bolt icon to connect using the same settings as your previous connection.

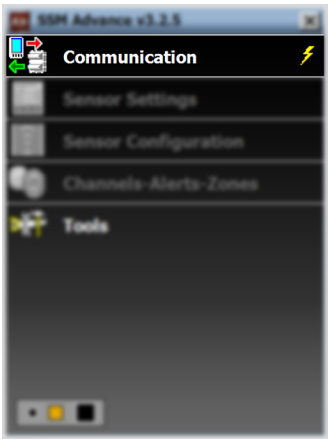

Figure 30. Communication button, main screen

SSMA can connect to your sensors via a serial (RS-232 or RS-485) or Internet (IP address) connection; this may require additional equipment. There is also a virtual option for testing or demo purposes.

Making a serial connection

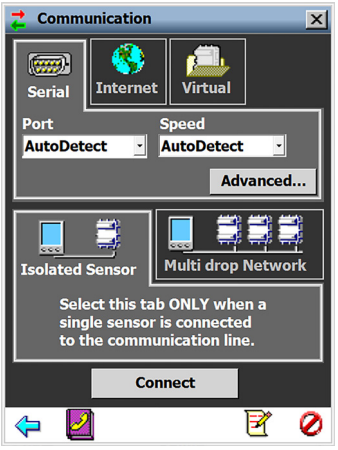

Figure 31. For serial connections

Note. You may need a USB to serial adapter to connect to your computer.

1. Click **Communication** on the main screen and then click the **Serial** connector icon at the top of the screen.
2. From the **Port** drop-down, choose the COM port on your computer that the sensor is plugged into.
3. From the **Speed** drop-down, choose 9600 bps (the default rate for the SmartSensor Advance), unless you have previously changed the baud rate of the sensor.
4. If there is only one sensor on the bus, leave this set to **Isolated Sensor**. If your connection can see several sensors (they're all on a single bus, for example), click the **Multi-drop Network** tab and enter the sensor ID of the sensor you want to connect to.
5. Click **Connect**.

Advanced Serial Connection Settings

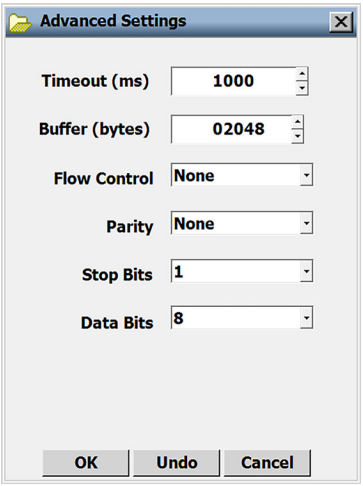

Figure 32. Advanced serial connection settings

Setting	Description	Details
Timeout	How long the software tries to connect to the sensor before it gives up.	Increase this time if you're having trouble connecting to the sensor.

Setting	Description	Details
Buffer	The number of bytes used by the software to store data received from the sensor.	Only change this if you are connecting to a complex serial device. Contact Wavetronix Technical Support before changing this setting.
Flow Control	Allows you to use flow control handshaking to keep up with the data rates of higher-performance devices.	This should be set to **None**. Change this to **Hardware** if you're connecting through a device that uses RS-232 hardware handshaking.
Parity	In serial protocol, this is a bit added to a string of code so that the total number of bits in the string is even or odd.	This should always be set to **None**. Contact Wavetronix Technical Support before changing this setting.
Stop Bits	In serial protocol, this indicates that the transmission of a byte has ended.	This should always be set to **1**. Contact Wavetronix Technical Support before changing this setting.
Data Bits	In serial protocol, this is the number of bits used to represent one character of data.	This should always be set to **8**. Contact Wavetronix Technical Support before changing this setting.

Multi-drop Network

If there is only on sensor on the bus, leave this set to **Isolated Sensor**. If your connection can see several sensors (they're all on a single bus, for example), set this to **Multi-drop Network** and enter the sensor ID of the sensor you want to connect to. You can also select **Automatically detect sensors** and click **Connect** and a window will appear with a list of each detected sensor.

Making an Internet connection

Note. The Advance is not a native IP device. Therefore, connecting via the Internet requires a terminal server, such as a Click 65x, Click 301 serial to Ethernet converter in the cabinet, or an external modem to put it on a cellular network.

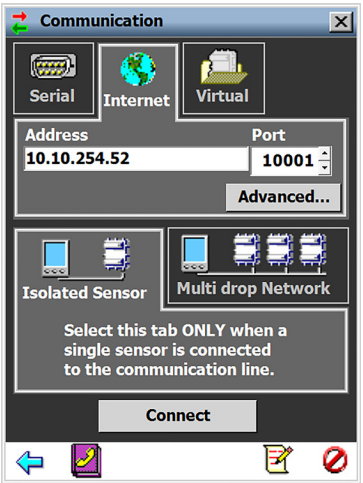

Figure 33. Internet connection screen

1. Click **Communication** on the main screen and then click the **Internet** globe icon at the top of the screen.
2. Under **Address**, enter the IP address of the terminal server (such as a serial to Ethernet converter or the cellular modem) that the sensor is connected to. Do the same with the port number in the **Port** field.
3. If there is only one sensor on the bus, leave this set to **Isolated Sensor**. If your connection can see several sensors (they're all on a single bus, for example), click the **Multi-drop Network** tab and enter the sensor ID of the sensor you want to connect to.
4. Click **Connect**.

Advanced Internet Connection Settings

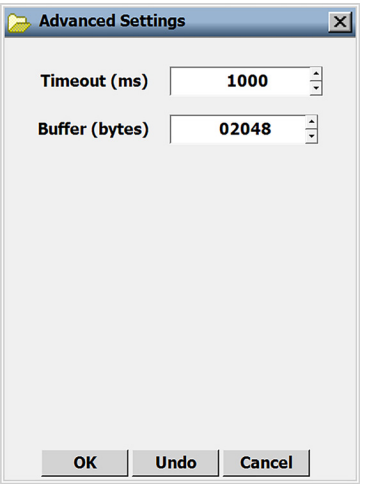

Figure 34. Advanced Internet connection settings

Setting	Description	Details
Timeout	How long the software tries to connect to the sensor before it gives up.	Increase this time if you're having trouble connecting to the sensor.
Buffer	The number of bytes used by the software to store data received from the sensor.	Only change this if you are connecting to a complex serial device. Contact Wavetronix Technical Support before changing this setting.

Multi-drop Network

If there is only on sensor on the bus, leave this set to **Isolated Sensor**. If your connection can see several sensors (they're all on a single bus, for example), set this to **Multi-drop Network** and enter the sensor ID of the sensor you want to connect to. You can also select **Automatically detect sensors** and click **Connect** and a window will appear with a list of each detected sensor.

Definition. A virtual sensor connection lets you see simulated traffic in SSMA without actually being connected to a sensor—great for demos!

Making a virtual connection

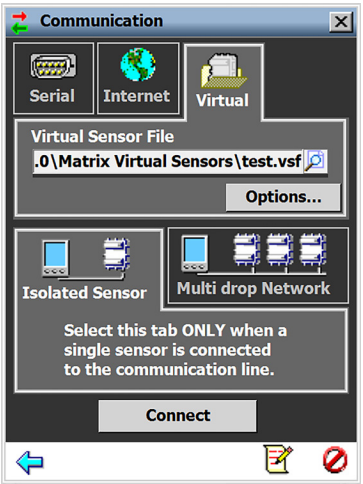

Figure 35. Virtual connection screen

1. Click **Communication** on the main screen and then click the **Virtual** folder icon at the top of the screen.
2. Under **Virtual Sensor File**, click the magnifying glass icon to navigate to the virtual sensor file you want on your hard drive. You can also create a new virtual sensor file in the window that pops up by navigating to the desired save location, typing in a new file name, and clicking **OK**.
3. Click **Connect**.

About virtual sensor files

If you make changes to the sensor's setup while using a virtual connection, those changes are saved to the virtual sensor file, which by default will be saved to C:\Program Files\Wavetronix\SmartSensor Manager Advance vX.X.X\Bin.

If you want, you can back up those virtual sensor settings; that will create a sensor setup file which can then be restored to an actual sensor. More on the backup and restore tools in chapter 10.

Playing real traffic in a virtual connection

Definition. See Chapter 7 for more information about tracker log files.

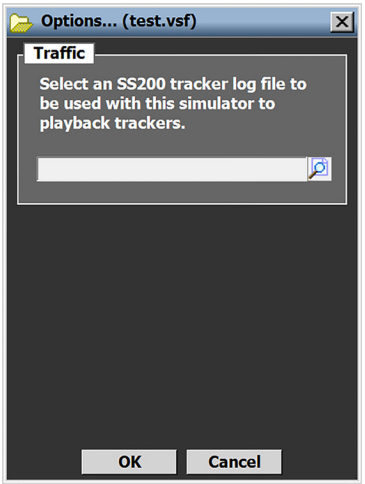

Figure 36. Creating tracker log files

1. Click the **Options...** button in the **Virtual** tab.
2. Click the magnifying glass icon and select the desired tracker log file.

Troubleshooting a connection

- Make sure that all power and communication wiring is correct.
- Check the port settings.
- Make sure the Click 65x is configured properly.
- If a failure occurs repeatedly, contact support@wavetronix.com.

Advanced communication tools

Once you've made a connection, the **Communication** button of the main screen should now be animated, with arrows moving past each other.

Viewing connection information

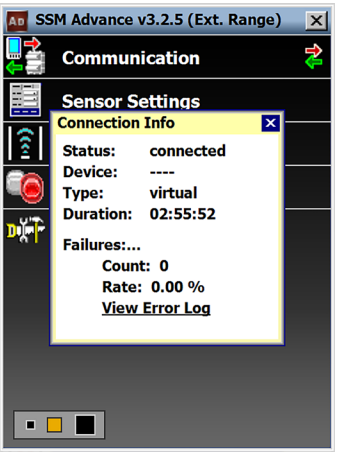

Figure 37. Connection Info window

1 Click the two arrows in the top-right corner of the main screen.
2 This will bring up the Connection Info window, with information about the connection status, device, and duration.

Viewing sensor information

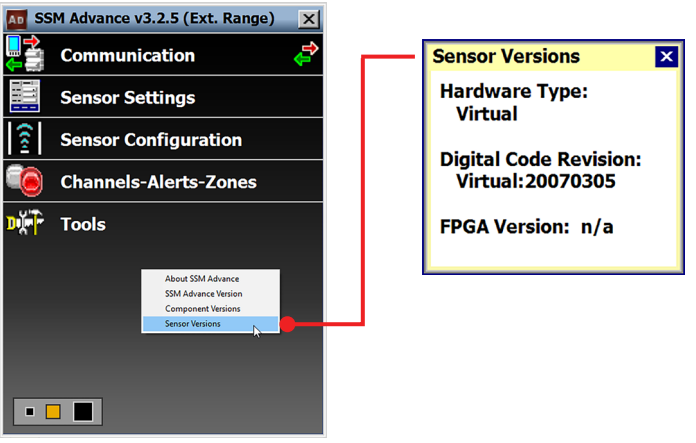

Figure 38. Sensor Versions window

1 Connect to a sensor.
2 Right-click anywhere in the software. This will bring up various window options that contain information about the sensor and the SmartSensor Manager Advance software. These settings will be explained further in Chapter 6.

Viewing software version information

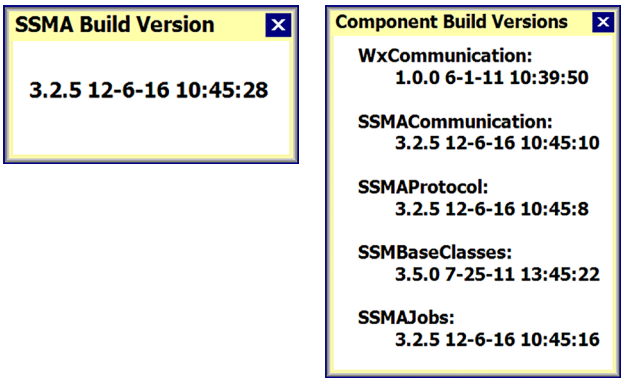

Figure 39. Version windows

1 Right-click anywhere on the screen.
2 Select **SSMA Advance Version** to view the current software build version number or click **Component Versions** to view component, firmware, and hardware version information.

Disconnecting from a sensor

1 Click **Communication** on the main screen.
2 Click **Disconnect**.

Using the address book

Note. The address book lets you save device connection settings for future use.

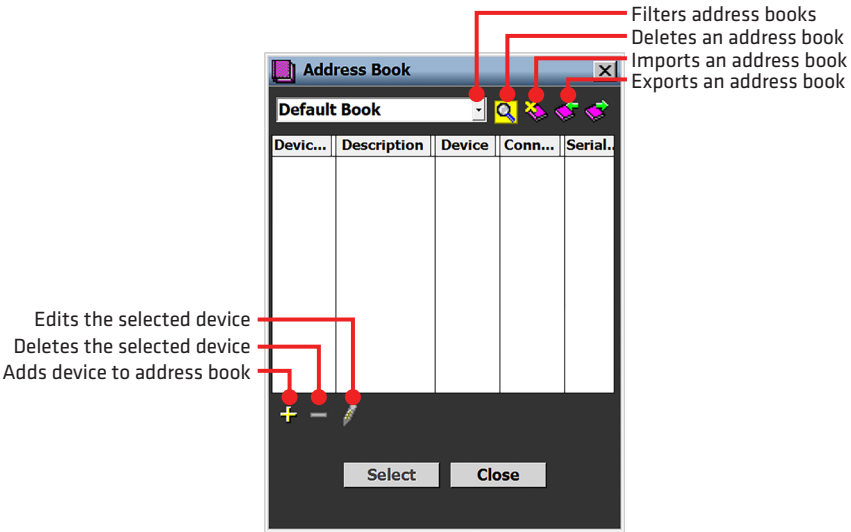

Figure 40. Address book screen

1. Click on the book icon at the bottom of the Communication screen (serial, Internet or virtual).
2. The address book screen will appear; use the settings pointed out to add, edit and delete device connection settings.

Viewing the error log

Note. The error log can be useful in troubleshooting, or you may need to save it and send to support@wavetronix.com.

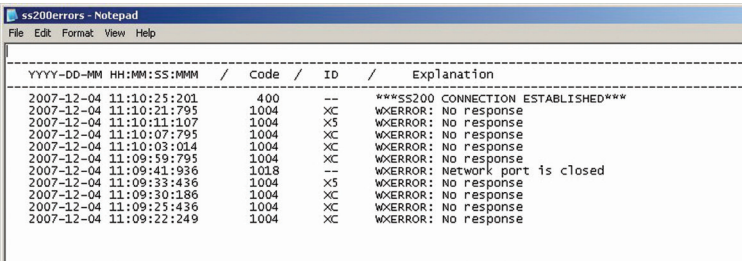

Figure 41. Error log

1. Click on the notepad icon at the bottom of the Communication screen (serial, Internet or virtual).
2. The error log will be saved to C:/ProgramFiles/Wavetronix/SmartSensor Manager Advance vX.X.X/bin. It will also open in your default .txt editor. If you need to save a copy for trouble-shooting purposes, do a Save As, as the file will be written over next time you view an error log.

Updating the sensor

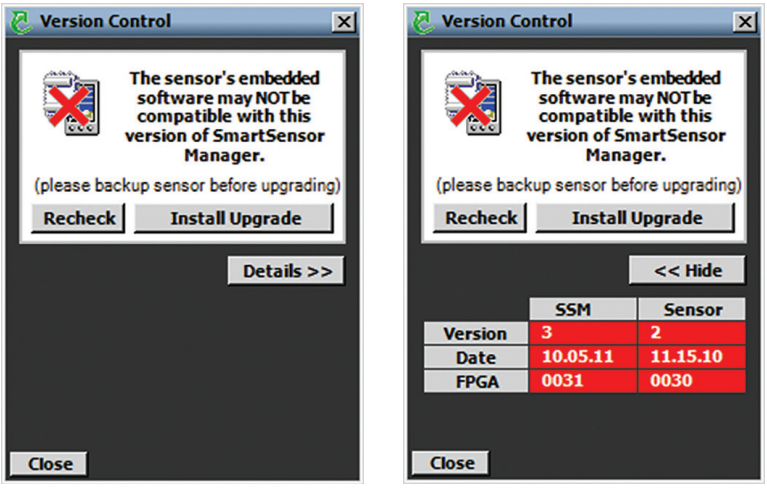

Figure 42. Version Control basic screen and detailed screen

1. If the version of SSMA doesn't match the version of the sensor's embedded firmware, then after you click **Connect**, the Version Control screen will appear.
2. If you would like specifics on the mismatch, click the **Details >>** button.
3. Click **Install Upgrade**, or, if you prefer not to update at this time, click **Close**.

Downgrading the sensor

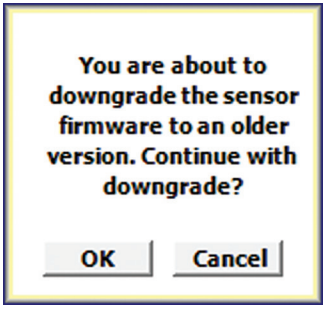

Figure 43. Downgrade warning message

If the downgrade message appears, it means that the sensor firmware is newer than the version of SSMA you're using. Click **Cancel**, and then get the newest version of SSMA from www.wavetronix.com.

5

Configuring Sensor Settings

Settings tabs

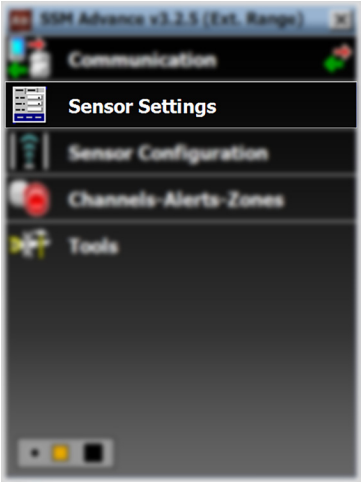

Figure 44. Settings button, main screen

After connecting to a sensor, access the sensor settings by clicking the **Sensor Settings** button on the main screen. Changing these settings is optional; if you leave them set to their defaults, the sensor will still function.

Changing General tab settings

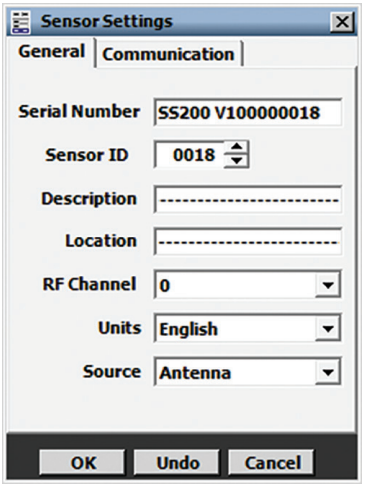

Figure 45. General tab

Setting	Description	Details
Serial Number	Shows the identification number assigned to the sensor by Wavetronix.	Can't be changed.
Sensor ID	Shows the sensor ID, which is the last seven digits of the sensor serial number. No two sensors should have the same ID.	Change this to assign a multi-drop address for a sensor.
Description	Lets you create a short description of the sensor.	Change this if you think you'll find it useful in identifying the sensor later.
Location	Lets you enter the sensor's location.	Change this if you think you'll find it useful in identifying the sensor later.

Setting	Description	Details
RF Channel	Lets you change the radio frequency channel the sensor is transmitting on.	If you're using multiple sensors in the same intersection, set each to a unique RF channel.
Units	Sets whether the software displays distances in standard (mph/feet) or metric (kph/meters).	Purely for your convenience—does not affect sensor performance.
Source	Lets you choose where the SSMA gets the traffic data it reports.	Choose **Antenna** for standard use (reports data as detected by the sensor). Choose **Diagnostic** for testing and training (creates simulated traffic).

Changing Communication tab settings

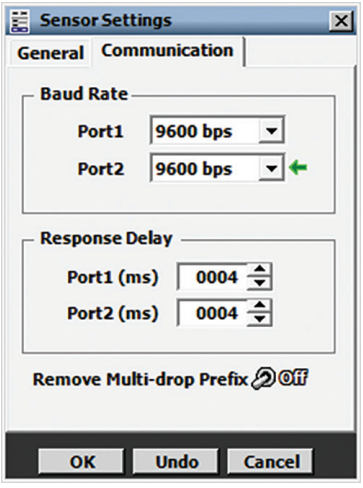

Figure 46. Communication tab

Setting	Description	Details
Baud Rate	Allows you to set the baud rate for ports 1 and 2. The default setting is 9600 bps.	Change this to match the baud rate of the communication devices you are using.
Port 1 (Control)	Port usually reserved for connecting and configuring the sensor.	Please contact Wavetronix Technical Support before changing this setting.
Port 2 (Data)	Port usually reserved for pushing data.	Please contact Wavetronix Technical Support before changing this setting.
Green Arrow	Shows the port over which SSMA is connected to the sensor.	N/A
Response Delay	How long the sensor will wait before responding to a received message, shown in milliseconds.	The default setting is 4 milliseconds. Please contact Wavetronix Technical Support before changing this setting.
Remove Multi-drop Prefix	This should remain OFF unless you are using a device that does not support a multi-drop prefix.	Please contact Wavetronix Technical Support before changing this setting.

6

Sensor Configuration

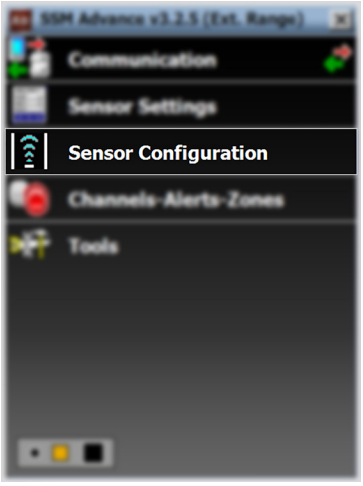

Figure 47. Sensor Configuration, main screen

Click **Sensor Configuration** on the main screen to open the Sensor Configuration screen.

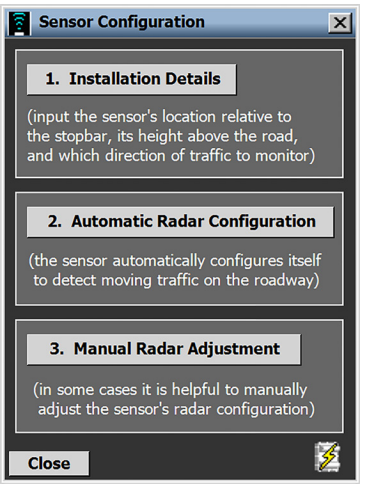

Figure 48. Sensor Configuration screen

Note. Click the lightning bolt icon at the bottom of the screen to save the current configuration to the sensor's non-volatile, flash memory.

1. Installation Details

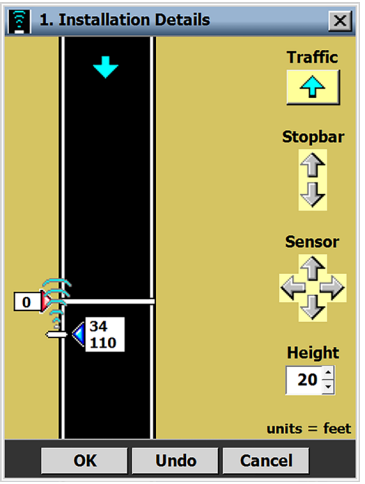

Figure 49. Installation Details screen

Note. Accurately configuring the settings on this screen will affect the aiming instructions given in the Alignment Tool screen in the Tools section (see chapter 11).

Setting	Description	Details
Traffic	Shows the direction of traffic the sensor is currently detecting.	Click the button to change the arrow direction.
Stopbar	Represents the location of the stopbar on the roadway. To move it, drag the stopbar up and down the roadway or use the **Stopbar** arrows. The stop bar will always have a distance of 0.	The stopbar and sensor location may affect channel configuration.
Sensor	Represents the location of the sensor on the roadway. To move it, drag the stopbar up and down the roadway or use the **Sensor** arrows. The top number represents how many feet the sensor is to the left or right of the center of the lanes of interest. The bottom number represents how many feet the sensor is in front of or behind the stop bar.	The stopbar and sensor location may affect channel configuration.
Height	Lets you enter the sensor's height.	The sensor height may affect range accuracy.

2. Automatic Radar Configuration

Figure 50. Automatic Radar Configuration screen

Automatically configuring the sensor

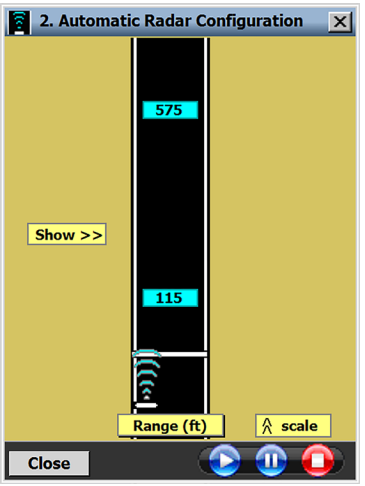

Figure 51. Automatically configuring the sensor

1. Click the **Play** button and you should see blue trackers on the screen representing vehicles on the roadway.
2. Wait at least four minutes while automatic configuration runs. Use the **Pause** button when there are no vehicles or stopped vehicles. Common practice is to allow the intersection to cycle 2–3 times before proceeding.

Note. The **scale** button allows you to see the sensor's range. The range will vary depending on if you are connected to a SmartSensor Advance or a SmartSensor Advance Extended Range.

Note. The **Range (ft)** button allows you to display different information on the trackers, including speed, ETA, and tracker ID numbers.

3 Clear the transparent configuration window by clicking the **<<Hide** button and compare the traffic on the road with the detections in the software.
4 Click **Close**.

Note. If you feel the sensor is reporting too few or too many detections, changing the radar thresholds could help. Contact Wavetronix support before changing the PGA setting.

3. Manual Radar Adjustment

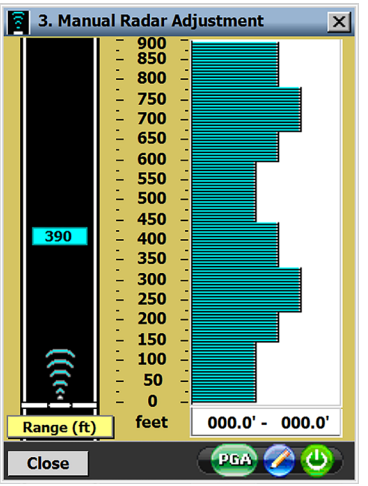

Figure 52. Manual Radar Adjustment screen

Note. The Programmable Gain Amplifier (PGA) allows you to change the radar sensitivity for the entire approach.

Changing PGA thresholds for the entire approach

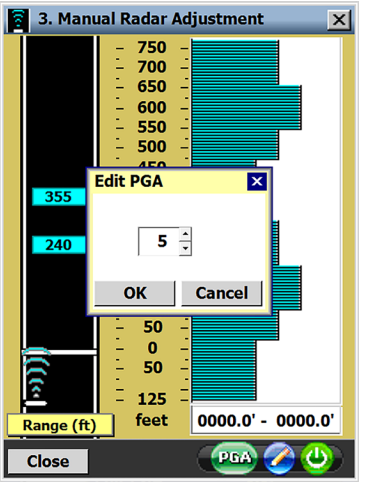

Figure 53. Editing the PGA

1 Click the **PGA** button.
2 Raise or lower the PGA and click **OK**.

Editing thresholds for specific bins

Note. Negative values will increase sensitivity; positive values will decrease sensitivity.

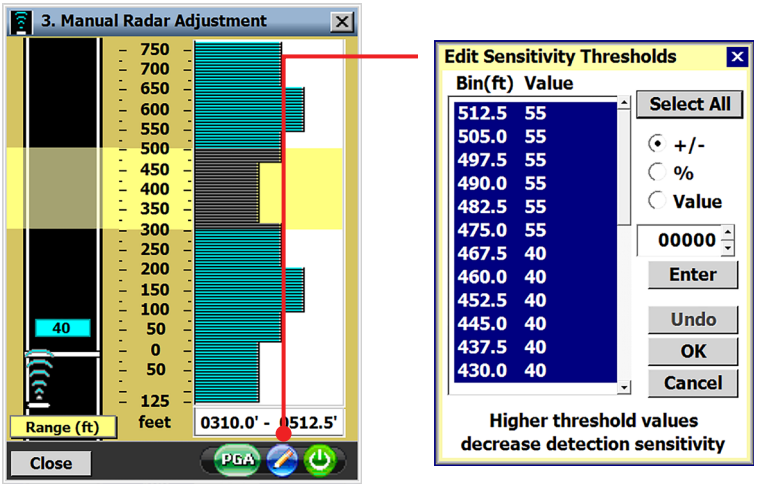

Figure 54. Editing specific bins

1 Click and drag over the ranges that need to be adjusted.
2 Click the pencil button and the Edit Sensitivity Thresholds window will appear.
3 Click and drag again to select the exact bins to adjust.
4 Make sensitivity adjustments using the controls on the right. You can add/subtract a specified value, set the sensitivity level to be a certain percentage of the existing value, or specify an exact value.
5 Click **Enter** to confirm. If desired, repeat with other bins.
6 Click **OK**.
7 Re-evaluate the traffic on the road with the trackers in the software.

Rebooting the sensor

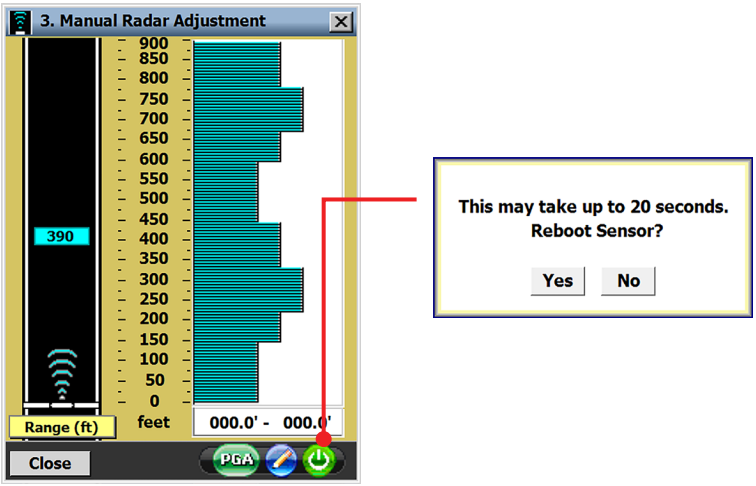

Figure 55. Rebooting the sensor

1 Click the power icon at the bottom of the screen.
2 In the prompt that appears, click **Yes**.

7

Setup Channels-Alerts-Zones

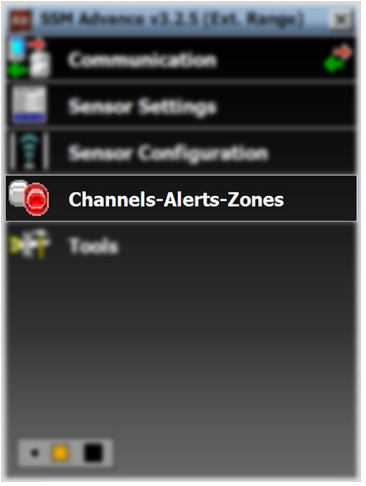

Figure 56. Channels-Alerts-Zones

Click **Channels-Alerts-Zones** on the main screen to open the Channels-Alerts-Zones screen.

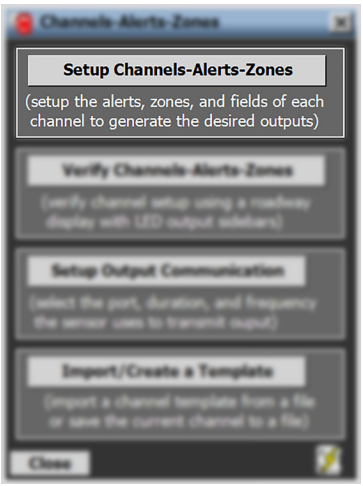

Figure 57. Setup Channels-Alerts-Zones button

Click **Setup Channels-Alerts-Zones** on the Channels-Alerts-Zones screen.

Simple Channel

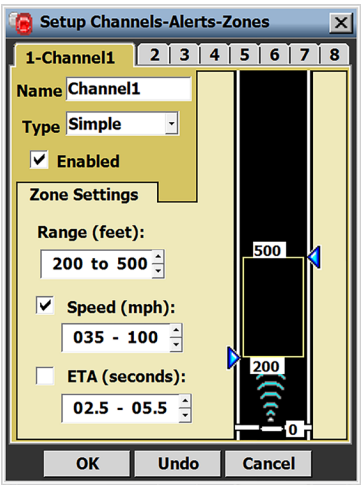

Figure 58. Simple channel

A Simple channel consists of only one zone. A Simple channel's output will be triggered when its zone settings are met. This channel is commonly used for basic dynamic dilemma zone applications.

Setting up a Simple channel

1. Click a channel tab and then click the **Enabled** checkbox.
2. Enter a channel name.
3. Select **Simple** from the **Type** drop-down menu.
4. Change the desired settings and click **OK**.

Setting	Description	Details
Channel settings		
Name	Lets you set a name for the channel.	This setting is optional.
Type	Lets you select the channel type.	Select **Simple** here.
Enabled	Turns the channel on.	This checkbox must be checked for normal operation.
Zone settings		
Range (feet)	Lets you enable a zone and set its range.	Either click and drag the blue zone arrows anywhere along the roadway or change the values in the **Range** field.
Speed (mph)	Lets you set the speed thresholds that will trigger the zone output.	Click inside the **Speed** field and use the up/down arrows to change the speed filter. The channel will only be triggered if a vehicle's speed is within the speed thresholds.
ETA (seconds)	Lets you set the ETA thresholds that will trigger the zone output.	Click inside the **ETA** field and use the up/down arrows to change the ETA filter. The channel will only be triggered if a vehicle's ETA to the stop bar is within the ETA thresholds.

Note. The speed and ETA filters will only be activated if the **Speed** and **ETA** boxes are checked.

Normal Channel

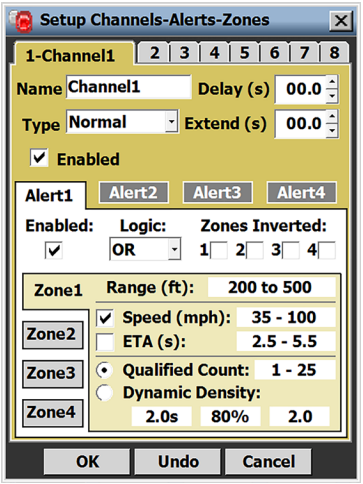

Figure 59. Normal channel

A Normal channel can have up to four alerts and each alert can have up to four zones. A Normal channel's output will be triggered only after its alert and zone settings are met. This is commonly used for dynamic dilemma zone protection with additional features.

Setting up a Normal channel

1. Click a channel tab and then click the **Enabled** checkbox.
2. Enter a channel name.
3. Select **Normal** from the **Type** drop-down menu.
4. Change the desired settings and click **OK**.

Setting	Description	Details
Channel settings		
Name	Lets you set a name for the channel.	This setting is optional.
Type	Lets you select the channel type.	Select **Normal** here.
Enabled	Turns the channel on.	This checkbox must be checked for normal operation.

Setting	Description	Details
Delay (s)	Sets how long, in seconds, the sensor delays the channel output.	It is recommended that you change delay settings in the traffic controller. If needed, you can also change delay settings in the SSMA software.
Extend (s)	Sets how long, in seconds, the sensor extends the channel output.	It is recommended that you change extend settings in the traffic controller. If needed, you can also change extend settings in the SSMA software.
Alert settings		
Enabled	Turns the alert on.	One alert is enabled by default.
Logic	If you're using more than one zone, this allows you to apply AND or OR logic to zone outputs.	OR means the alert will be triggered if one or more zones are activated; AND means the alert will be triggered if all enabled zones are activated.
Zones Inverted	Lets you invert the zone's output.	If one of these boxes is checked, the output will remain on until a detection in a zone deactivates it.
Zone settings		
Range (ft)	Lets you enable a zone and set its range.	Click the **Range** field and then drag a zone onto the roadway to enable it. Either click and drag the blue zone arrows or change the values in the **Range** field to set zone length.

Note. The speed and ETA filters will only be activated if the **Speed** and **ETA** boxes are checked.

Setting	Description	Details
Speed (mph)	Lets you set the speed thresholds that will trigger the zone output.	Click inside the **Speed** field and use the up/down arrows to change the speed filter. The zone ouput will only be triggered if a vehicle's speed is within the speed thresholds.
ETA (s)	Lets you set the ETA thresholds that will trigger the zone output.	Click inside the **ETA** field and use the up/down arrows to change the ETA filter. The zone ouput will only be triggered if a vehicle's ETA to the stop bar is within the ETA thresholds.
Qualified Count	Lets you limit a zone's output to times when there are a certain number of detections in a zone at one time.	The zone ouput will only be triggered if the number of vehicle's in a zone are within the Qualifed Count thresholds.
Dynamic Density	Lets you limit a zone's output to times when the number of detections in a zone equal or exceed a density requirement.	The zone ouput will only be triggered if a vehicle meets the Headway, % Utilization and Tuning Factor requirements.

Using the Dynamic Density filter

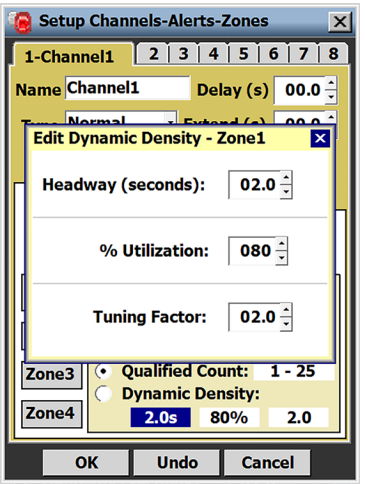

Figure 60. Using the Dynamic Density filter

1. Click a zone tab and click the **Dynamic Density** radio button.
2. Click any of the **Dynamic Density** fields.
3. Change the values in the **Headway**, **% Utilization**, and/or **Tuning Factor** fields.
4. Close the Edit Dynamic Density window.
5. Click **OK** to save your changes.

Dynamic Density settings

- **Headway –** This is the time separation of the front edge of two consecutive vehicles traveling in a given lane. A typical headway for heavily traveled lanes is two seconds, which corresponds to a flow rate of 1800 vehicles per hour.
- **% Utilization –** This is the ratio of observed flow rate to ideal flow rate and is a measure used to describe traffic efficiency in terms of ideal efficiency.
- **Tuning Factor –** This is a general-purpose scale factor used to adjust observed results to represent actual road conditions. This number should equal the number of lanes in the approach the sensor is detecting.

Latched channel

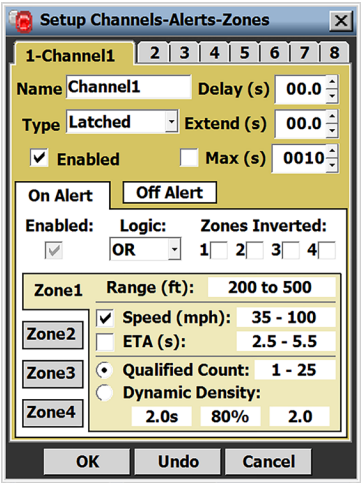

Figure 61. Latched chanel

A Latched channel has two alerts (ON and OFF) and each alert can have up to four zones. A Latched channel's output will remain triggered until a contradictory alert is triggered, or until a maximum latch time has expired. A Latched channel is usually only used in advanced queue applications.

Setting up a Latched channel

1. Click a channel tab and then click the **Enabled** checkbox.
2. Enter a channel name.
3. Select **Latched** from the **Type** drop-down menu.
4. Change the desired settings and click **OK**.

Setting	Description	Details
Channel settings		
Name	Lets you set a name for the channel.	This setting is optional.
Type	Lets you select the channel type.	Select **Latched** here.
Enabled	Turns the channel on.	This checkbox must be checked for normal operation.

Setting	Description	Details
Delay (s)	Sets how long, in seconds, the sensor delays a channel output.	It is recommended that you change delay settings in the traffic controller. If needed, you can also change delay settings in the SSMA software.
Extend (s)	Sets how long, in seconds, the sensor extends a channel output.	It is recommended that you change extend settings in the traffic controller. If needed, you can also change extend settings in the SSMA software.
Max (s)	This is the maximum amount of time, in seconds, that the latched channel will remain active.	Click the checkbox in order to use this setting.
Alert settings		
On Alert/Off Alert	Allows you to set which zones will trigger the On and Off alerts.	Click the appropriate tab to change settings.
Enabled	On/Off alerts are always enabled with Latched channels.	N/A
Logic	If you're using more than one zone, this allows you to apply AND or OR logic to zone outputs.	OR means the alert will be triggered if one or more zones are activated; AND means the alert will be triggered if all enabled zones are activated.
Zones Inverted	Lets you invert the zone's output.	If one of these boxes is checked, the output will remain on until a detection in a zone deactivates it.

Setting	Description	Details
Zone settings		
Range (ft)	Lets you enable a zone and set its range.	Click the **Range** field and then drag a zone onto the roadway to enable it. Either click and drag the blue zone arrows or change the values in the **Range** field to set zone length.
Speed (mph)	Lets you set the speed thresholds that will trigger the zone output.	Click inside the **Speed** field and use the up/down arrows to change the speed filter. The zone ouput will only be triggered if a vehicle's speed is within the speed thresholds.
ETA (s)	Lets you set the ETA thresholds that will trigger the zone output.	Click inside the **ETA** field and use the up/down arrows to change the ETA filter. The zone ouput will only be triggered if a vehicle's ETA to the stop bar is within the ETA thresholds.
Qualified Count	Lets you limit a zone's output to times when there are a certain number of detections in a zone at one time.	The channel will only be triggered if the number of vehicle's in a zone are within the Qualifed Count thresholds.
Dynamic Density	Lets you limit a zone's output to times when the number of detections in a zone equal or exceed a density requirement.	The channel will only be triggered if a vehicle meets the Headway, % Utilization and Tuning Factor requirements.

Note. The speed and ETA filters will only be activated if the **Speed** and **ETA** boxes are checked.

Using the Dynamic Density filter

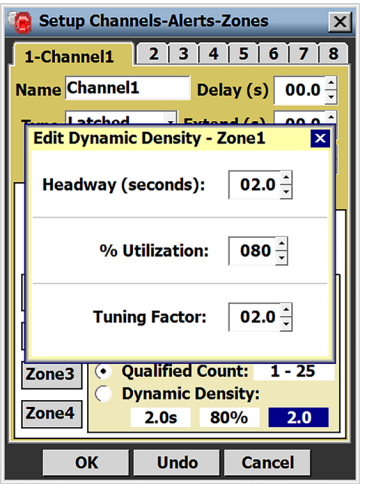

Figure 62. Using the Dynamic Density filter

1. Click a zone tab and click the **Dynamic Density** radio button.
2. Click any of the **Dynamic Density** fields.
3. Change the values in the **Headway**, **% Utilization**, and/or **Tuning Factor** fields.
4. Close the Edit Dynamic Density window.
5. Click **OK** to save your changes.

Dynamic Density settings

- **Headway –** This is the time separation of the front edge of two consecutive vehicles traveling in a given lane. A typical headway for heavily traveled lanes is two seconds, which corresponds to a flow rate of 1800 vehicles per hour.
- **% Utilization –** This is the ratio of observed flow rate to ideal flow rate and is a measure used to describe traffic efficiency in terms of ideal efficiency.
- **Tuning Factor –** This is a general-purpose scale factor used to adjust observed results to represent actual road conditions. This number should equal the number of lanes in the approach the sensor is detecting.

Pulse channel

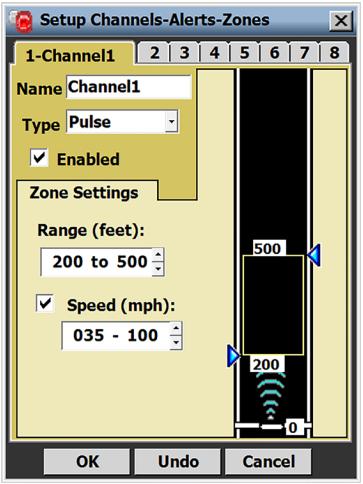

Figure 63. Pulse channel

A Pulse channel has one zone. When a vehicle enters the zone, the channel output will pulse once and then turn off. This channel is primarily used for arrival data collection for signal coordination.

Setting up a Pulse channel

1. Click a channel tab and then click the **Enabled** checkbox.
2. Enter a channel name.
3. Select **Pulse** from the **Type** drop-down menu.
4. Change the desired settings and click **OK**.

Setting	Description	Details
Channel settings		
Name	Lets you set a name for the channel.	This setting is optional.
Type	Lets you select the channel type.	Select **Pulse** here.
Enabled	Turns the channel on.	This checkbox must be checked for normal operation.

Setting	Description	Details
Zone settings		
Range (feet)	Lets you enable a zone and set its range.	Either click and drag the blue zone arrows anywhere along the roadway or change the values in the **Range** field.
Speed (mph)	Lets you set the speed thresholds that will trigger the zone output.	Click inside the **Speed** field and use the up/down arrows to change the speed filter. The zone output will only be triggered if a vehicle's speed is within the speed thresholds.

Note. The speed filter will only be activated if the **Speed** box is checked.

Priority channel

Note. Priority channels are only available with SmartSensor Advance Extended Range.

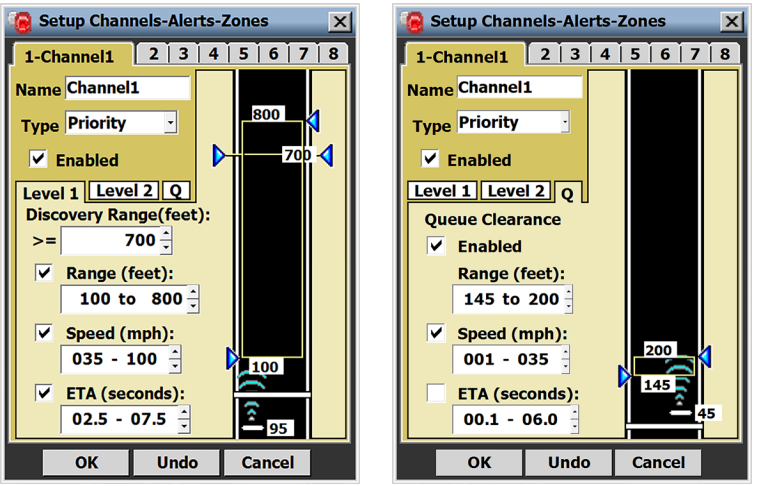

Figure 64. Priority channel, level 1 and level 2 zones

A Priority channel has three zones. The channel output is triggered when any one of the three zones is triggered. A Priority channel is

primarily used to distinguish between the dilemma zones of larger vehicles, such as trucks and buses, and the dilemma zones of smaller vehicles.

Setting up a Priority channel

1. Click a channel tab and then click the **Enabled** checkbox.
2. Enter a channel name.
3. Select **Priority** from the **Type** drop-down menu.
4. Change the zone settings and click **OK**.

Setting	Description	Details
Channel settings		
Name	Lets you set a name for the channel.	This setting is optional.
Type	Lets you select the channel type.	Select **Priority** here.
Enabled	Turns the channel on.	This checkbox must be checked for normal operation.
Level 1, Level 2 settings		
Discovery Range (feet)	Sets the discovery range threshold, which allows you to differentiate between high-priority vehicles (trucks, busses) and smaller vehicles.	Use the up/down arrows to change the Discovery Range threshold. Adjust this so that most large vehicles are discovered beyond the threshold (Level 1) and most smaller vehicles are discovered after it (Level 2).
Range (feet)	Lets you enable a zone and set its range.	Either click and drag the blue zone arrows anywhere along the roadway or change the values in the **Range** field.

Setting	Description	Details
Speed (mph)	Lets you set the speed thresholds that will trigger the zone output.	Click inside the **Speed** field and use the up/down arrows to change the speed filter. The zone output will only be triggered if a vehicle's speed is within the speed thresholds
ETA (seconds)	Lets you set the ETA thresholds that will trigger the zone output.	Click inside the **ETA** field and use the up/down arrows to change the ETA filter. The zone output will only be triggered if a vehicle's ETA to the stop bar is within the ETA thresholds. The ETA thresholds for a Level 1 zone should be larger to protect larger vehicles with larger dilemma zones.
Q settings		
Enabled	Turns the zone on.	This checkbox must be checked for normal operation.
Range (feet)	Lets you enable a zone and set its range.	Either click and drag the blue zone arrows anywhere along the roadway or change the values in the **Range** field.

Note. The speed and ETA filters will only be activated if the **Speed** and **ETA** boxes are checked.

Note. The Q tab allows you to use the SmartSensor Advance for queue reduction.

Setting	Description	Details
Speed (mph)	Lets you set the speed thresholds that will trigger the zone output.	Click inside the **Speed** field and use the up/down arrows to change the speed filter. The zone output will only be triggered if a vehicle's speed is within the speed thresholds.
ETA (seconds)	Lets you set the ETA thresholds that will trigger the zone output.	Click inside the **ETA** field and use the up/down arrows to change the ETA filter. The zone output will only be triggered if a vehicle's ETA to the stop bar is within the ETA thresholds.

Note. You can copy and paste alert and zone settings by right-clicking on alert and zone tabs.

Copying and pasting channel settings

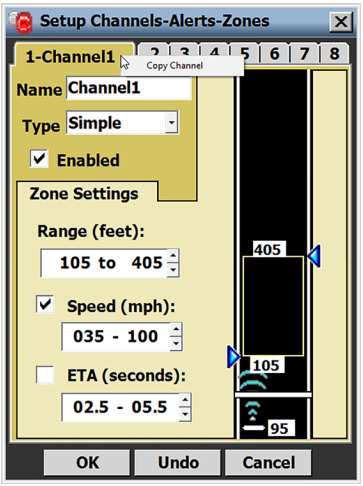

Figure 65. Copying channel settings

1 Right-click on a channel tab and select **Copy Channel**.
2 Right-click on another channel tab and select **Paste Channel**.

8

Verifying Channels-Alerts-Zones

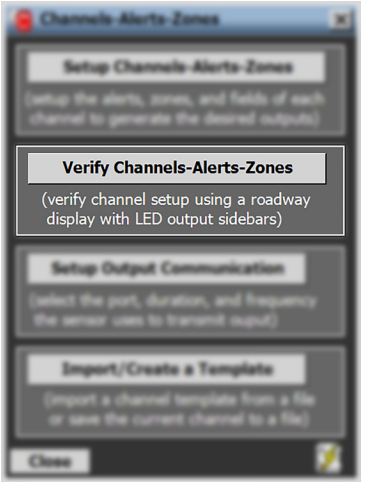

Figure 66. Channels-Alerts-Zones button, main screen

Note. Some channel types take more time to process than others. Limiting the number of channels you use will ensure that the sensor can process all activated logic to keep latency low. Contact Wavetronix Support if you want to use more than two channels.

Click **Channels-Alerts-Zones** on the main screen, and then click **Verify Channels-Alerts-Zones** on the Channels-Alerts-Zones screen.

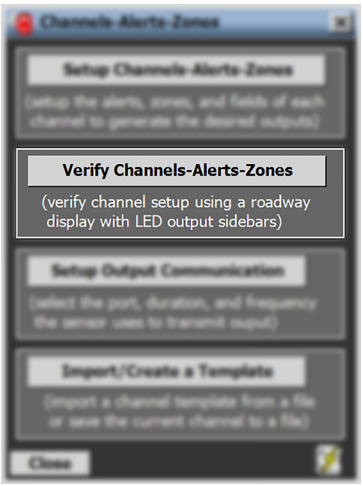

Figure 67. Verify Channels-Alerts-Zones screen

Verifying channels, alerts and zones means comparing the detection data in the SSMA software with the actual traffic in the roadway; you can observe the roadway traffic yourself, or record it using a separate device. If the actual traffic matches the software traffic, your channels, alerts and zones are set up properly.

Verification options

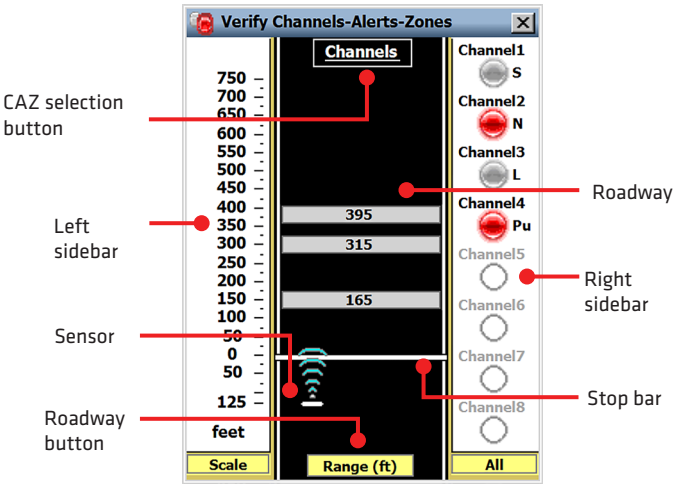

Figure 68. Verifying tools

Setting	Description	Details
CAZ selection button	Shows the currently selected channel, alert and zone.	Click this to go back to the Setup Channels-Alerts-Zones screen.
Roadway button	Allows you to choose what data will be displayed on each tracker.	Click this to cycle through all the roadway display options or click and hold to see all options in a list.
Left sidebar	Allows you to see the sensor's range and to create a tracker logging file.	N/A
Right sidebar	Allows you to verify all channel outputs at once or individual channel outputs.	Click the LEDs to see the zone outlines in the roadway and to verify which trackers are triggering channel, alert and zone outputs.
Roadway	Shows trackers as they pass through detection zones.	Click anywhere on the roadway to view different channel, alert or zone outputs.
Sensor	Shown on the roadway pointing towards the top of the screen.	Sensor location is set in the Installation Details screen.
Stop bar	Shown at the bottom of the roadway.	Stop bar location is set in the Installation Details screen.

Verifying using roadway display options

1. Set up a way to observe on-road traffic: seat yourself in a place where you can observe both the road and the computer, or have someone else observe traffic for you while you monitor your computer.
2. Click and hold the roadway display button (at the bottom of the roadway). The roadway display menu will appear.
3. Choose **Range (ft)**, **Speed (mph)**, **ETA (s)**, **ID**, **Qualified Count**, **Discovery Range**, **Priority Level**, or **Tri-view** to select which of these will apear on top of the trackers (the trackers appear as gray rectangles moving down the screen).
4. Compare the range, speed, etc., information on the trackers with what is observed in the roadway. If they match, the sensor is set up properly.
5. Now click the right sidebar button until the **All** channels view appears and compare channel outputs in the software with equipment in the traffic cabinet.

If the detections don't match traffic

You may be able to improve accuracy by adjusting thresholds (covered in Chaper 6), double-checking the alignment (covered in Chapter 2), or changing the mounting location. If all else fails, contact your dealer or support@wavetronix.com.

Verifying using tracker logging

Note. This tool records traffic detections and saves it to a file. You can then play back the file using a virtual connection to fine-tune your configuration.

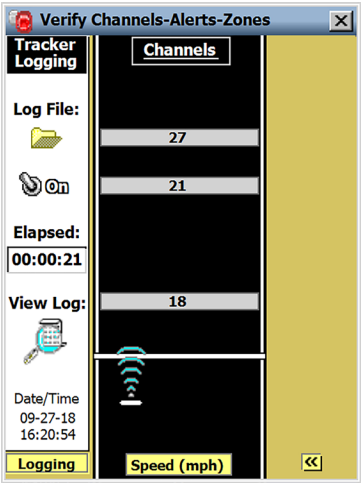

Figure 69. Tracker logging

1. Set up a way to record what's happening on the road, such as a video camera or someone with a speed gun.
2. Click the left sidebar button on the Verify Channels-Alerts-Zones screen, until the Tracker Logging section appears.
3. Choose where to store the log file by clicking the folder icon.
4. Add a filename and click **OK**.
5. To begin logging, click the switch icon. When you're done, click it again to stop. Record the traffic that passes on the road during the same interval.
6. To view the file, click the **View Log:** magnifying glass icon in the sidebar. You can also navigate to the file on your computer: C://ProgramFiles/Wavetronix/ SmartSensor Manager Advance vX.X.X/bin. The file that was created will be a .txt document that can be opened in Notepad.
7. Compare the logged data to what was detected on the roadway. If they match, the sensor is set up properly.

If the detections don't match traffic

You may be able to improve accuracy by adjusting thresholds (covered in Chaper 6), double-checking the alignment (covered in Chapter 2), or changing the mounting locations. If all else fails, contact your dealer or support@wavetronix.com.

Using the scale view

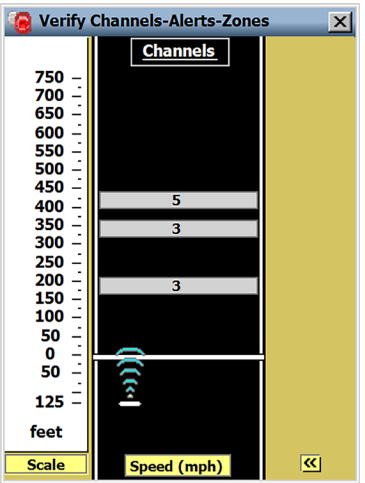

Figure 70. Scale view

1. Click the left sidebar button until the scale appears. This shows a distance scale relative to the stop bar.
2. Using the scale you can do a quick visual check of detection accuracy.

Changing the roadway display

Tip. Click and hold on the **Roadway** button to view all the display options.

Many types of data can be displayed inside the tracker on the roadway. The roadway display button is used to cycle through the different tracker display options.

Setting	Description	Details
Range (ft)	Shows the distance from the vehicle to the stop bar.	N/A
Speed (mph)	Shows the vehicle's speed.	N/A
ETA (s)	Shows the vehicle's estimated time of arrival (in seconds) to the stop bar.	N/A
ID	Shows the tracker ID number. SSMA assigns a unique five-digit identification number to each tracker.	N/A
Qualified Count	Shows Qualified Count and Dynamic Density data.	The data displayed on the trackers depends on the channel type selected in the Setup Channels-Alerts-Zones screen.

Setting	Description	Details
Discovery Range	Shows the range at which the tracker was first detected.	This is only available with SmartSensor Advance Extended Range.
Priority Level	Shows the priority level assigned to a vehicle based on its discovery range. Level 1 is the highest priority.	This is only available with SmartSensor Advance Extended Range.
Tri-view	Allows you to choose up to three display options on each tracker.	This is useful to see what specifically is triggering the output.
(blank)	Removes all data from trackers.	N/A
(disabled)	Does not show trackers on the roadway. However, the LEDs in the right sidebar will still function and channel outputs will still be triggered.	This option may be useful when communication is slow or unreliable.

Configuring the tri-view display option

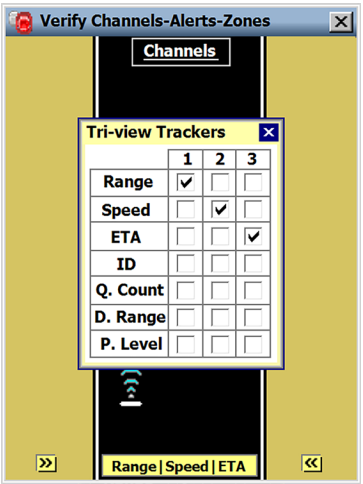

Figure 71. Tri-view display

1. Click the **Roadway** button until you get to the tri-view display option.
2. Click and hold the **Roadway** button until the Tri-view Trackers window appears.
3. Select the display options you want to appear on the trackers.

Verifying all channels

Note. If a channel is not enabled, it will be grayed out in the right sidebar.

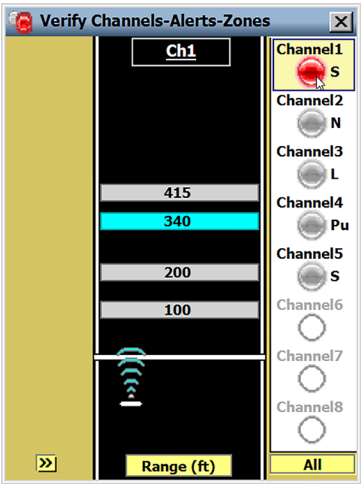

Figure 72. Verifying all channels

1 Click the right sidebar button until the **All** option appears. This option shows all eight channel outputs at the same time. Channel LEDs will turn red when the output is triggered.
2 Watch the LEDs and make sure they function the way that you expected.
3 For additional verification, click a channel LED and trackers that are triggering that channel output will turn light blue.

Tip. Click and hold on a channel LED to view a summary of that channel's settings.

Additional information

- The channel type appears next to the channel LED (S = Simple, N = Normal, L = Latched, P = Priority, Pu = Pulse).

Verifying individual channels

Tip. Click and hold on an LED to view a summary of channel, alert and zone settings.

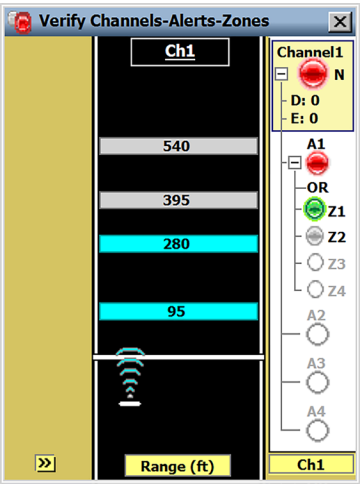

Figure 73. Verifying individual channels

1 Click the right sidebar button until the channel option appears. The channel LED will turn red when the output is triggered.
2 Click the **+** signs to expand the list of channels, alerts and zones. Channel, alert and zone LEDs will light up when triggered.
3 Watch the LEDs and make sure they function the way that you expected. See the table below for LED behavior.
4 For additional verification, click a zone LED to see that particular zone on the roadway and click inside a zone to see that zone's name and measurements.

Note. Only channel outputs are reported to contact closure devices. While they appear in SSMA, zone and alert outputs are not directly associated with contact closure outputs.

Setting	Description	Details
Channel LED turns red	The channel output is triggered.	A channel output is triggered when the associated alert outputs fulfill the channel's requirements.
Alert LED turns red	The alert output is triggered.	An alert output is triggered when the associated zone outputs fulfill the alert's requirements.
Zone LED turns a color	A zone output is triggered.	A zone output is triggered when its detection filters are met. Each zone is represented by a different color. Zone 1 = green Zone 2 = blue Zone 3 = yellow Zone 4 = red
Letter next to channel LED	Shows the channel type.	S = Simple N = Normal L = Latched P = Priority Pu = Pulse
Letter under channel LED	Shows the channel settings.	D = Delay E = Extend M = Max timer

Setting	Description	Details
AND/OR below alert LED	Shows if AND or OR logic is applied.	N/A
Solid black line	Appears above LEDS for inverted zones.	N/A
Tracker turns light blue	If a channel is selected, the tracker meets the range, speed, or ETA requirements for at least ONE of the channel's zones. If an alert is selected, the tracker meets the requirements for whatever data is being displayed on the tracker.	N/A
Tracker turns green, blue, yellow or red	If an alert or zone is selected, the tracker meets ALL of a zone's range, speed and ETA requirements.	N/A
Tracker turns gray	The tracker has NOT triggered any channel, alert or zone output.	N/A

9

Setup Output Communication

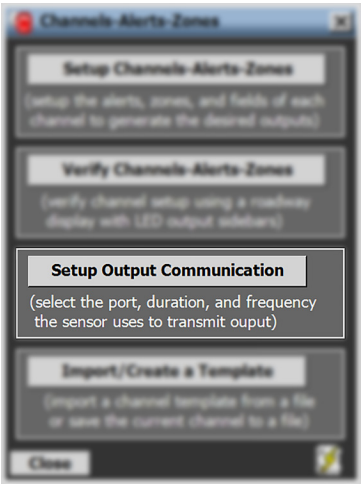

Figure 74. Setup Output Communication button

Click **Setup Output Communication** on the Channels-Alerts-Zones screen.

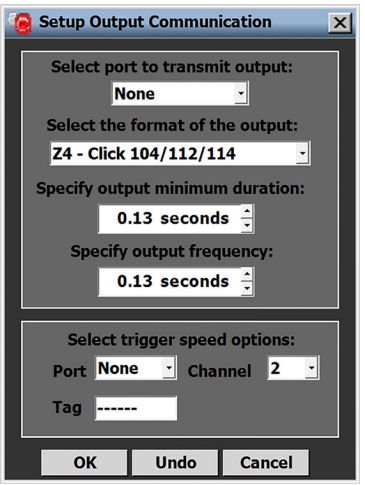

Figure 75. Setup Output Communication screen

This screen lets you push sensor data to a data logger or data collector.

Setting	Description	Details
Select port to transmit output	Allows you to select which port will be used for pushing data.	Port 1 is designated as the control bus and Port 2 as the data bus.
Select the format of the output	Allows you to manually select which type of data the SmartSensor Advance will transmit.	Select **Z4** if you're using a Click 100/112/114. Select **Simple** if you're using a Click 104/172/174 (not available for SmartSensor Advance Extended Range). Select **Track File** if you want to get raw range and speed data, rather than channel output data.

Setting	Description	Details
Specify output minimum duration	Allows you to specify the minimum amount of time a channel output will be on (in seconds).	May be useful for detections that occur very quickly and need to be held long enough for the system to recognize and use the information. In most cases, the default value of 0.13 seconds will work fine.
Specify output frequency	Allows you to set the minimum time between channel outputs.	In most cases, the default value of 0.13 seconds will work fine.
Select trigger speed options		
Port	Indicates which port the trigger speeds will be pushed on. **None** = disabled Port **1** = control bus Port **2** = data bus	Select port **1** or **2** to push speeds and select **None** if you don't want to push trigger speed data.
Channel	Monitors alert 1 and zone 1 of the selected channel.	Select the pulse channel you want to use to gather trigger speed data.
Tag	Allows you to define a 6-character tag that will help identify which intersection the speed came from. This tag is inserted after the speed bytes of the trigger speed message.	Enter a unique 6-character tag to identify intersection location.

Note. Trigger speeds show the speed of the detected vehicles that activated the channel and are normally used with Pulse channels.

10

Import/Create Template

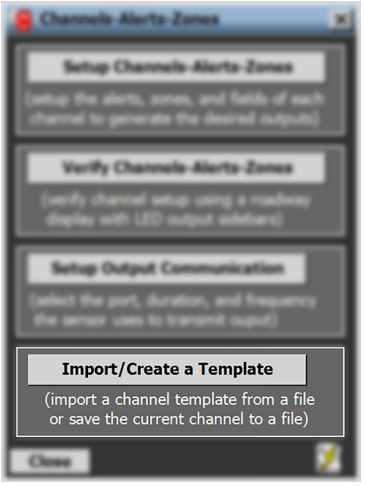

Figure 76. Import/Create a Template button

Click **Import/Create a Template** on the Channels-Alerts-Zones screen.

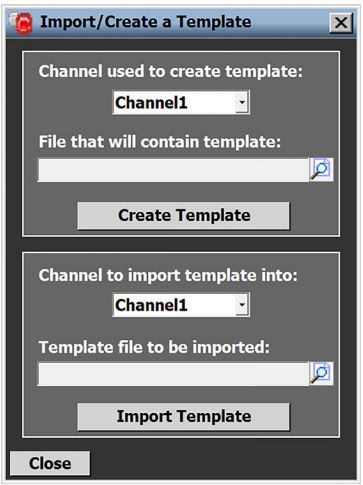

Figure 77. Tools screen

This screen lets you create channel templates for frequently used or standardized channel configurations.

Creating a template

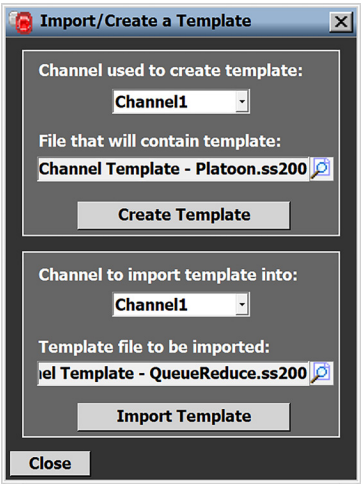

Figure 78. Creating a template

1. Select the channel you want to use as your template from the **Channel used to create template** drop-down.
2. Click the magnifying glass icon and either select a template from the list or create your own template.

3 Click **OK**.
4 Click **Create Template**.

Importing a template

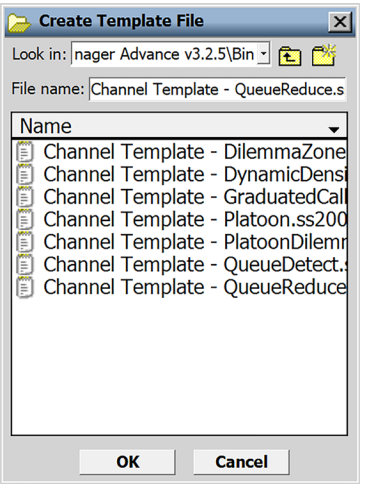

Figure 79. Importing a template

1 From the **Channel to import template into** drop-down menu, select the channel you would like to upload a template to.
2 Click the magnifying glass icon.
3 Select a template file you created or choose from the Wavetronix predefined templates.
4 Click **OK**.
5 Click **Import Template**.

Note. A message may appear saying that zones in the channel template are outside the sensor's detection range. If you load the template, those zones will be deleted from the channel configuration.

11

Using Tools

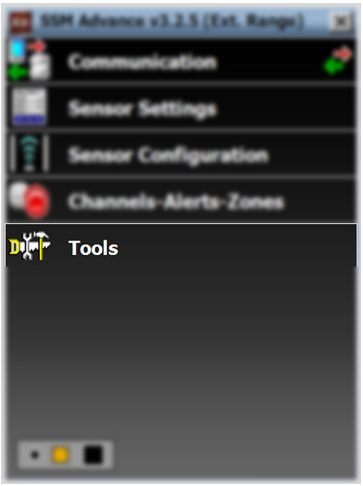

Figure 80. Tools

Click the **Tools** button on the main screen to open the Tools screen.

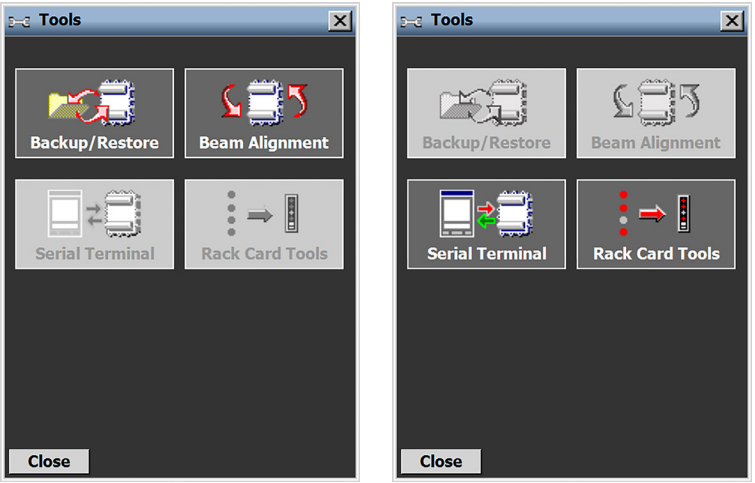

Figure 81. Tools menu

When you are connected to a sensor, only the **Backup/Restore** and **Beam Alignment** options will be available; when you aren't connected to a sensor, only the **Serial Terminal** and **Rack Card Tools** options will be available.

Backing up and restoring sensor setup files

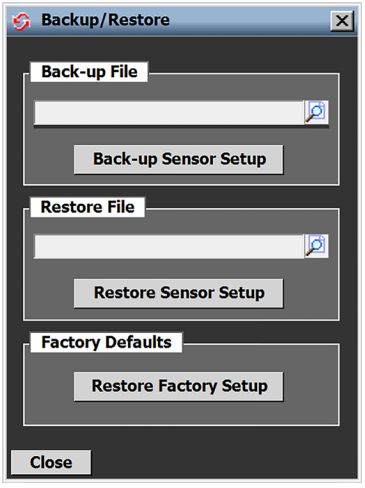

Figure 82. Backup/Restore screen

Setting	Description	Details
Backup File	Allows you to create a backup file (.ssc) of the sensor settings you currently have configured. Click the magnifying glass to navigate to where you want to create the backup file; type a name and hit **OK**. Click the **Back-up Sensor Setup** button to save the backup file to your computer.	This may be useful if you are making changes to the sensor and want to back up your configuration before you do so, so that you have a known good configuration to fall back on if necessary. Alternatively, it may be useful if you are replacing a sensor in the field, and you want to quickly apply the settings from the old sensor to the new one.
Restore File	Loads a backup file (.ssc) to the sensor, replacing the current sensor configuration with the configuration saved to the .ssc file. Click the magnifying glass to navigate to where the desired backup file is saved; select it and hit **OK**. Click the **Restore Sensor Setup** button to apply the saved configuration from the backup file to the sensor.	This may be useful if you have made changes to the sensor and need to restore a backed-up configuration from a saved file (see above).
Restore Factory Setup	Sets all sensor settings back to the factory defaults.	N/A

Using the beam alignment tool

Note. The alignment tool helps you visualize the radar footprint and doesn't affect sensor operation.

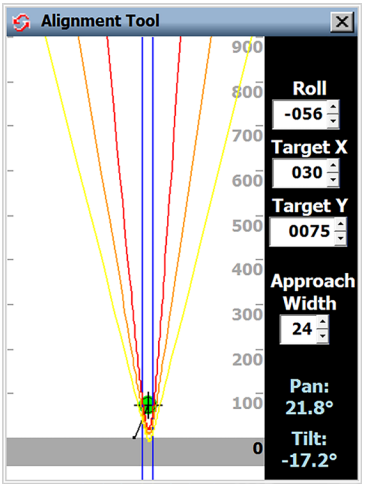

Figure 83. Beam Alignment tool

1. Click the **Beam Alignment** button in the Tools menu.
2. Verify that the settings you entered on the 1. Installation Details screen are correct.
3. If the settings entered on the 1. Installation Details screen are correct, the settings on the Alignment Tool screen will automatically populate and can be used to visualize the radar footprint.

Setting	Description	Details
Roll	The degree the sensor is rotated on its center axis. Clockwise = positive Counterclockwise = negative	Rotate the sensor on its center axis to the degree specified in the Roll field. For example, if the Roll field says "-70°," you would roll the sensor counterclockwise 70 degrees.
Target X	The sensor's offset from the middle of the lanes of interest.	Aim the sensor towards the approach by the amount of feet specified in the Target X field.

Target Y	The target distance. Represented by a light green dot with crosshairs.	Aim the sensor up the road by the amount of feet specified in the Target Y field.
Approach Width	The width of the approach you are detecting, represented by blue vertical lines.	Allows you to make the virtual roadway match the width of the approach.
Pan	The sensor's hoizontal angle. Right = positive Left = negative	For example, if under Pan it says "18°," you would pan the sensor right 18 degrees.
Tilt	The sensor's vertical angle, represented by a negative angle because the sensor should be pointed down.	For example, if under Tilt it says "-20°," you would tilt the sensor down 20 degrees.

Communicating via a serial terminal

Note. The serial terminal is used to examine serial data while troubleshooting. Consult Wavetronix Technical Support before using this feature.

Figure 84. Serial Terminal screen

1. Click the **Serial Terminal** button in the Tools menu.
2. Click **Settings** and choose a communication port and baud rate.
3. Save the settings by closing the window.
4. Click **Open** to start a terminal session.

Using Rack Card Tools

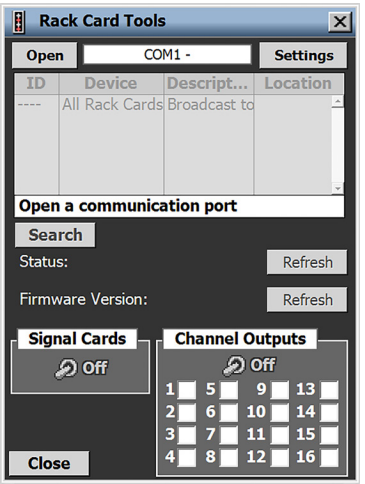

Figure 85. Rack Card Tools screen

1. Click **Settings** and choose a communication port and baud rate.
2. Close the **Serial Settings** window.
3. Click **Search**.
4. Once a list of devices appears, click on the device you want to test. Click **All Rack Cards** in the Device column if you want to test all devices at the same time.

Setting	Description	Details
Settings	Allows you to select the type of connection, communication port, and baud rate, and to adjust the timeout setting.	N/A
Open	Opens the communication port you selected on the Serial Settings screen.	N/A
Search	Searches for all available cards on the shared RS-485 T-bus.	N/A
ID	Shows the rack card ID number.	N/A

Note. Rack Card Tools allows you to verify channel mapping into the traffic controller without being connected to a sensor.

Device	Shows the type of rack card found on the bus.	N/A
Description	Shows a description of the rack card.	N/A
Location	Shows the rack card's location.	N/A
Status	Shows if the rack card is working normally or if it is in fail-safe mode.	Click the **Refresh** button to recheck the status.
Firmware Version	Shows the rack card firmware version.	Click the **Refresh** button to recheck the firmware version.
Signal Cards (switch)	Allows you to check channel mappings to each individual rack card.	Select a device from the list, click the **Signal Cards** toggle switch and all main menu LEDs will begin flashing.
Channel Outputs	Allows you to check channel mappings from the rack card outputs to the traffic controller inputs.	Select which channel outputs you want to test and click the **Channel Outputs** toggle switch.

Note. Since the SmartSensor Advance and SmartSensor Matrix can share the same control bus, all 16 outputs are shown, allowing you to test communications to rack cards from either sensor.

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