

# Manual

# 1 Wireless vehicle detector

## 1.1 Introduction

**The Wintrans WVD024 Wireless Vehicle Detection System** uses wireless vehicle detectors to detect the presence and movement of vehicles. The detectors installed on the surface or in small holes cored in the roadway transmit detections data in real-time via low-power radio technology to a nearby access point. Vehicle detections are further relayed to a traffic signal controller, remote traffic management center, or other system.

**The WVD024-S wireless vehicle detector** combine a magnetometer and a low-power radio in a small, hardened plastic case suitable for installation directly in the pavement. In typical traffic management application, a detector is placed in the middle of a traffic lane to detect the presence and passage of vehicles. Vehicle speeds and length are measured by two detectors installed in the same lane with the exact distance between them configured in software. The recommended distance between detectors depends on the range of expected speeds to be measured: for typical freeway applications, a separation of 20 to 24 feet is recommended; for typical arterial applications, a separation of 10 to 12 feet is preferred. The magneto-resistive sensing devices in each wireless detector measure the x-, y-, and z-axis components of the Earth's magnetic field at a 128Hz sampling rate. As vehicles come within range, changes in the x, y, or z axes of the measured magnetic field become apparent. When no vehicles are present, detectors continually measure the background magnetic field to estimate a reference. Each detector automatically self-calibrates to the local environment, and to any long-term variations of the local magnetic field, by allowing this reference value to change over time.

It provides information about the arrival and departure of front-end vehicles for the access point (AP) or repeater (RP) of the Wintrans Wireless Vehicle Detection System. It receives the commands such as the parameter modification, the system upgrade from the AP or the RP.

## 1.2 Appearance



## 1.3 Interface

The detector has no external interface, only have a 3.6v built-in battery interface.

## 1.4 Technical Parameters

physical layer protocol	IEEE 802.15.4PHY
over-the-air-protocol	Wintrans NanoPower protocol
frequency band	2405-2480MHz
frequency channels	16
frequency bandwidth	2MHz
transmit/receive bit rate	250 kbps
antenna type	ceramic patch antenna
antenna field of view	$\pm 60^{\circ}$
typical receive sensitivity	-101dBm
power supply	Li-SOCl <sub>2</sub> 3.6v 7.2ah
dimensions	7.6cm×7.6cm×5.6cm
weight	0.3kg

environment	IP67
operating temp	-40°C to 85°C
humidity	≤95%

## 2 Repeater

### 2.1 Introduction

The **Wintrans WVD024 Wireless Vehicle Detection System** uses wireless vehicle detectors to detect the presence and movement of vehicles. The detectors installed on the surface or in small holes cored in the roadway transmit detections data in real-time via low-power radio technology to a nearby access point. Vehicle detections are further relayed to a traffic signal controller, remote traffic management center, or other system.

**The WVD024-RP Repeater.** In cases where one or more installed wireless vehicle detectors are out of range of the nearest access point, one or more repeaters can be used to provide a two-way relay between the out-of-range detectors and the access point. As many as two repeaters operating in tandem can be installed between a detector and the access point. To simplify its deployment, a repeater is battery-powered and thus requires no wires or cabling. A repeater extends the range and coverage of an installation's access point. Mounted by the roadside on a pole or other structure, the repeater must be positioned so that both the detectors to be supported by the repeater and the communicating repeater or access point are within view and within range.

### 2.2 Appearance



## 2.3 Interface

The repeater has no external interface, only have a 3.6v built-in battery interface.

## 2.4 Technical Parameters

physical layer protocol	IEEE 802.15.4PHY
over-the-air-protocol	Wintrans NanoPower protocol
frequency band	2405-2480MHz
frequency channels	16
frequency bandwidth	2MHz
transmit/receive bit rate	250 kbps
antenna type	ceramic patch antenna
antenna field of view	$\pm 60^\circ$
typical receive sensitivity	-101dBm
power supply	Li-SOCl <sub>2</sub> 3.6v 7.2ah
dimensions	11.5cm×7.5cm×16cm
environment	IP67
operating temp	-40℃ to 85℃
humidity	≤95%

## 3 Access Point

### 3.1 Introduction

**The Wintrans WVD024 Wireless Vehicle Detection System** uses wireless vehicle detectors to detect the presence and movement of vehicles. The detectors installed on the surface or in small holes cored in the roadway transmit detections data in real-time via low-power radio technology to a nearby access point. Vehicle detections are further relayed to a traffic signal controller, remote traffic management center, or other system.

**The Access Point** is an intelligent device operating under the Linux operating system that maintains two-way wireless links to a vehicle detection system's detectors and repeaters, establishes overall time synchronization, transmits configuration commands and message acknowledgements, and receives and processes data from the detectors. The access point then uses either wired or wireless connections (or both) to replay the detection data to a roadside traffic controller or remote server, traffic management system, or other vehicle detection applications.

An access point uses a single cable to support 10Base-T Ethernet communications as well as DC power input and, in some versions, serial communications to the contact closure card that furnishes the interface to standard traffic controllers.

### 3.2 Appearance



### 3.3Interface

The access point has only one network interface, which contains the communication mode: RS485 and Ethernet.

The interface pins are defined as follows:

1	LAN_TX+
2	LAN_TX-
3	LAN_RX+
4	RS485+
5	RS485-
6	LAN_RX-
7	GND
8	+48V

The device board has two network interfaces (RS485 interface and Ethernet interface).

RS485 interface pin is defined as follows:

1	RS485+
2	RS485-
3	
4	GND
5	
6	
7	
8	+48V

Ethernet interface pin is defined as follows:

1	LAN_TX+
2	LAN_TX-
3	LAN_RX+
4	GND
5	GND

6	LAN_RX-
7	+48V
8	+48V

### 3.4 Technical Parameters

physical layer protocol	IEEE 802.15.4PHY
over-the-air-protocol	Wintrans NanoPower protocol
frequency band	2405-2480MHz
frequency channels	16
frequency bandwidth	2MHz
transmit/receive bit rate	250 kbps
antenna type	ceramic patch antenna
antenna field of view	$\pm 60^{\circ}$
typical receive sensitivity	-101dBm
power supply	POE
dimensions	15cm×7.5cm×20cm
environment	IP67
operating temp	-40℃ to 85℃
humidity	≤95%



## **Federal Communications Commission (FCC) Statement**

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

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

**Warning:** Changes or modifications made to this device not expressly approved by Wuxi Wintrans Information Technology Co., Ltd may void the FCC authorization to operate this device.

**Note:** The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.