



Multi-target Speed Measuring Radar

User's Manual



Foreword

General

This manual introduces the installation, functions, and operations of the multi-target speed measuring radar (hereinafter referred to as the "Radar"). Read carefully before using the device, and keep the manual safe for future reference.

Models

DHI-ITARD-024MA-T4 and DHI-ITARD-024MA-T6

Safety Instructions

The following signal words might appear in the manual.

Signal Words	Meaning
 WARNING	Indicates a medium or low potential hazard which, if not avoided, could result in slight or moderate injury.
 CAUTION	Indicates a potential risk which, if not avoided, could result in property damage, data loss, reductions in performance, or unpredictable results.
 TIPS	Provides methods to help you solve a problem or save time.
 NOTE	Provides additional information as a supplement to the text.

Revision History

Version	Revision Content	Release Time
V1.0.0	First release.	July 2022

Privacy Protection Notice

As the device user or data controller, you might collect the personal data of others such as their face, fingerprints, and license plate number. You need to be in compliance with your local privacy protection laws and regulations to protect the legitimate rights and interests of other people by implementing measures which include but are not limited: Providing clear and visible identification to inform people of the existence of the surveillance area and provide required contact information.

About the Manual

- The manual is for reference only. Slight differences might be found between the manual and the product.
- We are not liable for losses incurred due to operating the product in ways that are not in compliance with the manual.
- The manual will be updated according to the latest laws and regulations of related jurisdictions. For detailed information, see the paper user's manual, use our CD-ROM, scan the QR code or visit our official website. The manual is for reference only. Slight differences might be found between the electronic version and the paper version.

- All designs and software are subject to change without prior written notice. Product updates might result in some differences appearing between the actual product and the manual. Please contact customer service for the latest program and supplementary documentation.
- There might be errors in the print or deviations in the description of the functions, operations and technical data. If there is any doubt or dispute, we reserve the right of final explanation.
- Upgrade the reader software or try other mainstream reader software if the manual (in PDF format) cannot be opened.
- All trademarks, registered trademarks and company names in the manual are properties of their respective owners.
- Please visit our website, contact the supplier or customer service if any problems occur while using the device.
- If there is any uncertainty or controversy, we reserve the right of final explanation.

Important Safeguards and Warnings

This section introduces content covering the proper handling of the Radar, hazard prevention, and prevention of property damage. Read carefully before using the Radar, and comply with the guidelines when using it.

Transportation Requirements



- Pack the Radar with packaging provided by its manufacturer or packaging of the same quality before transporting it.
- Transport the Radar under allowed humidity and temperature conditions.

Storage Requirements



Store the Radar under allowed humidity and temperature conditions.

Installation Requirements



- Do not connect the power adapter to the Radar while the adapter is powered on.
- Strictly comply with the local electric safety code and standards. Make sure that the ambient voltage is stable and meets the power supply requirements of the Radar.
- Do not connect the Radar to two or more kinds of power supplies, to avoid damage to the Radar.
- Use the accessories suggested by the manufacturer. Installation and maintenance must be performed by qualified professionals.
- When using a laser beam device, avoid exposing the surface of the Radar to laser beam radiation.
- Do not install the Radar in an environment that has a large amount of metal, advertising boards, walls or electromagnetic interference. Otherwise, the performance of the Radar might be affected
- Do not install 2 devices with the same frequency in the same environment. Otherwise, the Radar might not work properly.



- Personnel working at heights must take all necessary measures to ensure personal safety including wearing a helmet and safety belts.
- Do not place the Radar in a place exposed to sunlight or near heat sources.
- Keep the Radar away from dampness, dust, and soot.
- Put the Radar in a well-ventilated place, and do not block its ventilation.
- Use an adapter or cabinet power supply provided by the manufacturer.
- The power supply must conform to the requirements of SELV in IEC 60065 or IEC 60950-1 standard. Please note that the power supply requirements are subject to the Radar label.
- The Radar is a class I electrical appliance. Make sure that the power supply of the Radar is connected to a power socket with protective earthing.

- An emergency disconnect device must be installed during installation and wiring at a readily accessible location for emergency power cut-off.
- Protect the line cord and wires from being walked on or squeezed particularly at plugs, power sockets, and the point where they exit from the Radar.
- Make sure that the Radar is installed horizontally, and that there are no items blocking the front of the Radar.

Operation Requirements



- Check whether the power supply is correct before use.
- Do not unplug the power cord on the side of the Radar while the adapter is powered on.
- Operate the Radar within the rated range of power input and output.
- Use the Radar under allowed humidity and temperature conditions.
- Do not drop or splash liquid onto the Radar, and make sure that there is no object filled with liquid on the Radar to prevent liquid from flowing into it.
- Do not disassemble the Radar without professional instruction.
- We recommend you use the Radar with a lightning protection device for stronger protection against lightning. For outdoor scenarios, strictly comply with the lightning protection regulations.
- We recommend you ground the function earthing portion of the Radar to improve its reliability. The Radar is a class I electrical appliance. Make sure that the power supply of the Radar is connected to a power socket with protective earthing.

Maintenance Requirements



- Use a soft dry cloth or a clean soft cloth dipped in a small amount of neutral detergent to clean the Radar.
- Use the accessories suggested by the manufacturer. Installation and maintenance must be performed by qualified professionals.

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1 Product Introduction

1.1 Overview

The Radar is developed for the traffic industry by using brand-new software and hardware technologies. The Radar has 2 models: DHI-ITARD-024MA-T4 (suitable for 4 lanes) and DHI-ITARD-024MA-T6 (suitable for 6 lanes). With a working frequency that ranges from 24 GHz to 24.25 GHz, the Radar conforms to global frequency standards. You can use the Radar to measure the information of multiple targets at the same time, including the distance between a target and the Radar, the angle between a target and the Radar, and target speed. Based on the measuring results, the Radar provides accurate trigger information.

The Radar adopts the frequency-modulated continuous-wave (FMCW) technology, which allows the Radar to accurately and quickly distinguish distances and speeds. For angle measurement, the Radar adopts the multiple-input and multiple-output (MIMO) technology, which allows the Radar to measure and distinguish angles with higher accuracy. In addition, the Radar is equipped with advanced tracking algorithm. The algorithm ensures that the Radar can measure the information of all targets in target-intensive scenarios. With these technologies, the Radar can be used to help monitor the checkpoints of multiple lanes and collect traffic information, and is particularly suitable for places with heavy traffic flow.

1.2 Functions

- You can install the Radar above the lanes or at the side of the lanes.
- DHI-ITARD-024MA-T4 has a horizontal viewing angle of 60° and can cover 4 lanes.
- DHI-ITARD-024MA-T6 has a horizontal viewing angle of 120° and can cover 6 lanes.
- Output trigger information includes lane numbers, vehicle speeds, and vehicle lengths.
- You can set the trigger distance between 20 m and 55 m. The accuracy is 1 m.
- You can set the lower limit of the trigger speed.
- The Radar supports signal processing based on MIMO.
- The Radar supports 100 M network port and RS-485 communication port.
- The Radar supports automatic calibration of the horizontal angle, which facilitates installation and debugging.

2 Appearance and Structure

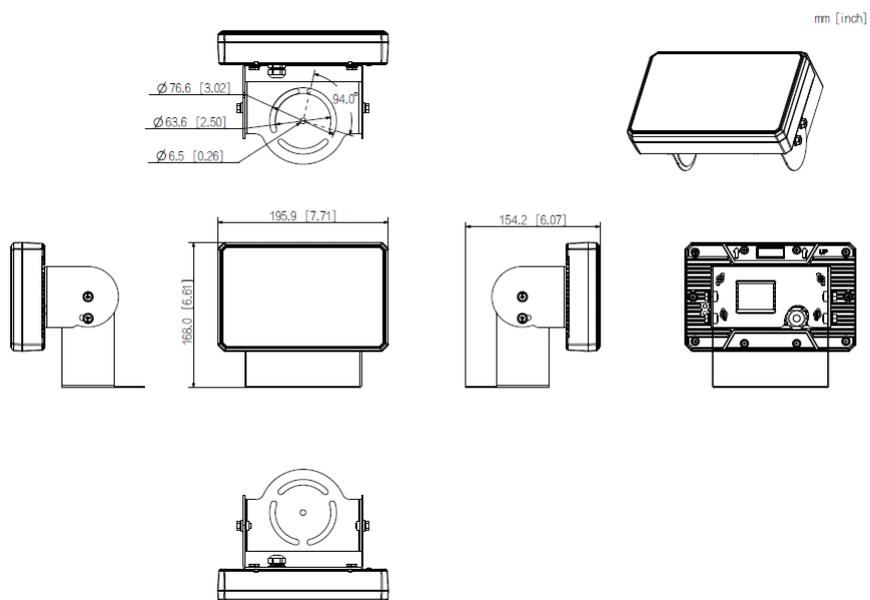
2.1 Appearance

Figure 2-1 Radar appearance



2.2 Dimensions

Figure 2-2 Dimensions



3 Installing the Radar

3.1 Installation Requirements

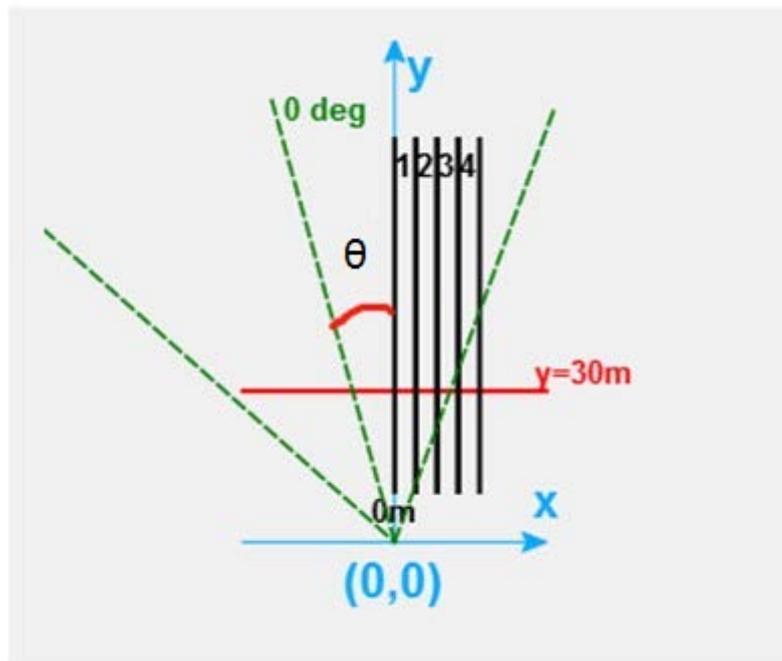
- Make sure that the Radar is installed in an environment without shelter and electromagnetic interference.
- Do not install 2 devices with the same frequency in the same environment. Otherwise, the Radar might not work properly.
- Keep the Radar away from large metal reflectors such as advertising boards.
- Install the Radar at a height between 5 m and 8 m.

3.2 Horizontal Angle and Pitch Angle

3.2.1 Horizontal Angle

The horizontal angle is the angle between the normal of the Radar and the lanes. If the normal is at the left side of the left-most lane (y-axis), the horizontal angle is a positive value. Otherwise, the horizontal angle is a negative value.

Figure 3-1 Horizontal angle



The Radar has a spirit level, as shown in the following figure. After you mount the Radar, adjust the horizontal angle until the bubble in the spirit level is in the middle part.

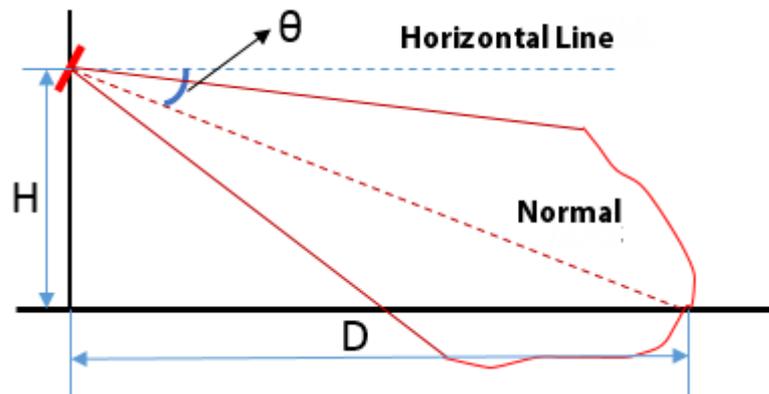
Figure 3-2 Spirit level



3.2.2 Pitch Angle

The pitch angle is the angle between the normal of the Radar and the horizontal line. If the Radar is down towards the road surface, the pitch angle is a negative value. Otherwise, the pitch angle is a positive value.

Figure 3-3 Pitch angle



You can set the installation height, trigger distance, and pitch angle based on the following table.

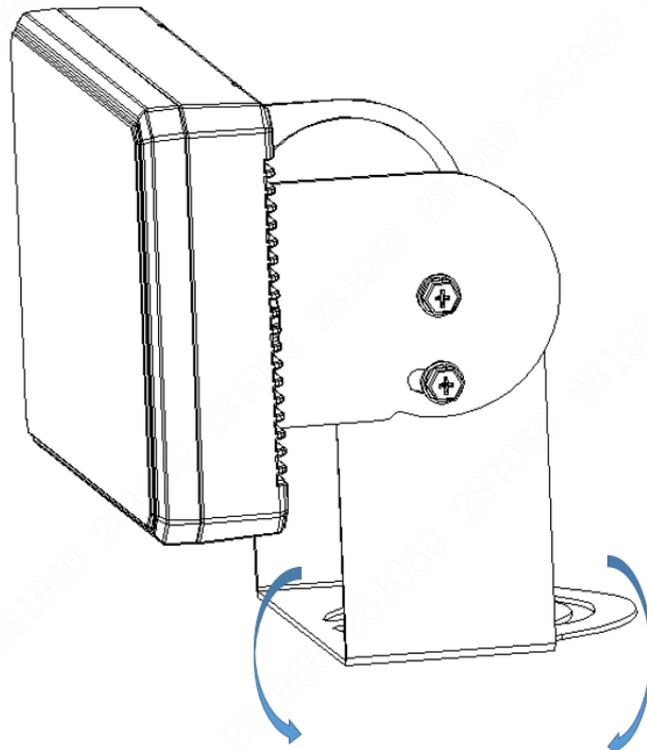
Table 3-1 Recommended pitch angle

Trigger Distance	Pitch angle (H = 4 m)	Pitch angle (H = 5 m)	Pitch angle (H = 6 m)	Pitch angle (H = 7 m)	Pitch angle (H = 8 m)
20 m	-6.0°	-7.5°	-9.0°	-10.4°	-11.9°
25 m	-6.0°	-7.5°	-9.0°	-10.4°	-11.9°
30 m	-6.0°	-7.5°	-9.0°	-10.4°	-11.9°
35 m	-6.0°	-7.5°	-9.0°	-10.4°	-11.9°
40 m	-5.7°	-7.1°	-8.5°	-9.9°	-11.3°
45 m	-5.1°	-6.3°	-7.6°	-8.8°	-10.1°
50 m	-4.6°	-5.7°	-6.8°	-8.0°	-9.1°
55 m	-4.2°	-5.2°	-6.2°	-7.3°	-8.3°

3.3 Installation Procedure

- Step 1 Fix the Radar to the traffic light pole by using a pole mount bracket. You must prepare a pole mount bracket as needed.

Figure 3-4 Fix the Radar



Fix the Radar to the traffic light pole at this place.

- Step 2 Adjust the pitch angle based on Table 3-1. You can adjust the pitch angle by adjusting the location of the Radar bracket.
- Step 3 Adjust the horizontal angle. We recommend you make the Radar surface that emits beams face the middle part of the road. This ensures that the Radar beams can cover the area to be detected.

Figure 3-5 Radar installed right above the lanes

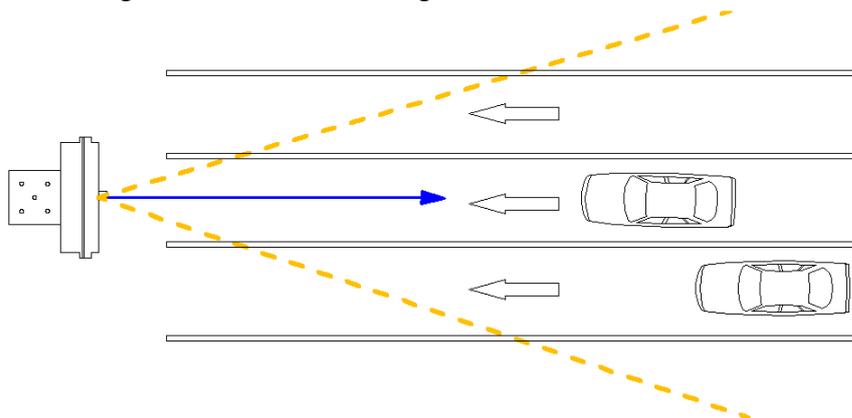
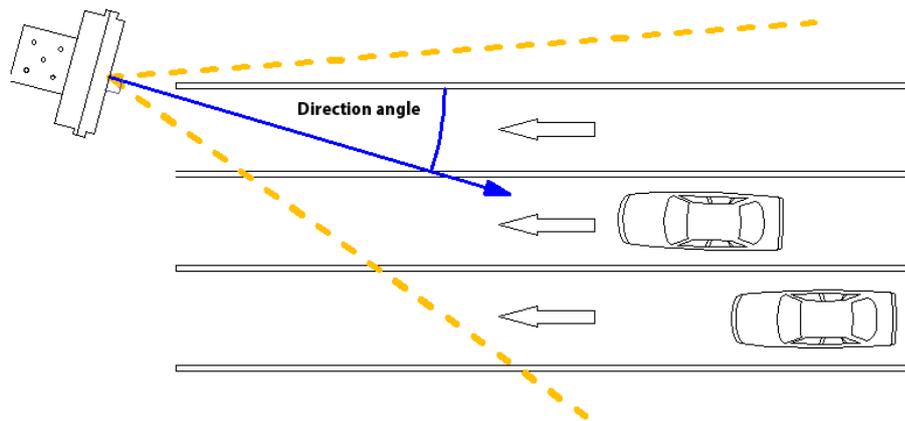


Figure 3-6 Radar installed at the side of the lanes



3.4 Wires and Indicator Lights

- Power cord

Figure 3-7 Power cord

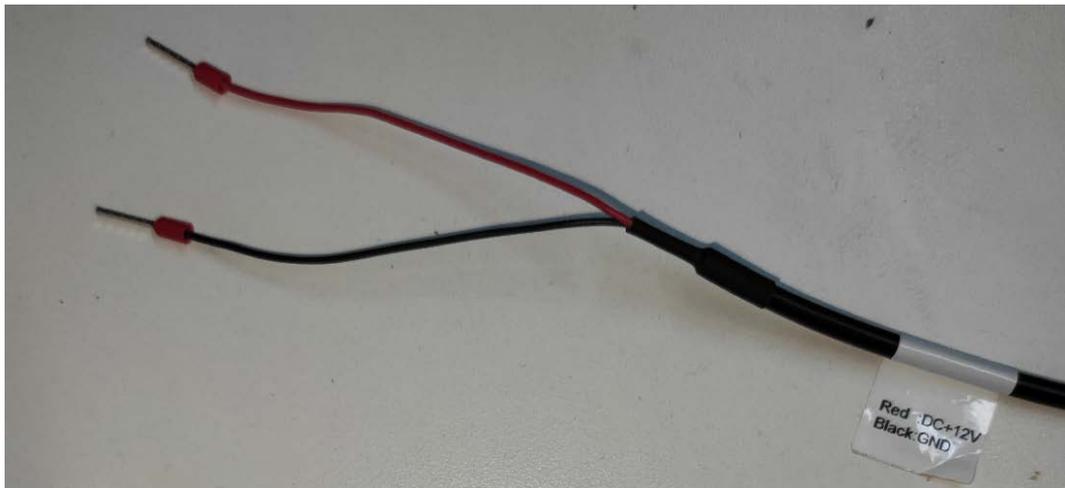


Table 3-2 Wire description

Wire color	Description
Red	DC + 12 V
Black	GND

- RS-485

Figure 3-8 RS-485



Table 3-3 Wire description

Wire color	Description
Red	RS-485A
Blue	RS-485B
Black	SGND

● RJ-45

Figure 3-9 Standard RJ-45 connector



● Indicator lights

Figure 3-10 Indicator lights on the Radar



- ◇ The Radar has 2 indicator lights. The red light is the power indicator, and the green light is the signal indicator.
- ◇ After the Radar is powered on, the power indicator keeps on. If the Radar is started as expected, the signal light flashes several times and then turns off.
- ◇ If the Radar is connected to WI-FI, the power light continuously flashes.
- ◇ If a vehicle triggers the Radar, the signal light flashes once.

4 Client Operations

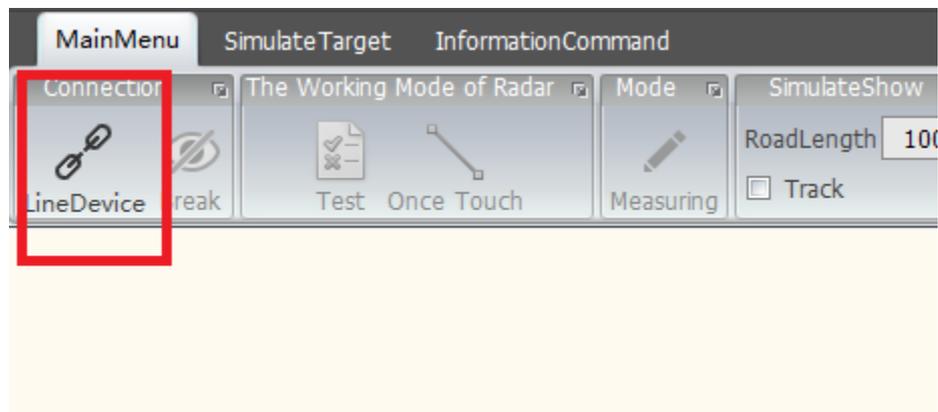
In the client, you can set parameters such as the installation height, pitch angle, deflection angle, and horizontal offset.

4.1 Modifying Parameters

This section describes how to debug the network port. The procedure of debugging the network port is the same as that of debugging the serial port and WI-FI.

Step 1 Log in to the client, click **MainMenu**, and then click **LineDevice**.

Figure 4-1 Connect the Radar to the network

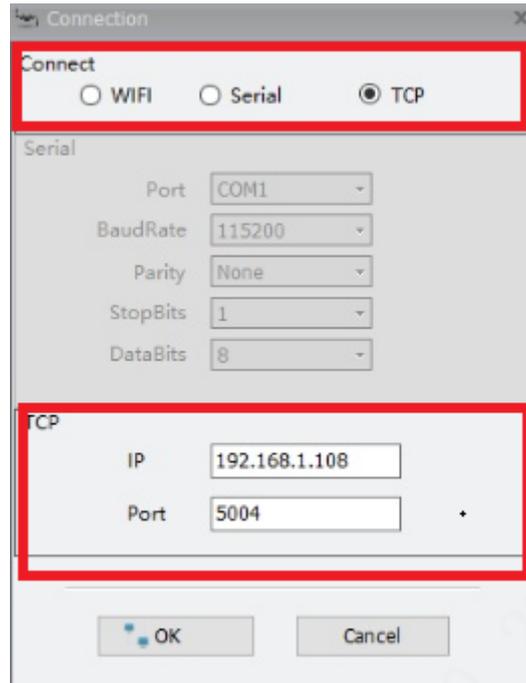


Step 2 Select **TCP**, enter an IP address and a port number, and then click **OK**.



- The default IP address is 192.168.1.108, and the default port number is 5004.
- The default baud rate of RS-485 is 9,600 bps, and the default WI-FI password is DAHUA123.

Figure 4-2 Select a connection method

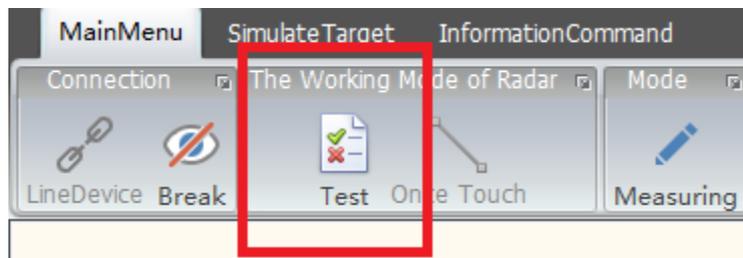


Step 3 Click **Test** to go to debugging mode.



You can modify Radar parameters only in debugging mode.

Figure 4-3 Go to debugging mode

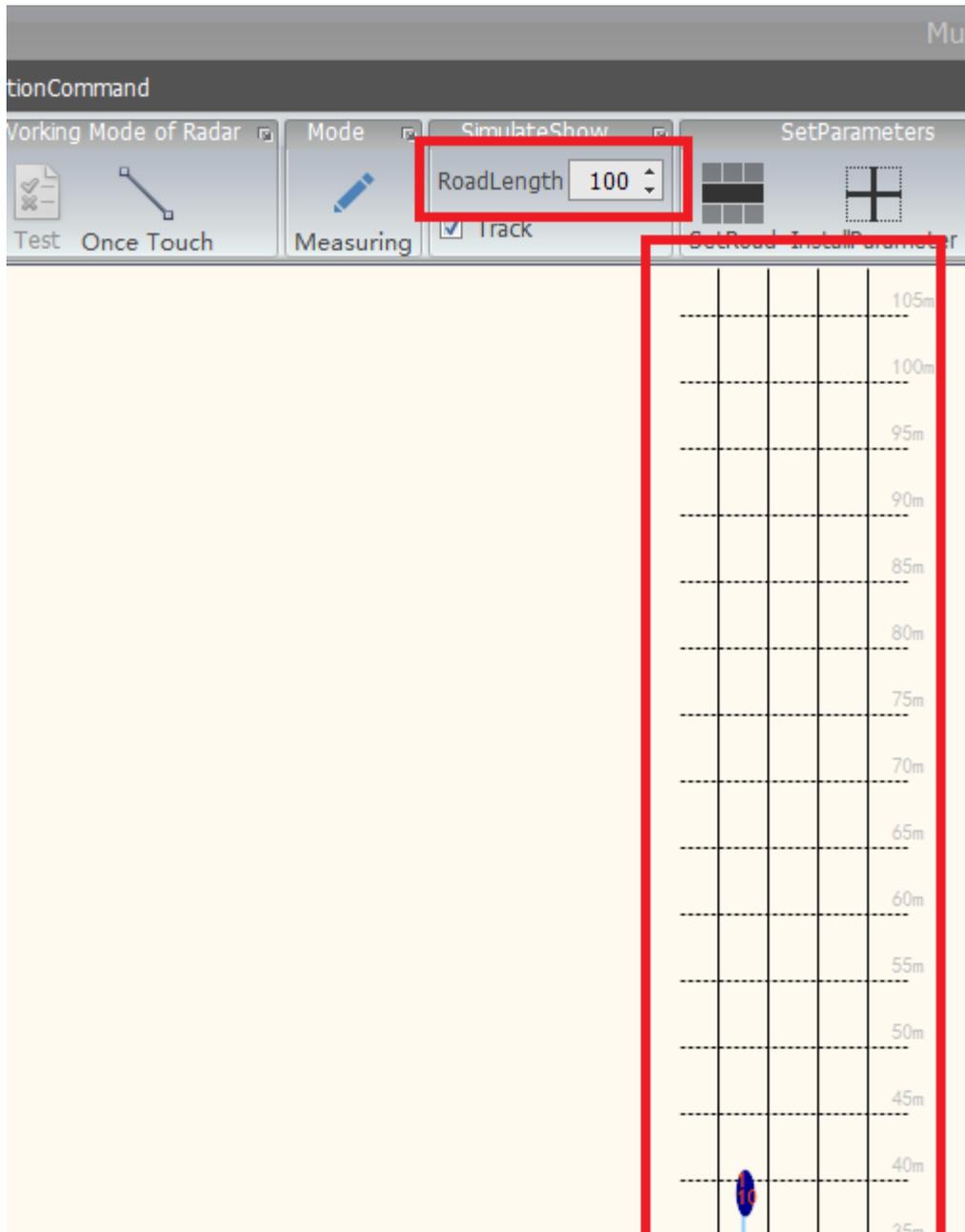


Step 4 Set **RoadLength**.



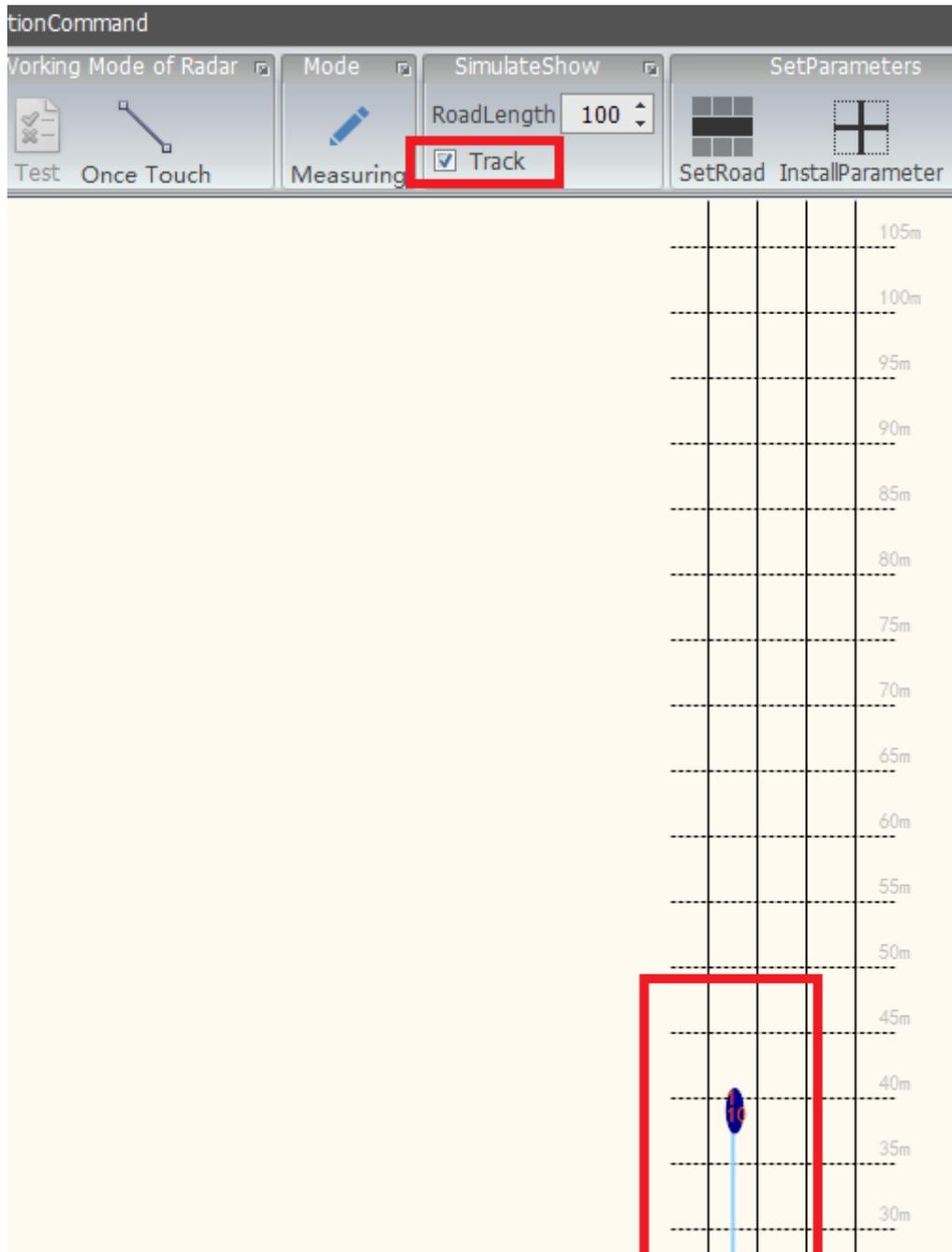
The configured road length is irrelevant to the maximum detection distance.

Figure 4-4 Set the road length



Step 5 Select **Track** to display the moving track of targets.

Figure 4-5 Display the moving track of targets

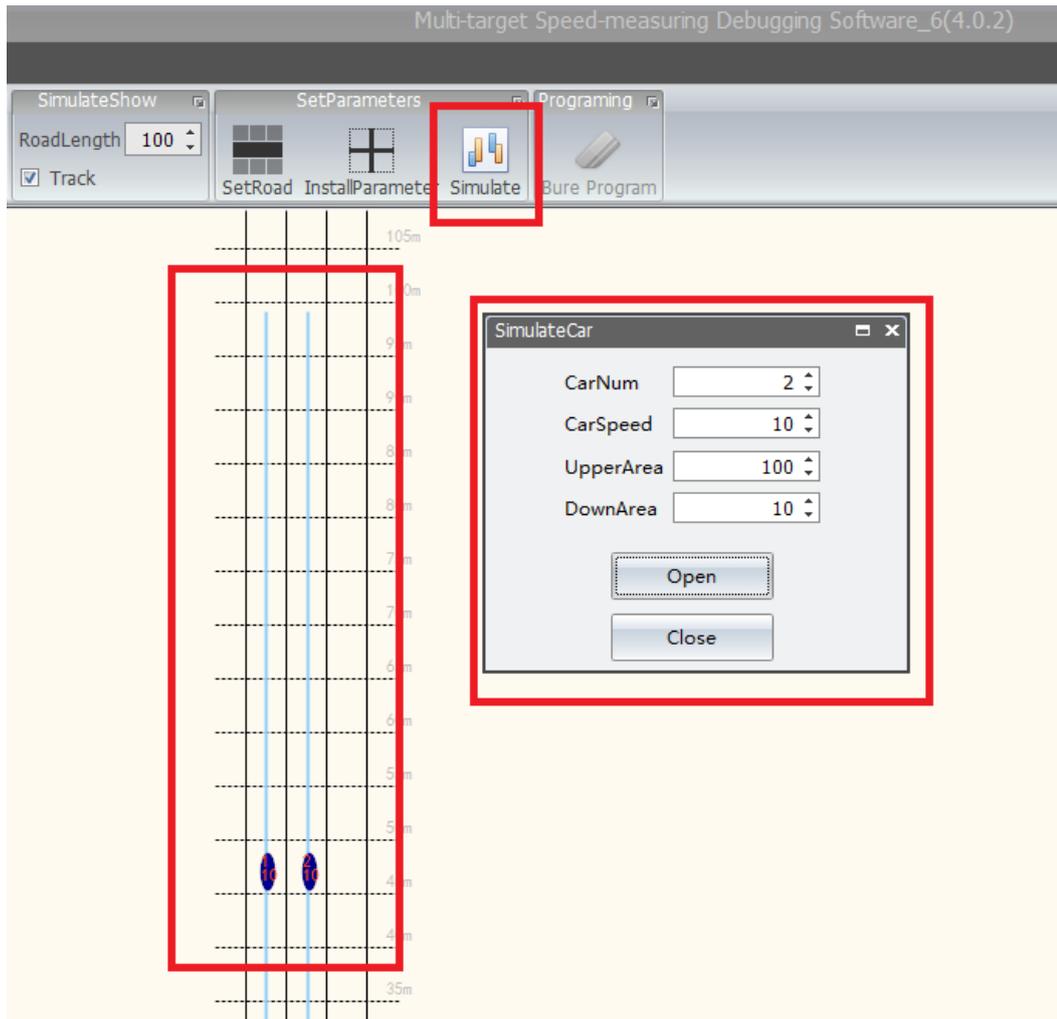


Step 6 Click **Simulate**. In the **SimulateCar** dialog box, set parameters to simulate vehicle passing.



The function is not enabled by default.

Figure 4-6 Simulate vehicle passing



Step 7 Click **SetRoad**. In the **RoadInformation** dialog box, set the following parameters:

Figure 4-7 Road information

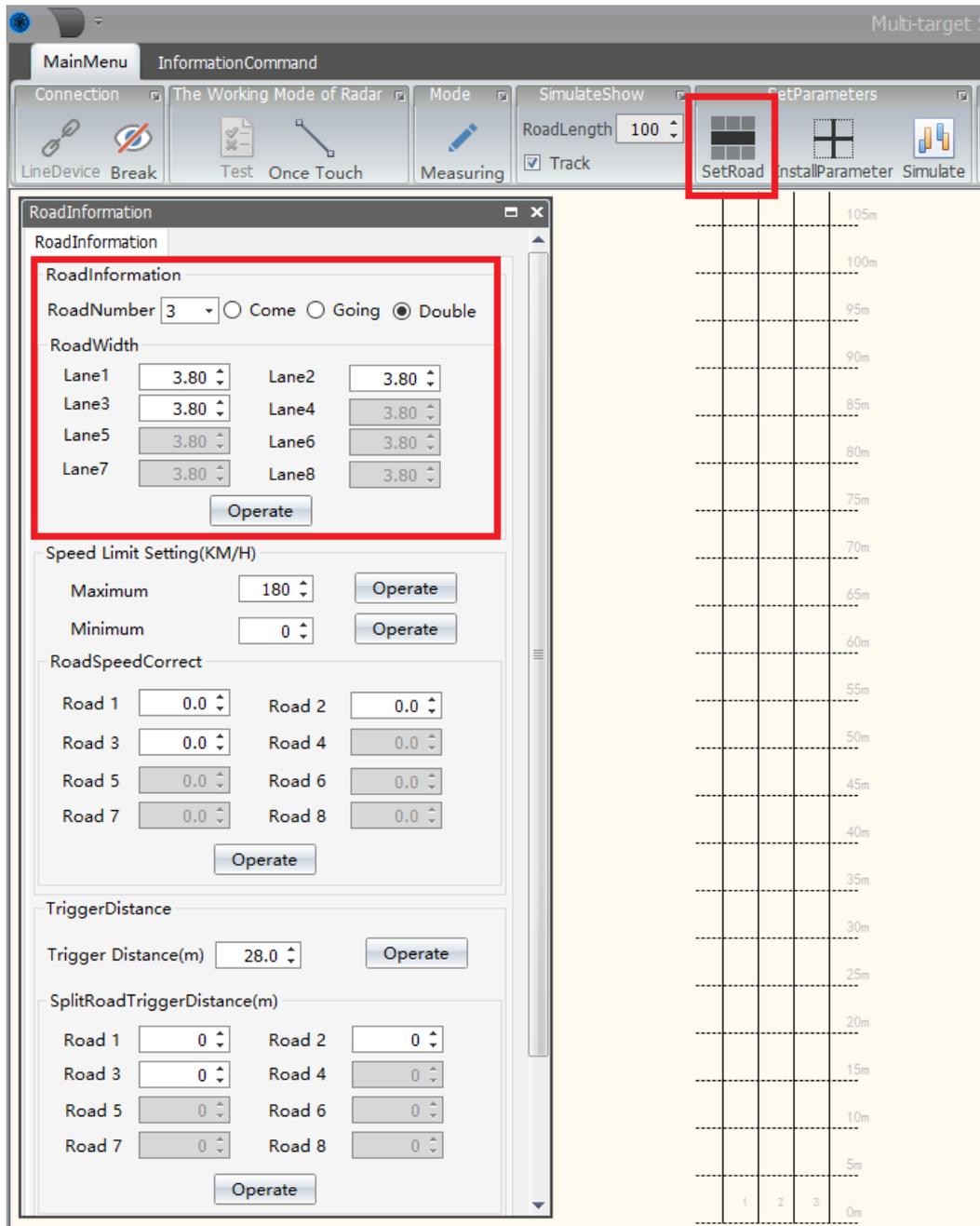


Table 4-1 Road information parameters

Parameter	Description
RoadNumber	The number of lanes.
RoadWidth	The width of the lane.
Come/Going/Double	The road direction.
Maximum	The maximum reported speed of captured targets. If you set the maximum reported speed to 180 km/h, the reported speed of any captured target is 180 km/h even if it runs at a speed of 190 km/h.
Minimum	The minimum reported speed of captured targets. If the speed of a target is lower than the minimum speed, the target is not captured.

Parameter	Description
RoadSpeedCorrect	Enter appropriate values to correct the captured speed. If the overall speed is lower than the actual speed, enter positive values. Otherwise, enter negative values.
TriggerDistance(m)	The trigger distance.
SplitRoadTriggerDistance(m)	Enter appropriate values to correct the specified trigger distance. If the specified trigger distance is shorter than the actual trigger distance, enter negative values. Otherwise, enter positive values.

Step 8 Click **InstalParameter**. In the **Installation** dialog box, set the following parameters:

Figure 4-8 Installation

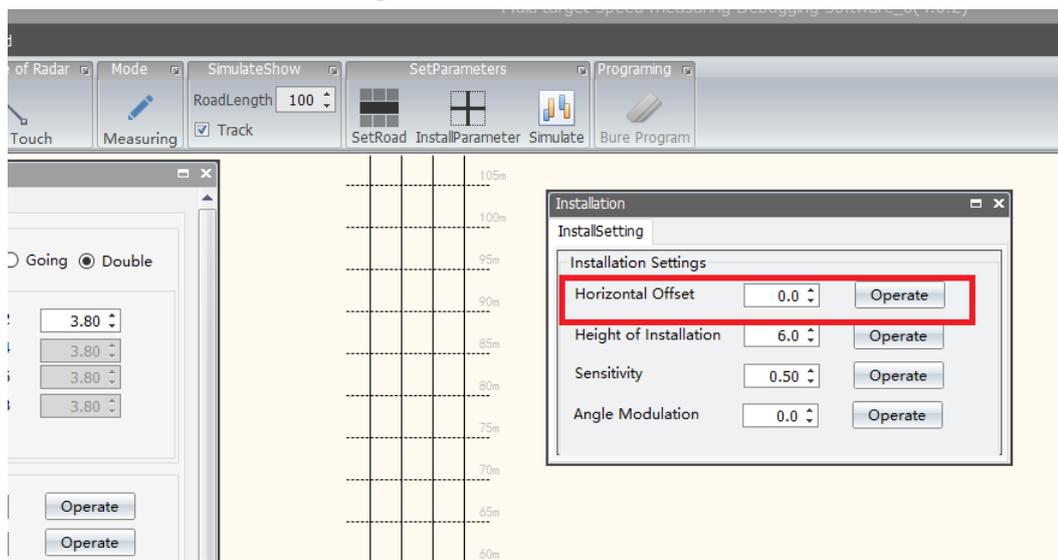
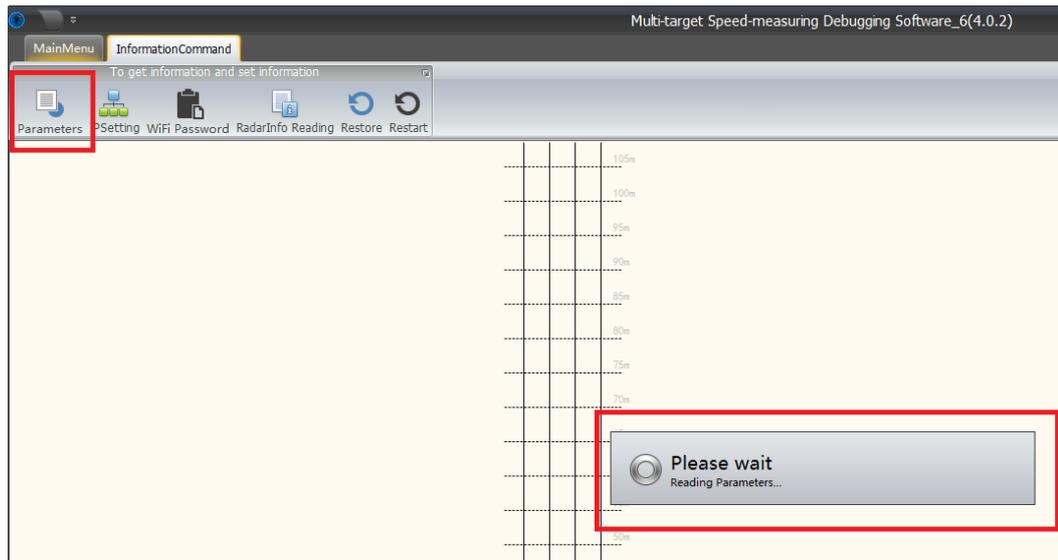


Table 4-2 Installation parameters

Parameter	Description
Horizontal Offset	The horizontal offset. The default value is 0. If you want to move targets to the left, increase the value. Otherwise, decrease the value.
Height of Installation	The installation height.
Sensitivity	The sensitivity of the Radar to detect targets. A lower value indicates higher sensitivity. The default value is 0.5.
Angle Modulation	The default value is 0. In general, the moving track of a target is a straight line. If the track tilts to the left, set the parameter to a positive value. If the track tilts to the right, enter a negative value.

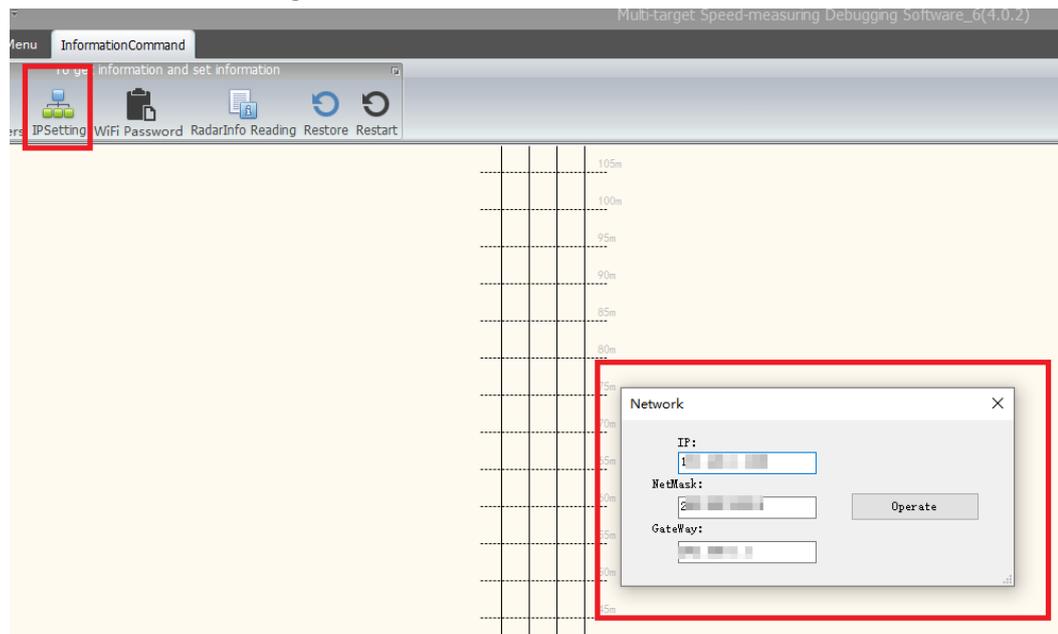
Step 9 Click **InformationCommand**, and then click **Parameters** to read all parameters.

Figure 4-9 Read all parameters



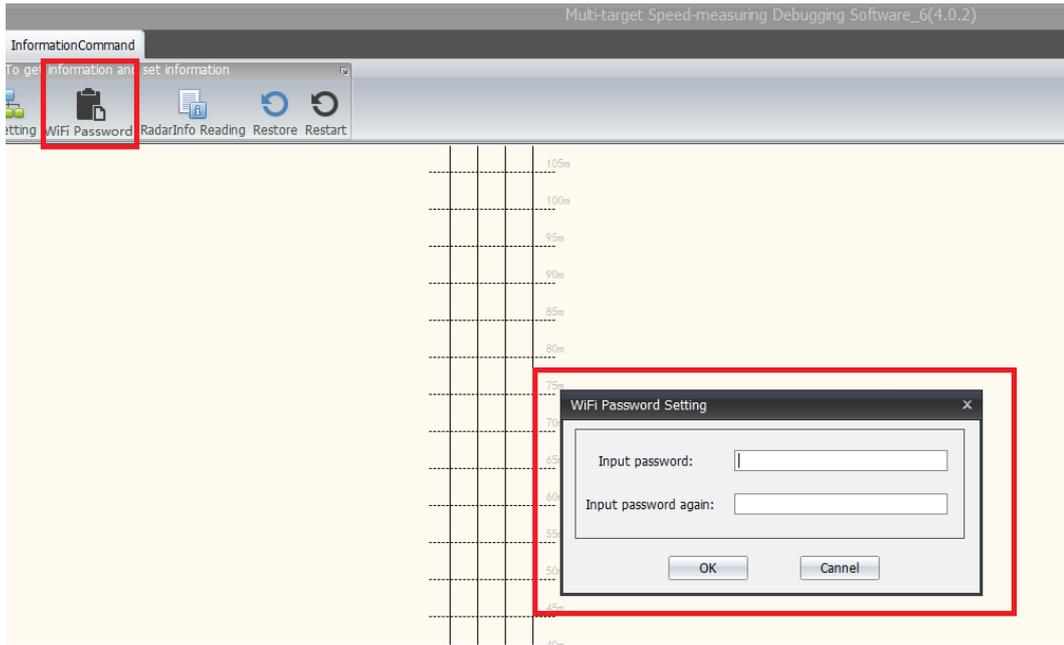
Step 10 Click **IPSetting**. In the **Network** dialog box, set **IP**, **NetMask**, and **GateWay**, and then click **Operate**.

Figure 4-10 Set network information



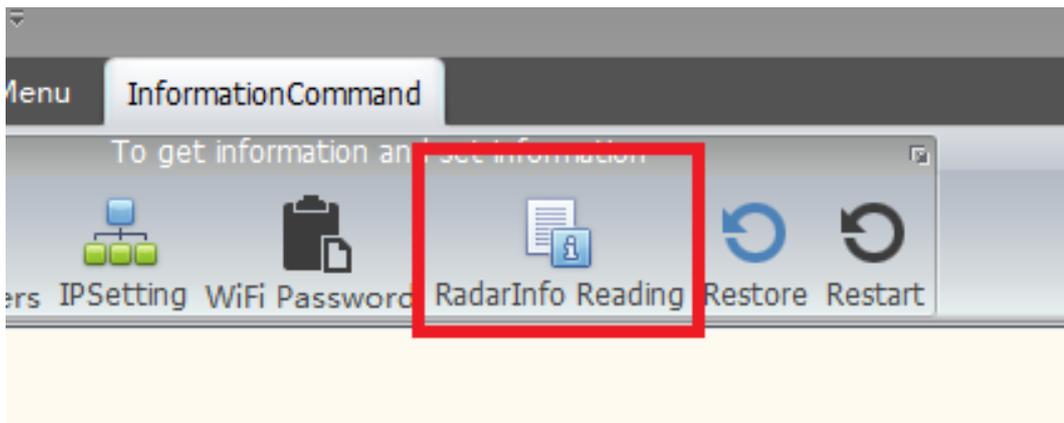
Step 11 Click **WiFi Password**. In the **WiFi Password Setting** dialog box, set the WI-FI password and then click **OK**.

Figure 4-11 Set the WI-Fi password



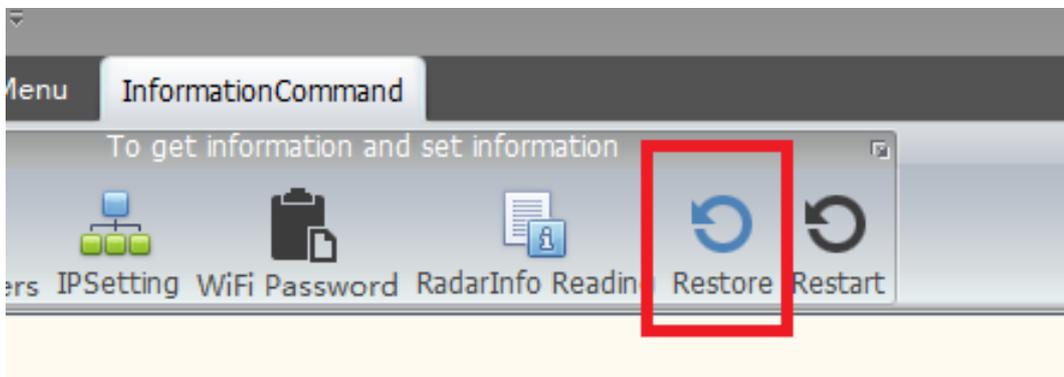
Step 12 Click **RadarInfo Reading** to obtain the serial number of the Radar and the version number of the software.

Figure 4-12 Obtain version information



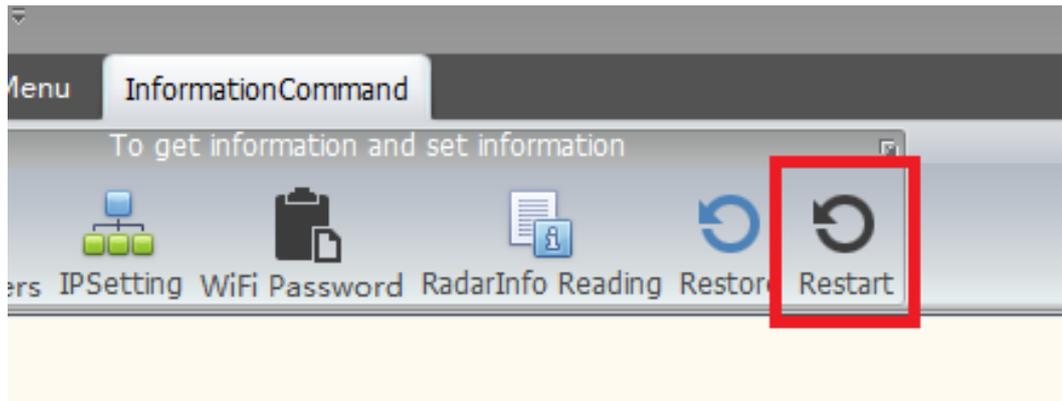
Step 13 Click **Restore** to restore the default settings except for the network information.

Figure 4-13 Restore the default settings



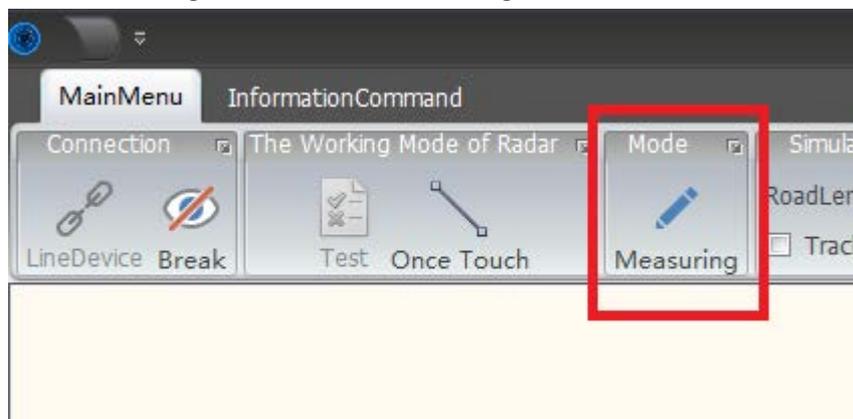
Step 14 Click **Restart** to restart the Radar.

Figure 4-14 Restart the Radar



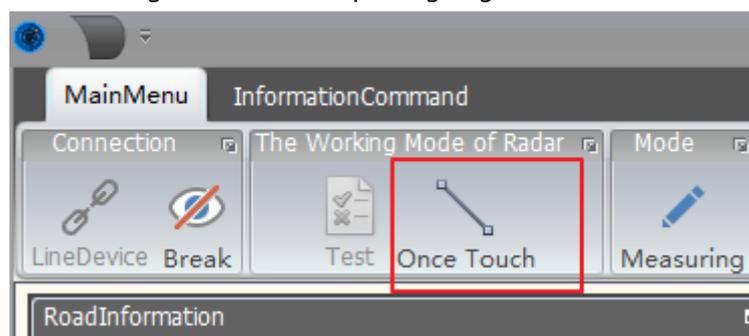
- Step 15** Click **Measuring** to enable measuring mode. After you enable measuring mode, the Radar is automatically started. Then, the Radar can detect the simulated speed of the simulator. If you restart the Radar again, the Radar exits from measuring mode. We recommend you use measuring mode when RS-485 is connected to the host computer.

Figure 4-15 Enable measuring mode



- Step 16** Click **Once Touch** to start capturing targets.

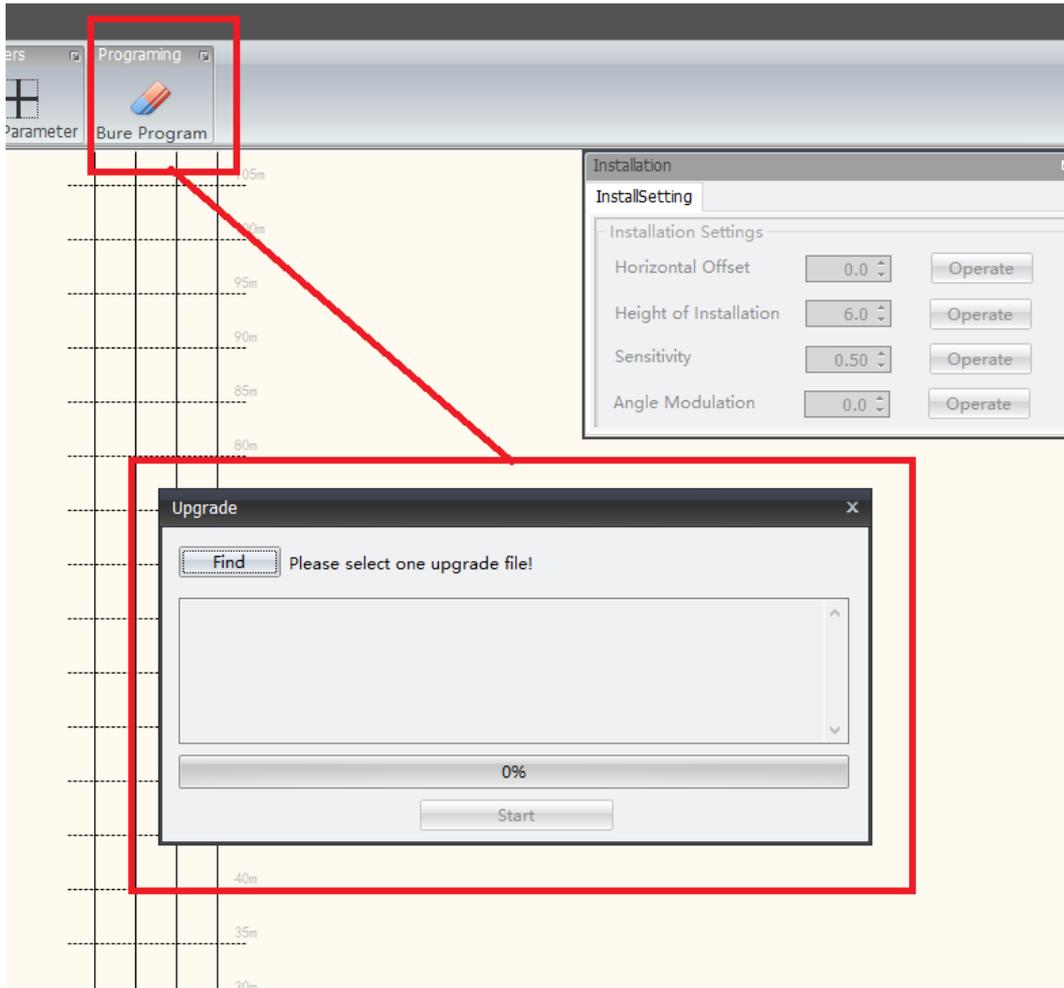
Figure 4-16 Start capturing targets



4.2 Upgrading Firmware

- Step 1** Disconnect the Radar from the host computer. Otherwise, you cannot upgrade the Radar firmware.
- Step 2** Click **Bure Program**, and then select a connection method.
- Step 3** Select a firmware to upgrade, and then click **Start**. After the firmware is upgraded, the Radar is automatically restarted.

Figure 4-17 Select and upgrade a firmware



5 FAQ

1. What can I do if the Radar cannot be found?

- Check whether the Radar is powered on, whether the Radar is connected to the network, whether the Radar IP and computer IP are on the same network segment, whether the Radar is connected to multiple applications in the computer, and whether an application is started multiple times.
- If a wireless network adapter and a local network adapter of your computer are enabled at the same time, you cannot search for or connect to radars by using the computer. In this case, you can disable a network adapter and restart the host computer.



After you modify the network adapter information of your computer, you need to restart the host computer.

2. What can I do if I cannot connect to the Radar in the device list?

- Troubleshoot the issue based on the solution to the first question in FAQ.
- Check whether the information of the Radar is invalid. If yes, delete invalid information.



After you modify the Radar IP or update the parameter file, the information of the Radar becomes invalid.

3. What can I do if the Radar is automatically disconnected?

- Check whether the Radar is powered off, restarted, or updated. If yes, reconnect the Radar to the network.
- Check whether the network is unstable. If yes, improve the network and then reconnect the Radar to the network.

4. What can I do if the actual parameters are inconsistent with parameters in the parameter diagram?

The parameter diagram is a visual graph designed to help you understand the meaning of parameters. If the actual parameters are inconsistent with parameters in the parameter diagram, the actual parameters prevail.

5. What can I do if I am notified of waiting during an upgrade?

Do not perform any operation. If an exception occurs or the update times out, the system ends the upgrade and might provide a solution.

6. What can I do if an upgrade failed?

- Check whether the Radar is connected to the network.
- Check whether files to be upgraded are valid.
- Check whether the power supply is stable. If the Radar is powered off during an upgrade, you need to perform an upgrade again.
- Check whether the network is stable. If the network speed is slow, files might fail to be uploaded.

If you cannot solve the issue by yourself, contact the technical support.

7. What can I do if I cannot connect to the Radar after an upgrade?

If files to be upgraded include a parameter file, the Radar parameters are restored to default

settings. In this case, search for or manually add the Radar, and then reconnect to the Radar.



- Generally, you do not need a parameter file during an upgrade.
- The default IP address is 192.168.1.108, and the default port is 5004.

8. What can I do if the web client of the camera indicates that the Radar fails?

- Check whether the Radar is powered on and whether the voltage is normal.
- Check whether Radar is correctly connected to the RS-485 communication cable.
- Check whether the Radar protocol configured on the camera is valid.

9. What can I do if no speed is reported or some vehicles are not captured when vehicles pass?

- Check whether the Radar faces the middle part of the monitored area.
- Check whether the pitch angle is within an appropriate range.
- Check whether the trigger distance is within an appropriate range.
- Check whether the horizontal angle and lane parameters are correctly configured.

10. What can I do if speeds are reported when no vehicle passes?

- Check whether intense electromagnetic interference or rotating object exists around the Radar.
- Check whether reflectors such as advertising boards and walls exist within the area covered by radar beams.

11. What can I do if moving tracks are abnormal in debugging mode?

- Modify installation parameters and lane parameters.
- Check whether the Radar is fastened. If no, fasten the Radar and then debug the Radar.

Appendix 1 Cybersecurity Recommendations

Cybersecurity is more than just a buzzword: it's something that pertains to every device that is connected to the internet. IP video surveillance is not immune to cyber risks, but taking basic steps toward protecting and strengthening networks and networked appliances will make them less susceptible to attacks. Below are some tips and recommendations from Dahua on how to create a more secured security system.

Mandatory actions to be taken for basic device network security:

1. Use Strong Passwords

Please refer to the following suggestions to set passwords:

- The length should not be less than 8 characters.
- Include at least two types of characters; character types include upper and lower case letters, numbers and symbols.
- Do not contain the account name or the account name in reverse order.
- Do not use continuous characters, such as 123, abc, etc.
- Do not use overlapped characters, such as 111, aaa, etc.

2. Update Firmware and Client Software in Time

- According to the standard procedure in Tech-industry, we recommend to keep your device (such as NVR, DVR, IP camera, etc.) firmware up-to-date to ensure the system is equipped with the latest security patches and fixes. When the device is connected to the public network, it is recommended to enable the "auto-check for updates" function to obtain timely information of firmware updates released by the manufacturer.
- We suggest that you download and use the latest version of client software.

"Nice to have" recommendations to improve your device network security:

1. Physical Protection

We suggest that you perform physical protection to device, especially storage devices. For example, place the device in a special computer room and cabinet, and implement well-done access control permission and key management to prevent unauthorized personnel from carrying out physical contacts such as damaging hardware, unauthorized connection of removable device (such as USB flash disk, serial port), etc.

2. Change Passwords Regularly

We suggest that you change passwords regularly to reduce the risk of being guessed or cracked.

3. Set and Update Passwords Reset Information Timely

The device supports password reset function. Please set up related information for password reset in time, including the end user's mailbox and password protection questions. If the information changes, please modify it in time. When setting password protection questions, it is suggested not to use those that can be easily guessed.

4. Enable Account Lock

The account lock feature is enabled by default, and we recommend you to keep it on to guarantee the account security. If an attacker attempts to log in with the wrong password several times, the corresponding account and the source IP address will be locked.

5. Change Default HTTP and Other Service Ports

We suggest you to change default HTTP and other service ports into any set of numbers between

1024–65535, reducing the risk of outsiders being able to guess which ports you are using.

6. **Enable HTTPS**

We suggest you to enable HTTPS, so that you visit Web service through a secure communication channel.

7. **MAC Address Binding**

We recommend you to bind the IP and MAC address of the gateway to the device, thus reducing the risk of ARP spoofing.

8. **Assign Accounts and Privileges Reasonably**

According to business and management requirements, reasonably add users and assign a minimum set of permissions to them.

9. **Disable Unnecessary Services and Choose Secure Modes**

If not needed, it is recommended to turn off some services such as SNMP, SMTP, UPnP, etc., to reduce risks.

If necessary, it is highly recommended that you use safe modes, including but not limited to the following services:

- SNMP: Choose SNMP v3, and set up strong encryption passwords and authentication passwords.
- SMTP: Choose TLS to access mailbox server.
- FTP: Choose SFTP, and set up strong passwords.
- AP hotspot: Choose WPA2-PSK encryption mode, and set up strong passwords.

10. **Audio and Video Encrypted Transmission**

If your audio and video data contents are very important or sensitive, we recommend that you use encrypted transmission function, to reduce the risk of audio and video data being stolen during transmission.

Reminder: encrypted transmission will cause some loss in transmission efficiency.

11. **Secure Auditing**

- Check online users: we suggest that you check online users regularly to see if the device is logged in without authorization.
- Check device log: By viewing the logs, you can know the IP addresses that were used to log in to your devices and their key operations.

12. **Network Log**

Due to the limited storage capacity of the device, the stored log is limited. If you need to save the log for a long time, it is recommended that you enable the network log function to ensure that the critical logs are synchronized to the network log server for tracing.

13. **Construct a Safe Network Environment**

In order to better ensure the safety of device and reduce potential cyber risks, we recommend:

- Disable the port mapping function of the router to avoid direct access to the intranet devices from external network.
- The network should be partitioned and isolated according to the actual network needs. If there are no communication requirements between two sub networks, it is suggested to use VLAN, network GAP and other technologies to partition the network, so as to achieve the network isolation effect.
- Establish the 802.1x access authentication system to reduce the risk of unauthorized access to private networks.
- Enable IP/MAC address filtering function to limit the range of hosts allowed to access the

device.

More information

Please visit Dahua official website security emergency response center for security announcements and the latest security recommendations.

ENABLING A SAFER SOCIETY AND SMARTER LIVING

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