



The World-Leading LiDAR and Solution Provider

**LSLiDAR Upper Computer Platform
Operation Manual
V3.0.0**

[https:// www.lslidar.com/](https://www.lslidar.com/)

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1. Foreword

This document is for the detailed description of the Windows Client Software V3.0 developed by Leishen Intelligent System Co., Ltd.

1.1. Applicable Range

Upper Computer Platform (or Windows Client) (V3.0) is a host computer software to view point cloud image under Windows operating system, which is also referred to as "point cloud display software". Simple functions like parameter configuration, lidar test and fault detection can be realized through the software.

1.2. Software Installation

This software can only run under the Windows x64 operating system at present. The computer configuration requirements for installing the software are: CPU: Intel(R) Core (TM) i5 or higher; Graphics Card: NVIDIA GeForce GTX750 or higher achieves the best effect, otherwise the display of the point cloud may be affected. And the computer graphics card must support OpenGL 2 or higher graphics acceleration to display the point cloud normally. And to use the Upper Computer Platform, it is necessary to install the **Npcap** third-party library, which is also included in the Upper Computer Platform installation files package.

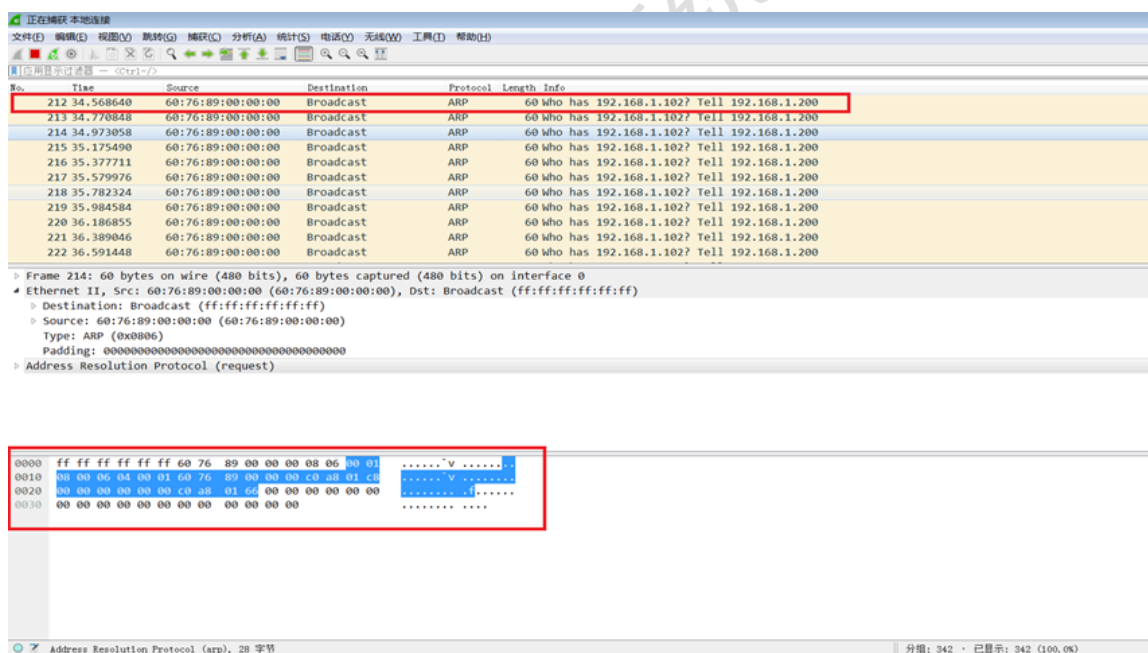
1.3. LiDAR Connection

	IP Address	UDP Device Package Port	UDP Data Package Port
LiDAR	192.168.1.200	2368 (Fixed)	2369 (Fixed)
Computer	192.168.1.102	2369	2368

- 1) The original IP address of the LiDAR is 192.168.1200, the destination IP is 192.168.1.102, default data package port is 2368, device package port is 2369. If the above settings are not modified, please set the IP address of the host computer as 192.168.1.102 and subnet mask as 255.255.255.0 in

the Network Settings. The user can change the IP address later if needed, and please note the IP address of other devices in the controlling end such as host computer should also be changed accordingly to be in the same network segment with the LiDAR.

If the IP address of the LiDAR is changed and it is not in the same network segment with the computer, the gateway needs to be set. If they are in the same network segment, it just needs to set a different IP, such as 192.168.1.x, gateway: 255.255.255.0. If you need to find the Ethernet configuration information of the lidar, please connect the lidar to the computer and use “Wireshark” to capture the ARP packet of the device for analysis. For the feature identification of the ARP packet, see the figure below.



Note: Wireshark is a third-party software, and you may need to download it by yourself. Leishen Intelligent bears no responsibility for any copyright and commercial disputes caused by users' use of the software.

- 2) Please disable the virtual network card when using SDK to avoid receiving interrupting data;

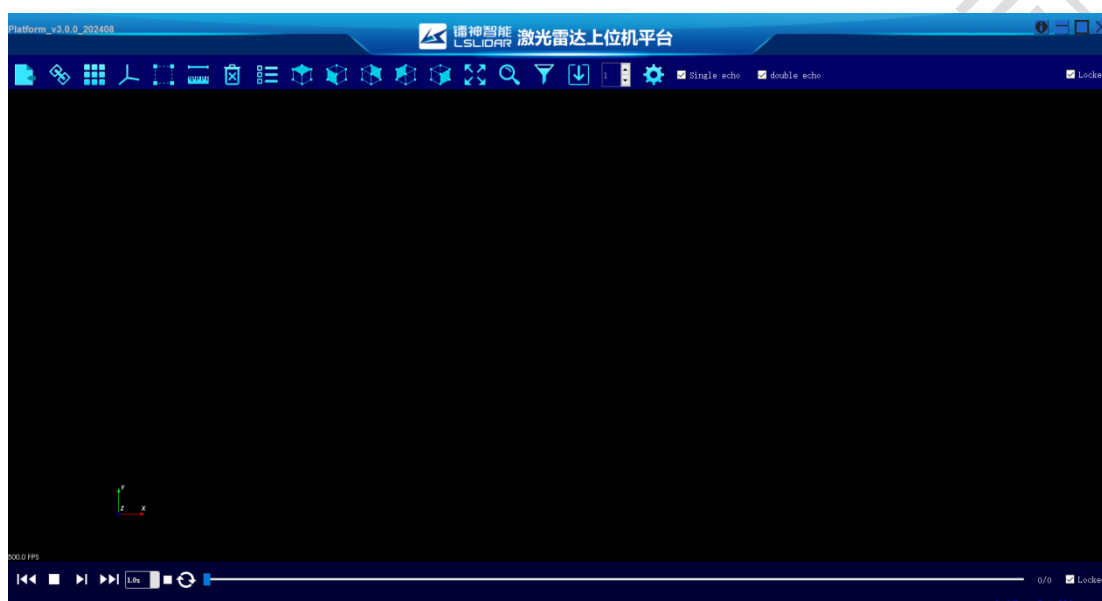
- 3) When using the Visual Studio, use the “release” mode in priority to reduce data jamming, reading and writing delay.

深圳市镭神智能系统有限公司

2. Software Introduction

This part states operation instructions of the Upper Computer Platform developed by the Leishen Intelligent System Co., Ltd. Please note that you need to press down the middle mouse button to move the home interface or sub-interface, and do not click any headline text on that interface.

2.1. Home Interface



2.1.1. Interface Introduction

- The top bar includes the current software version, software name, company icon, operation instruction manual, minimize, maximize and close button;
- The middle menu bar includes offline data packet, LiDAR connection, grid display, coordinates axis display, point cloud selecting, distance ranging, data clear, data column display, view switch, full screen display, point cloud zoom in, data filtering, data saving, data size adjustment, LiDAR parameters display, echo mode (only available when the LiDAR support multiple echoes), menu lock, and lock and hide operation bar.
- **Point Cloud Display Interface:** the LiDAR data are displayed in 3D coordinates (XYZ) to present the surroundings around it;

- **Offline Data Operation Bar:** playback, pause play (available for both online data and offline data), end play, play speed setting, loop playback, offline display progress bar, frame number display, lock and hide operation bar;
- **Status Information Bar:** status information, company official website.

2.1.2. Functions Descriptions

Button	Descriptions
	Open offline data: to parse and play the offline PCAP and PCD data
	Parse the LiDAR data in real time: to connect the LiDAR, parse the data in real time, display point cloud
	Grid display: to display the grid to show the form of the point cloud better
	Coordinates display: to display coordinates and change the angle of view to observe point cloud
	Select: to select specific point cloud data
	Distance ranging: to range the distance between two points
	Clear: to clear the grid, coordinates and selected point cloud
	Data column display: to display the real-time data refresh (if specific points cloud are selected, only these points cloud would be displayed)
	Switch to top view
	Switch between the front view and rear view
	Switch between the left view and right view
	Full screen display: to display the point cloud in full screen
	Zoom in point cloud to observe the details
	Filtering: to filter data
	Download: to save the point cloud locally; the supported data type: PCAP, CSV, PCD, LAS
	Point cloud size: to set the size of the point cloud
	Parameters settings: view and modify the current LiDAR parameters, including IP address, port number, timing source.
	Switch echo mode when LiDAR is under multiple-echo mode: all echoes, only single echo, only double echo

☒ double echo	
☒ Locked	Lock the menu: to lock the menu if check it and hide it if unchecked. Press the left mouse key and slide upward to show the menu bar again if hided

2.1.3. Offline Data Operation

Once the offline data is opened, the icon is used for playing or pausing the offline data (it also applies to online data). Other buttons are only available for offline data display.

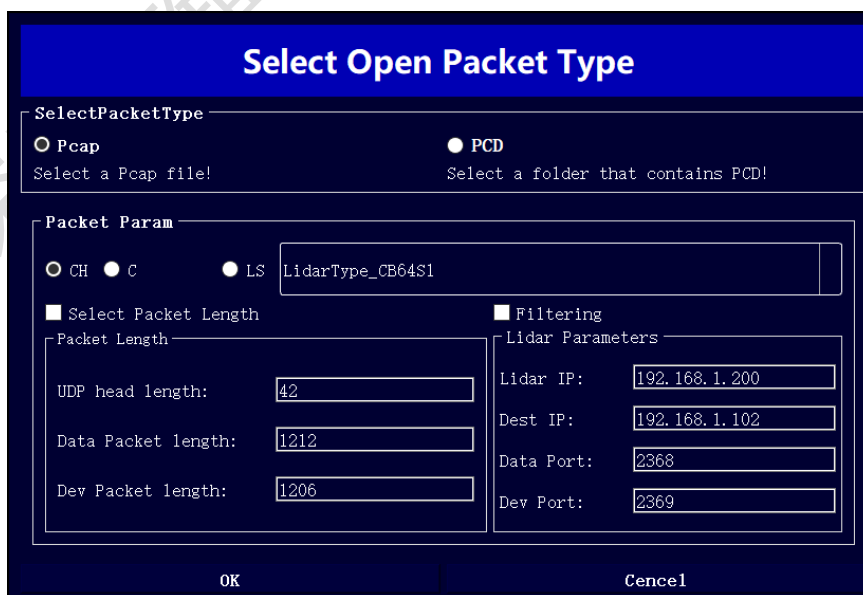
Button	Descriptions
	- When play online data: when the icon is , it means the data play is paused, and user can view the data details. The icon will turn to  once click it again, and the interface will continue to play the data and refresh the LiDAR data in real time. - When play offline data: when the icon is , it means the data play is paused, and user can view the data details. The icon will turn to  once click it again, and the interface will continue to play the offline data.
	- When play online data: when the icon is , it is displaying the real-time data. The icon will turn to  once click it again, it will stop playing new data. - When play offline data: when the icon is , it is playing offline data. The icon will turn to  once click it again, it will stop playing offline data.
	- When play data: click it to rewind. - When data play is paused: click it to skip back to the previous frame.
	Stop playing data: click it to end the play of offline data
	- When playing, click it to fast forward - When paused, click it to skip to the next frame of data
	Play speed: to control the speed of playing offline data, it supports 0.5x, 0.75x, 1x, 2x, 2.5x speed.
	Loop playback: click it to enable loop playback. After the play is finished, it will play the data again if the box is checked, otherwise it will stop. The play will stop once click  when it is in loop playback.
	Progress bar: display the current progress.
	Data frame progress display: the value in the left shows the current frame position; the value in the right shows the frame number of the whole packet.
☒ Locked	Lock button: check it to lock the operation bar and hide it with unchecking it. Holding the left mouse key and slide upward to show it again.

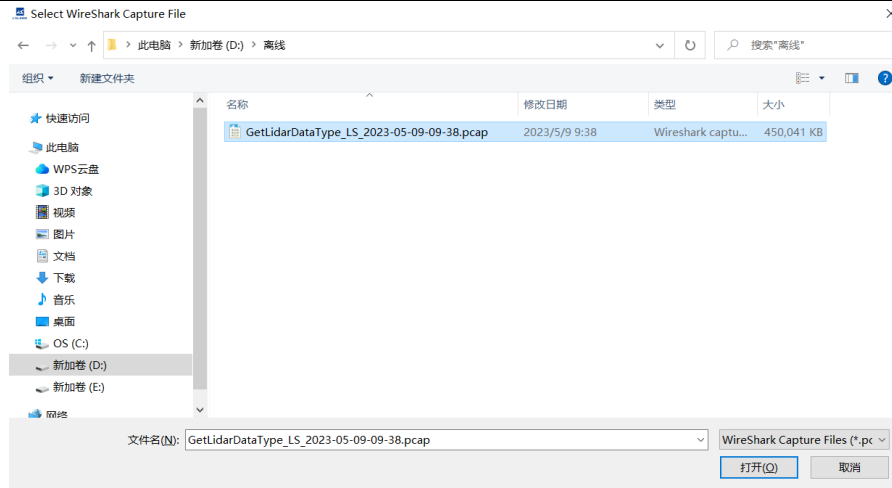
2.2. Functions Details

2.2.1. Offline Data

Click  to bring the secondary menu. Now the software supports playing the offline data in PCAP and PCD format.

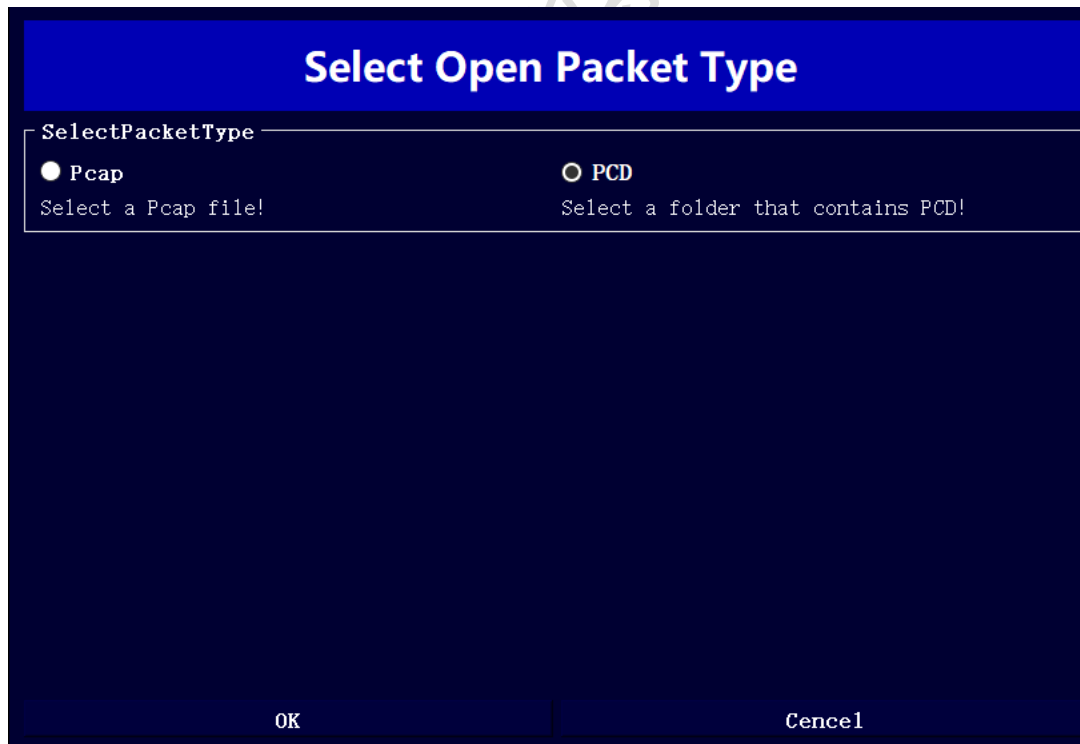
- 1) Choose PCAP bag to play.
- Firstly choose PCAP. Secondly, choose LiDAR type: 905 nm (CH series), mechanical LiDAR (C series), 1550 nm LiDAR (LS series), and then choose the corresponding LiDAR model (if not sure about the LiDAR model, please contact the technical support as selecting the incorrect model will cause incorrect point cloud display).
 - Select “Packet Length” to define the length of offline data packet and “Filtering” to filter the LiDAR IP and port. If unchecked, the packet will be opened in a default way and will not be judged (Note: it doesn’t require checking for normal data packet, just use the default way to play offline data).
 - Click “OK” to open the path on the computer that saved the offline data packet and click the .PCAP file.

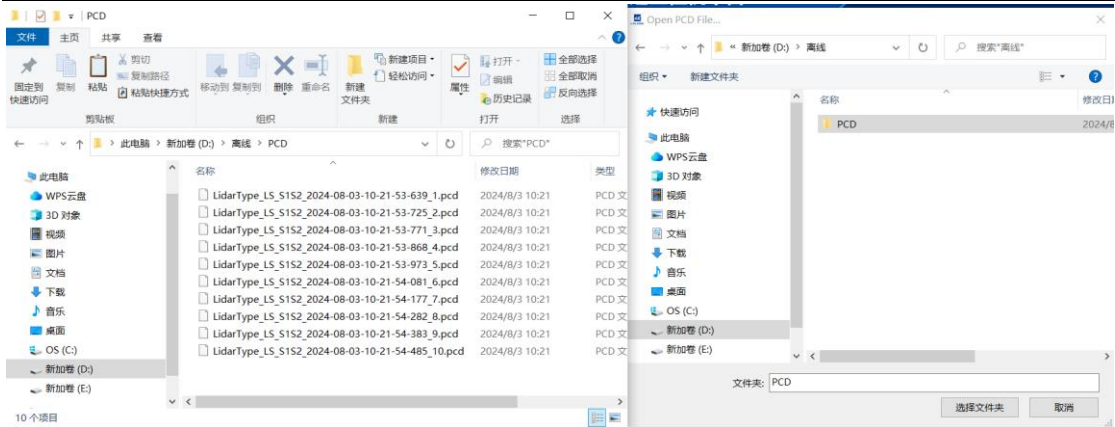




2) Choose PCD packet to play:

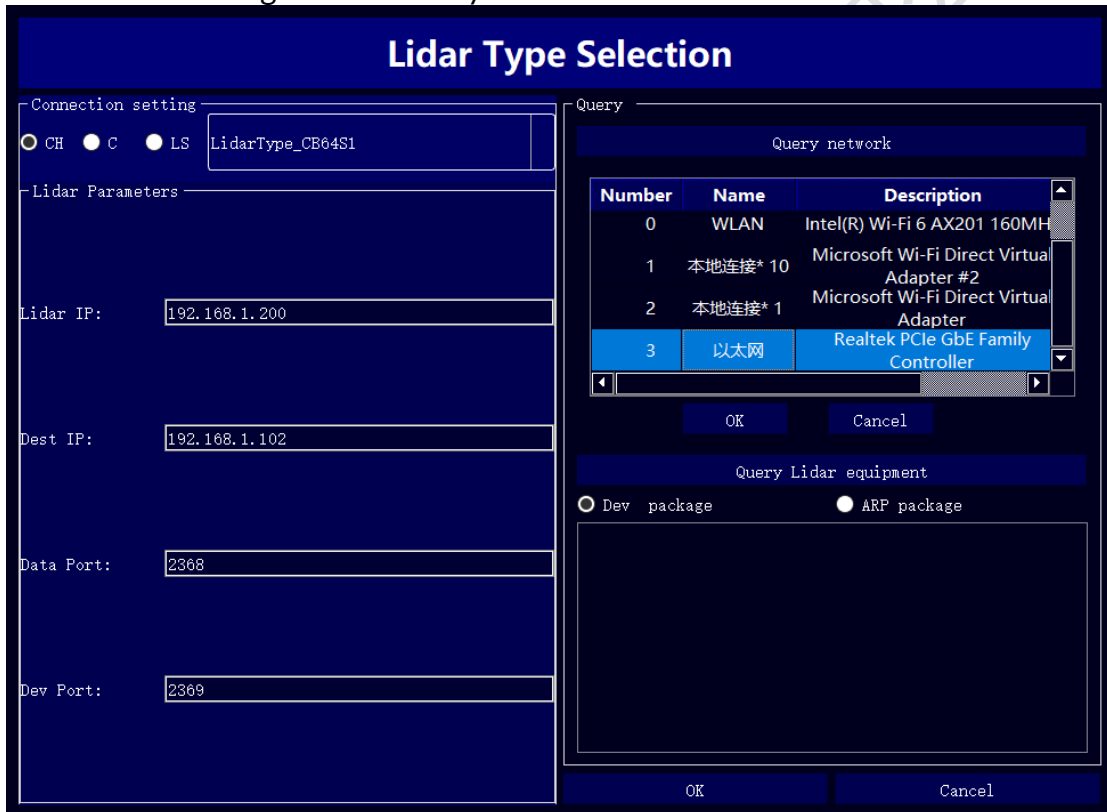
- Firstly choose PCD;
- Click OK to open the path on the computer that saved the offline data packet. Multiple PCD files are saved in one file folder and you can select the file folder.

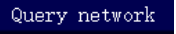




2.2.2. Online Data Connection

Click  to bring the secondary menu.



- 1) The “Query” function on the upper-right corner is to query the current network card. Select the corresponding network card and click “OK”. If the incorrect network card is selected, please click  to query all network cards and then choose the correct one.

Note: If there is no network card settings choice, please check if the Npcap library is installed and make sure there is no other PCAP library. Selecting LiDAR model is a necessary step, please select the LiDAR model first.

- 2) The “Connection Settings” on the upper left is to select LiDAR model: Firstly, choose LiDAR type: 905 nm (CH series), mechanical LiDAR (C series), 1550 nm LiDAR (LS series). Secondly, choose the corresponding LiDAR model (if not sure about the LiDAR model, please contact the technical support as selecting the incorrect model will cause incorrect point cloud display).

If you know the LiDAR IP, destination IP, data package port, device package port, you can fill them in the left and then click “OK” (no other operation is required). **If you don't know there parameters, please follow the methods below to query them.**

- 3) Click **Query Lidar equipment** to query connected LiDAR after selecting network card.

Dev package: the computer IP has been set to the LiDAR's destination IP, and the LiDAR can receive data package and device package normally.

Query the current LiDAR IP and port through device package: the LiDAR's MAC address shows on the list. Select the corresponding LiDAR, then its IP and port will show on the left.

ARP package: The LiDAR IP is not clear and the computer doesn't receive the data package and device package.

Through ARP: query the computer IP that LiDAR accesses, LiDAR MAC address will show on the list. Select the corresponding LiDAR settings, the LiDAR IP and destination IP will show on the left.

注意：ARP 方式查询不到端口为 0；修改电脑 IP 后，雷达正常发送数据后，可按照“通过设备包”的方式再次查询；

Note: it cannot query the port through ARP when it is 0. After changing computer IP and the LiDAR can sent data normally, it can use the method of “through device package” to query it again;

- 4) After selecting the corresponding LiDAR, click “OK” to connect the LiDAR

in real time, then the icon will become .The LiDAR model will show

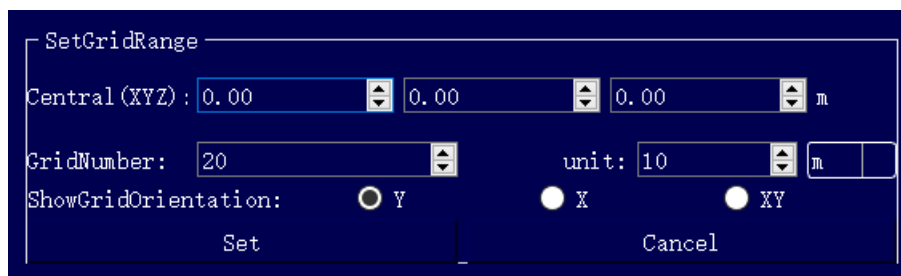
on the top left of the software.

Platform_v3.0.0_202408

LidarType_LS_S3 -180-B -0 Single display -Single Echo

2.2.3. Grid Display

Click the  and the secondary menu will pop up.



SetGridRange

Central (XYZ): 0.00 0.00 0.00 m

GridNumber: 20 unit: 10 m

ShowGridOrientation: ☒ Y ☐ X ☐ XY

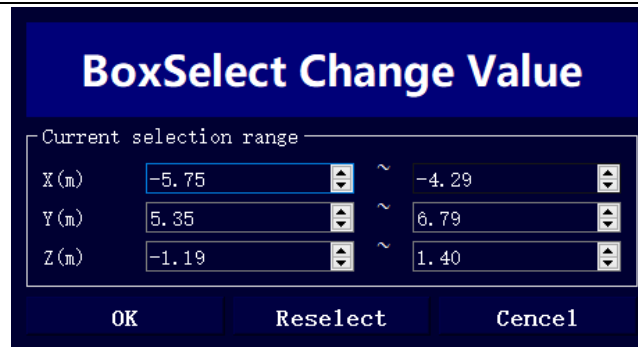
Set Cancel

- 1) Central (XYZ): choose the center coordinates point and the grid will display; the coordinates of default origin point is (0,0,0).
- 2) Grid Number: choose the number of grid.
- 3) Unit: choose the grid spacing size, the unit can be meter (m) or centimeter(cm) which is available in the drop-down list.
- 4) Show Grid Orientation: show the unit information of the grid, choose X axis ,Y axis or both axis to display.
- 5) Click "Set" to confirm settings.

2.2.4. Selecting Point Cloud

Click  for selecting point cloud:

- When click  selecting for the first time, the mouse pointer will become a cross to select the data;
- After selecting and click  again, the secondary menu will pop up;



- 1) XYZ shows the range value that is selected last time, the unit is meter and it can be modified;
- 2) Click "OK" after modification, the range can be expanded or narrowed;
- 3) Click "Reselect" to reselect data;
- 4) Click "Cancel" to close the window.

2.2.5. Ranging Distance Between Two Points



After click the icon :

- Press the "shift" key and click two points successively with left mouse key, then the distance between two points can be ranged;

Note: please make sure click two points in display, it is invalid to click blank position;



- Click the icon again to exit "ranging distance".



2.2.6. Data Column Display

Click , the data column, which is hidden by default, will show on the left. Click the icon again to hide it. The selected data can be viewed here.

	Channel	XYZ	H_angle	V_angle	Dis
1	0	2.714 2.639 0.830	45.802	12.363	3.876
2	0	2.746 2.682 0.841	45.674	12.358	3.930
3	0	2.681 2.630 0.823	45.544	12.358	3.845
4	0	2.678 2.639 0.824	45.414	12.358	3.849
5	0	2.673 2.647 0.824	45.283	12.358	3.851
6	0	2.668 2.654 0.825	45.154	12.358	3.853
7	0	2.676 2.673 0.829	45.024	12.358	3.872
8	0	2.625 2.634 0.815	44.894	12.358	3.807
9	0	2.609 2.631 0.812	44.763	12.358	3.793
10	0	2.610 2.642 0.814	44.644	12.358	3.802
11	1	2.571 2.582 0.667	44.870	10.370	3.704
12	0	2.606 2.651 0.815	44.513	12.358	3.806
13	1	2.574 2.597 0.669	44.739	10.370	3.717
14	2	2.647 2.681 0.757	44.627	11.361	3.843
15	0	2.592 2.648 0.812	44.384	12.355	3.793
16	1	2.566 2.602 0.669	44.611	10.367	3.715
17	2	2.647 2.694 0.759	44.498	11.361	3.852
18	3	2.617 2.642 0.614	44.723	9.373	3.769
19	0	2.614 2.683 0.820	44.254	12.355	3.834
20	1	2.523 2.569 0.659	44.481	10.367	3.660

2.2.7. Data Filtering

Click the  to bring the secondary menu, it supports filtering LiDAR horizontal angle, vertical angle, distance, intensity, coordinates XYZ, channel No..

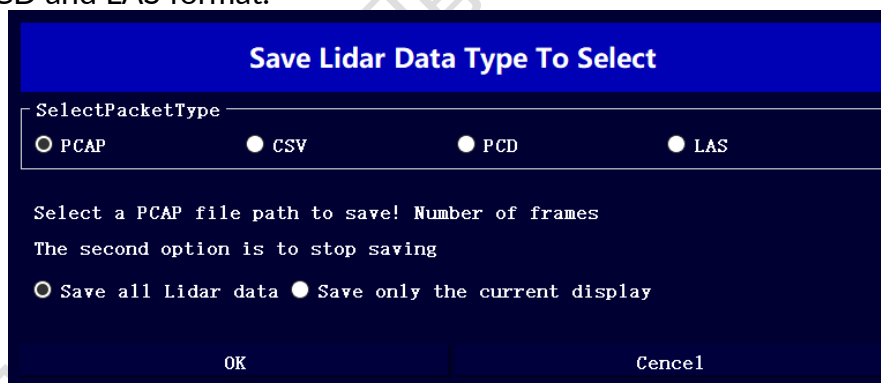
- Choose one function or functions combination to filter by checking them.
Please make sure that you checked them before filtering. The range will be limited by the parameter values set in the box.
- Check the corresponding channel No. to display.
- Click “OK” to display filtered point cloud.



2.2.8. Data Download



Click  to bring the secondary menu, it supports saving files in PCAP, CSV, PCD and LAS format.



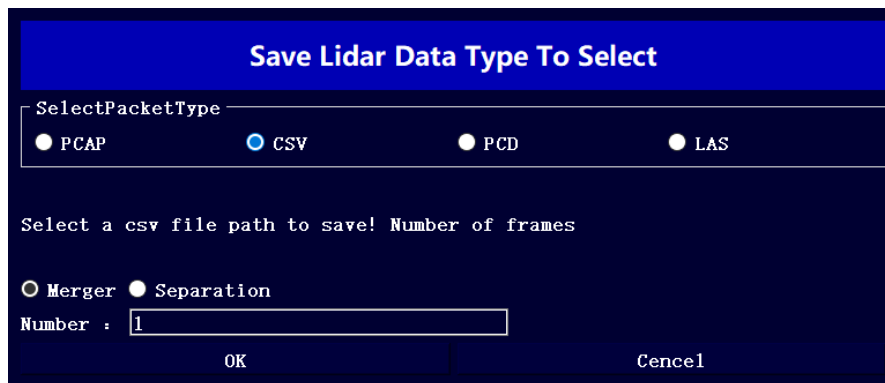
1) Here are two ways to save PCAP data:

- Save the LiDAR data received by the selected network card.
- Save the LiDAR data that is connected currently and filter out other LiDAR data.

Note: when there is only one LiDAR connected, the effect is the same.

- Click "OK" to save; click  again to stop saving.

2) Here are two ways to save CSV data:



- Number: select the number of frame to be saved;

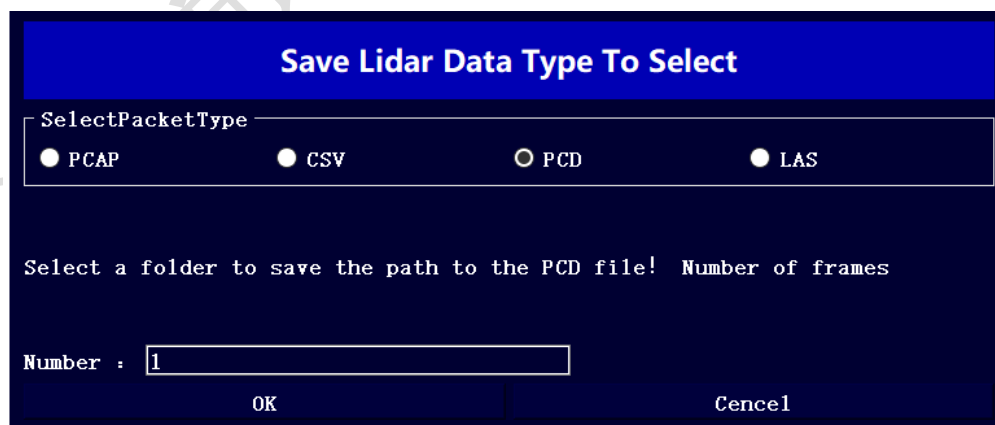
If the current frame of point cloud is paused, the current frame is saved, otherwise, the next frame of data is saved after confirmation. If specific point cloud are selected, then they will be saved, otherwise a complete frame of data is saved.

- Here are two ways to save data: :

Merger: save all frames of data in one file in CSV format;

Separation: choose one folder to save each frame of data, then they will be saved in one file in CSV format.

3) Save PCD data:



- Choose one file folder, number: the number of frame to be saved.

4) Save LAS data:

Save Lidar Data Type To Select

SelectPacketType

☐ PCAP
☐ CSV
☐ PCD
☒ LAS

Select a folder to save the path to the LAS file! Number of frames
The second option is to stop saving

OK
Cancel

Choose one file folder, click “OK” to save, and click  again to stop saving.

2.2.9. Parameters Settings

Click  to bring the secondary menu:

Parameter Setting

Param1
Param2

Laser Config

Lidar IP:

Data Port:

Computer IP:

Equipment Port:

Moto RPM:

Moto State:

Mac:

Source Selection:

Phase Angle Locked:

Phase Locked Status:

Standby mode:

Gateway IP:

Subnet mask IP:

Laser State

PhaseLockDeviation:

PTP Status:

GPS time:

Moto RPM:

GPS:Longitude:

GPS:latitude:

Left_Regulated:

Right_Regulated:

GPS Status:

PPS Status:

Cover_Dirt_info:

Cover_Dirt_Energy:

Cover_Dirt_Initial:

Cover_Dirt_Count:

setAddress1: writel: readl:

Refresh state
Cancel

Note: only after selecting the correct LiDAR type in the settings of “LiDAR connection”, can you open the second level interface;

- There are different settings interface between different LiDAR models;

- After modifying the parameters of corresponding LiDAR, click “Set” to send UDP package to modify.

2.2.10. Software Version

Click  to bring the secondary menu:



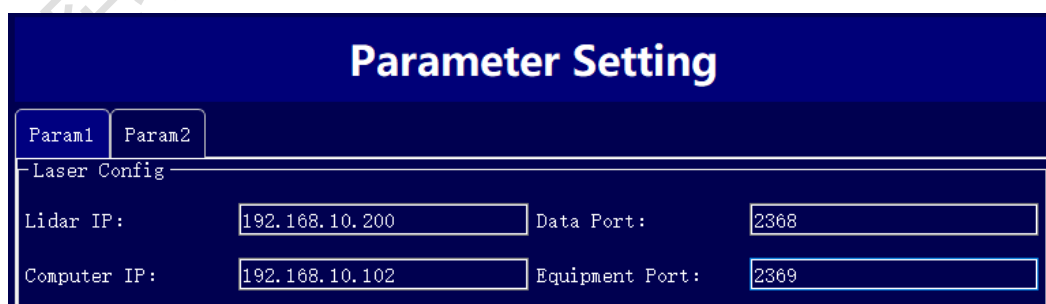
Note: only after selecting the correct LiDAR type in the settings of “LiDAR connection” , can you open the second level interface;

- There are different settings interface between different LiDAR models;
- It shows the current FPGA version and hardware version of the LiDAR.

2.3. Communication Mode

2.3.1. Unicast Settings

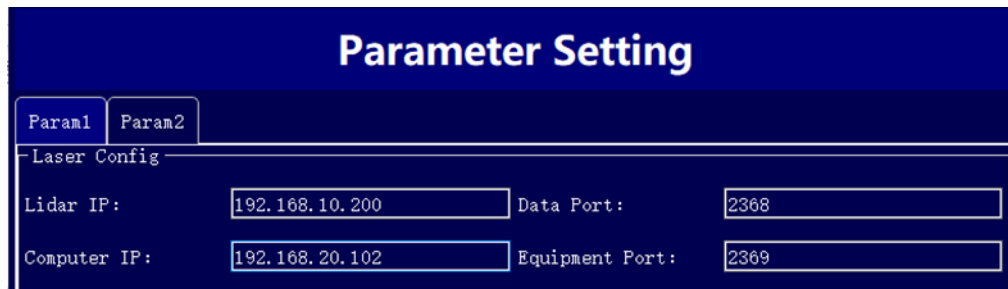
- 1) The LiDAR IP address and the computer IP address are in the same network segment.



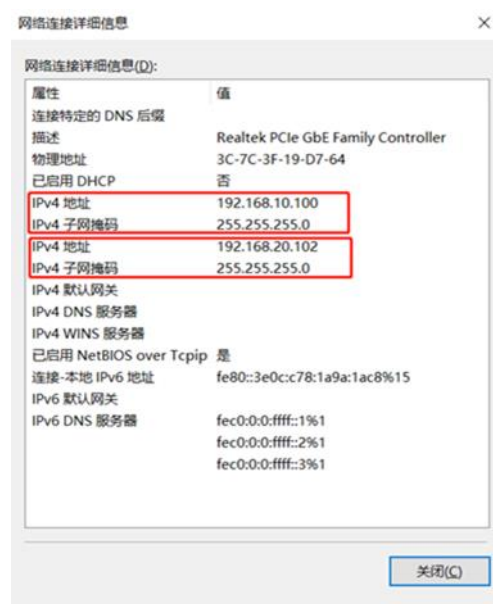
- 2) Cross-network segment

The LiDAR IP address and the computer IP address can be used in different

network segments. When modifying, the network configurator needs to contain the LiDAR IP and computer IP segments.



Parameter Setting			
Param1		Param2	
Laser Config			
Lidar IP:	192.168.10.200	Data Port:	2368
Computer IP:	192.168.20.102	Equipment Port:	2369

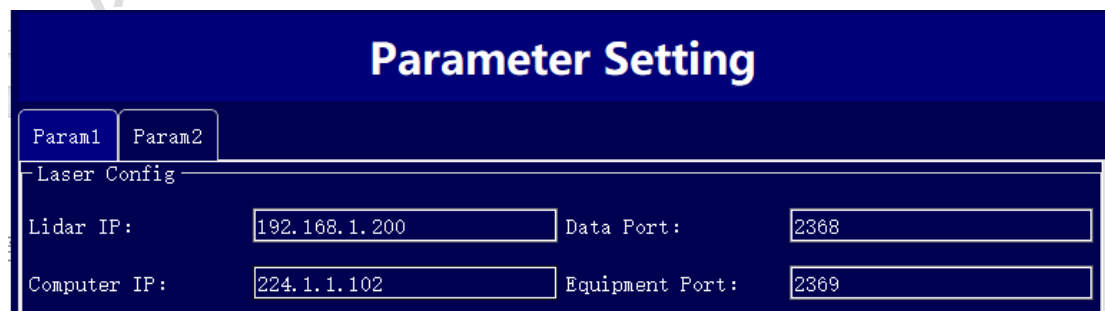


网络连接详细信息(D):	
属性	值
连接特定的 DNS 后缀	
描述	Realtek PCIe GbE Family Controller
物理地址	3C-7C-3F-19-D7-64
已启用 DHCP	否
IPv4 地址	192.168.10.100
IPv4 子网掩码	255.255.255.0
IPv4 地址	192.168.20.102
IPv4 子网掩码	255.255.255.0
IPv4 默认网关	
IPv4 DNS 服务器	
IPv4 WINS 服务器	
已启用 NetBIOS over Tcpip	是
连接-本地 IPv6 地址	fe80::3e0c:c78:1a9a:1ac8%15
IPv6 默认网关	
IPv6 DNS 服务器	fec0:0:0::1%1
	fec0:0:0::2%1
	fec0:0:0::3%1

2.3.2. Multicast Settings

The computer IP is the address of the multicast group. The Class D IP address is for multicast: 224.0.0.0 - 239.255.255.255.

The default subnet mask is 0.0.0.0 and the default gateway is 0.0.0.0. No need to configure the subnet mask or the gateway



Parameter Setting			
Param1		Param2	
Laser Config			
Lidar IP:	192.168.1.200	Data Port:	2368
Computer IP:	224.1.1.102	Equipment Port:	2369

2.3.3. Broadcast Settings

Under the broadcast mode, the computer IP address is the broadcast address, and the LiDAR IP address and the computer IP address are in the same network segment. Then the subnet mask should be configured as 255.255.255.0, and the default gateway is 0.0.0.0.

Parameter Setting			
Param1	Param2		
Laser Config			
Lidar IP:	192.168.1.200	Data Port:	2368
Computer IP:	192.168.1.255	Equipment Port:	2369

3. Cautions

■ Notice about the lidar setting and usage:

- 1) It is not possible to use Upper Computer Platform to receive data in two processes (open twice at the same time) on the same computer. The port occupancy of the PC is generally exclusive, so the other software that uses the same process or the same port number cannot work normally after a process is bound to a specified port number. When the software detects that the port is occupied, it will prompt that the communication network port configuration has failed, and automatically close the software. You need to close the software process that occupied the port, and re-run the software to use it normally.

At the same time, since Qt is adopted in the low-level software development, please create English paths when naming files and path folders.

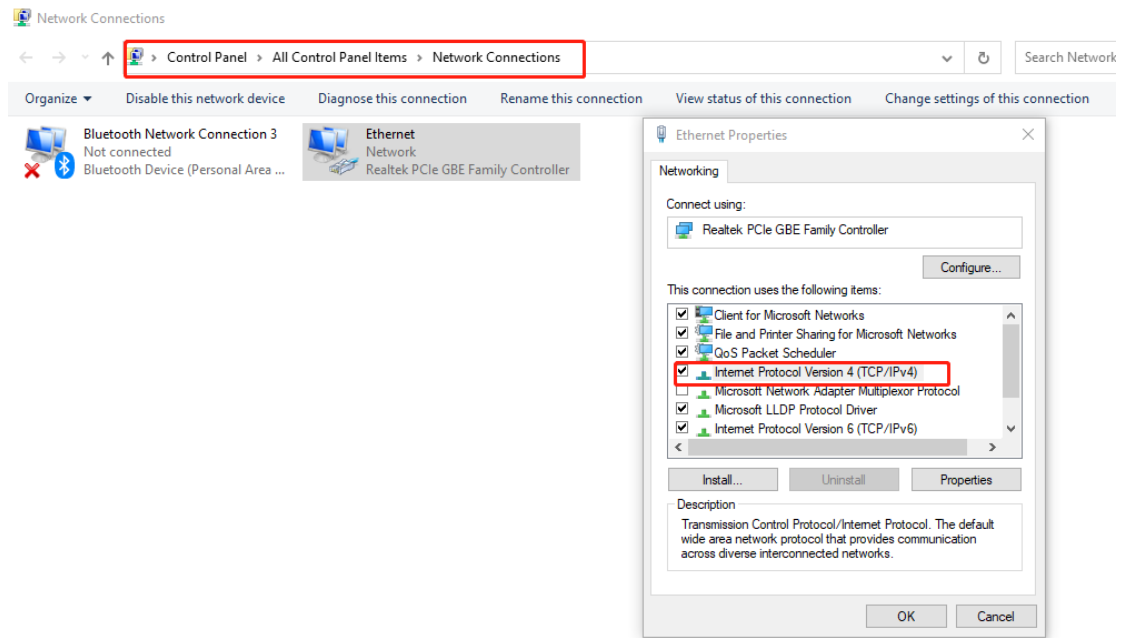
- 2) Since the port number of the LiDAR can be modified through user configuration, and the lidar sends data to the host computer through the preset destination IP and port. Therefore, when the local laptop or desktop computer and other devices are receiving data, their IP address should be the same as the destination IP, and the port bound to the local host computer program needs to be the same as the destination port number, as shown in the figure below (these are the data packet parameters captured and analyzed by Wireshark software). The data in the red boxes indicate the destination IP and port number of the LiDAR

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.200	192.168.1.102	UDP	1254	2369 → 2368 Len=1212
2	0.000603	192.168.1.200	192.168.1.102	UDP	1254	2369 → 2368 Len=1212
3	0.000602	192.168.1.200	192.168.1.102	UDP	1254	2369 → 2368 Len=1212
4	0.000606	192.168.1.200	192.168.1.102	UDP	1254	2369 → 2368 Len=1212
5	0.000599	192.168.1.200	192.168.1.102	UDP	1254	2369 → 2368 Len=1212

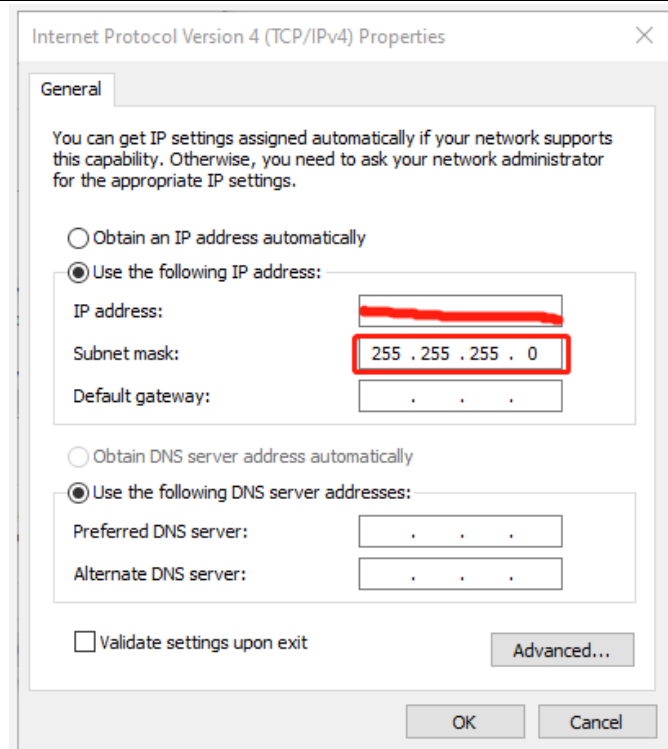
Please set the host computer IP according to the following steps:

Step 1. In the Control Panel -> All Control Panel Items -> Network Connections, click the “Ethernet” icon.

Step 2. Click “Properties” in the pop-up status box, and click “TCP/IPv4 protocol” in the pop-up Ethernet properties box, as shown in the figure below.



Step 3. In the TCP/IPv4 property settings, set the IP address to the LiDAR's destination IP (The default destination IP of the LiDAR is 192.168.1.102), and the subnet mask is set to 255.255.255.0.



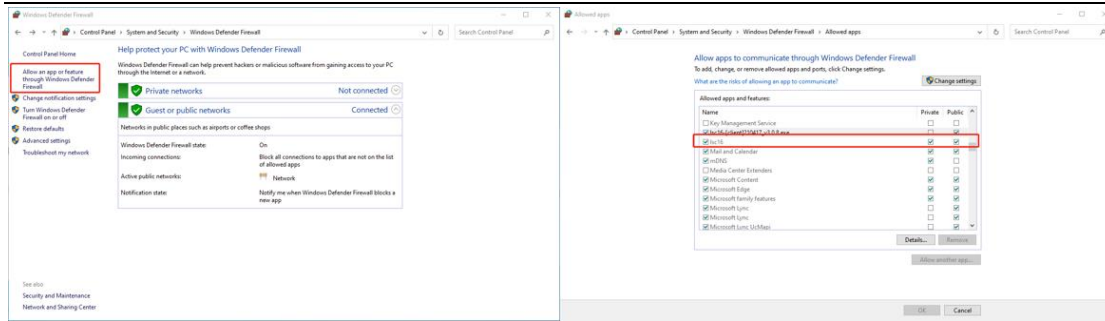
- 3) Since the Upper Computer Platform needs to obtain a large number of data packets through the network in a short time, it may be considered as a malicious program by the network firewall and be prohibited. Therefore, there may be situations in which the data packet has been sent to the computer by the Wireshark software, but the client cannot display it.

To address this problem, in Control Panel->System and Security->Windows Firewall Settings, click to allow this program to pass through Windows Firewall, setting steps are as shown in the figures below:

Step 1. In Control Panel -> System and Security -> Windows Defender Firewall, click "Allow an app or feature through the Windows Defender Firewall".

Step 2. Browse to find the software installation path, select it and click OK.

Step 3. Tick the part marked in the red box according to the nature of your network, and click OK to see the data.



● Computer graphics settings

When installing the Windows Client on a desktop or laptop with dual graphics cards, the default global settings of the computer operating system is to use the global settings (automatic selection: integrated graphics), which affects the display efficiency of the software. To ensure the use and display efficiency of the software, you need to manually set the computer graphics.

The condition of dual graphics cards can be checked in the computer configuration, and the condition of the display adapter can be seen in My Computer->Properties->Device Manager.

Take a laptop with Intel(R)HD Graphics 530 integrated graphics and NVIDIA GeForce GTX 960 discrete graphics as an example. The setting steps to manually switch the applicable graphics card of the software to high-performance discrete graphics card are as follows:

Step 1. Right-click on a blank space on the desktop to pop up a right-click menu and select "NVIDIA Control Panel".

Step 2. Select the "Manage 3D Settings" in the NVIDIA Control Panel interface.

Step 3. Click the "Program Settings" button in the Manage 3D Settings interface.

Step 4. Click the "Add" button on the Manage 3D Settings interface.

Step 5. Click the "Browse" button in the pop-up interface.

Step 6. Find the application file (.exe file) of the software according to its installation path in the pop-up browsing interface.

Step 7. Click “OK” to automatically return to the NVIDIA control panel, select the high-performance NVIDIA processor in the combo box of the preferred graphics processor for this program in Option -2., and click “Apply” in the lower right corner.

- After the computer application is set, close the NVIDIA Control Panel to complete the setting.

Revision History:

Ver.	Revised Date	Revised Content	Revised By	Note
V3.0.0	2024/08/13	Initial Version	LSJ	/

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