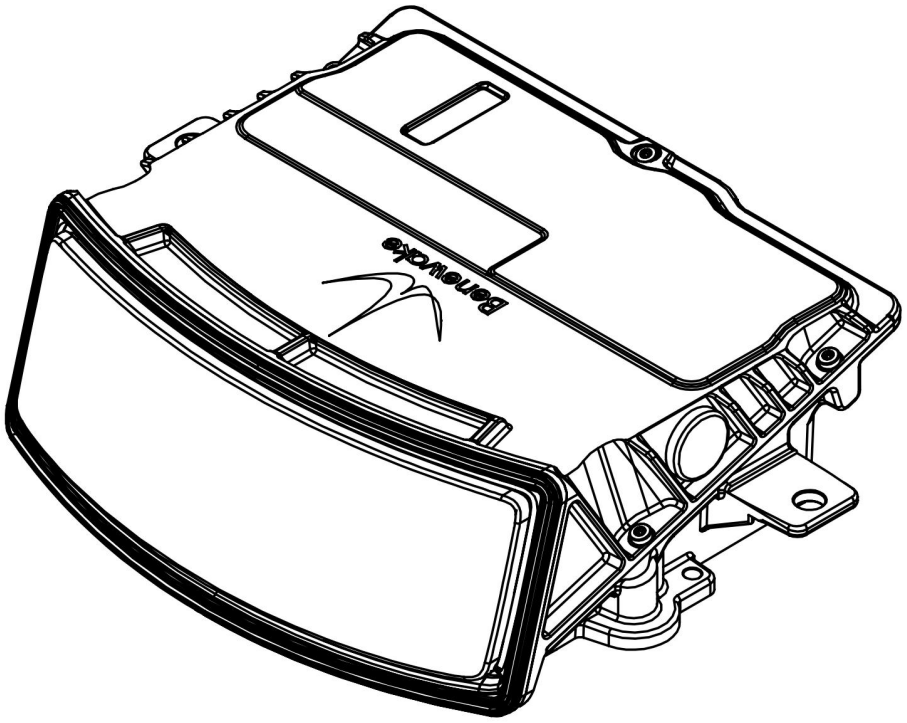
Benewake

Benewake LiDAR Viewer GUI User Manual



Contents

1 Brief Introduction

1.1 Objective

The purpose of this article is to explain the basic functions, operation methods and precautions of Benewake LiDAR Viewer GUI (hereinafter referred to as **BLV**).

1.2 System Introduction

BLV is a GUI software used by AD2 LiDAR, which is mainly used for real-time display, recording and playback of point cloud data. BLV is compiled on the Windows 10 platform, and it is recommended to install and use it on Windows 10 and above systems.

1.3 Terms and Abbreviations

Terms and abbreviations	Meaning
IP	The IP address of the network protocol used by the LiDAR communication
MDOP	Primary data transfer port
DCSP	Device control command transmission port
DSOP	The port where the device status information is transmitted
*.pcd	A file format in which the GUI saves point cloud data, which can be directly read and played back by the GUI
*.csv	The GUI saves a file with this format for point cloud data, which can be viewed directly in Excel or Word
*.pcap	A file format in which the GUI saves point cloud data, which can be directly read and played back by the GUI.

Table. 1: Terms and abbreviations

1.4 Precautions before use

1. Before using the LiDAR, you need to change the IP address of your computer.

   Network and Internet → Ethernet → Change adapter options → Properties → Internet Protocol version 4 (TCP/IPv4), set the host IP address to remain on the same network segment as the LiDAR IP address (i.e., segment 0), subnet mask 255.255.255.0, and host IP address used in this instruction manual is 192.168.0.10 (the last byte is different from the IP address of the connected device).

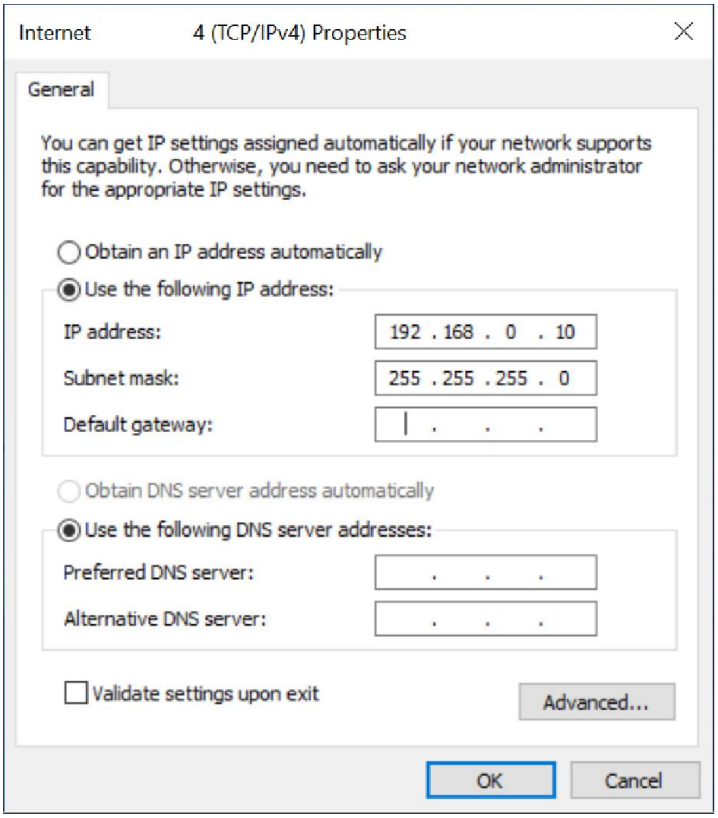


Figure. 1: Configuring IP address

1. Make sure that your computer's firewall is turned off (this is optional: if you can't connect properly, try this step again). Control Panel → System and Security → Windows Defender → Turn on/off Windows Defender Firewall.

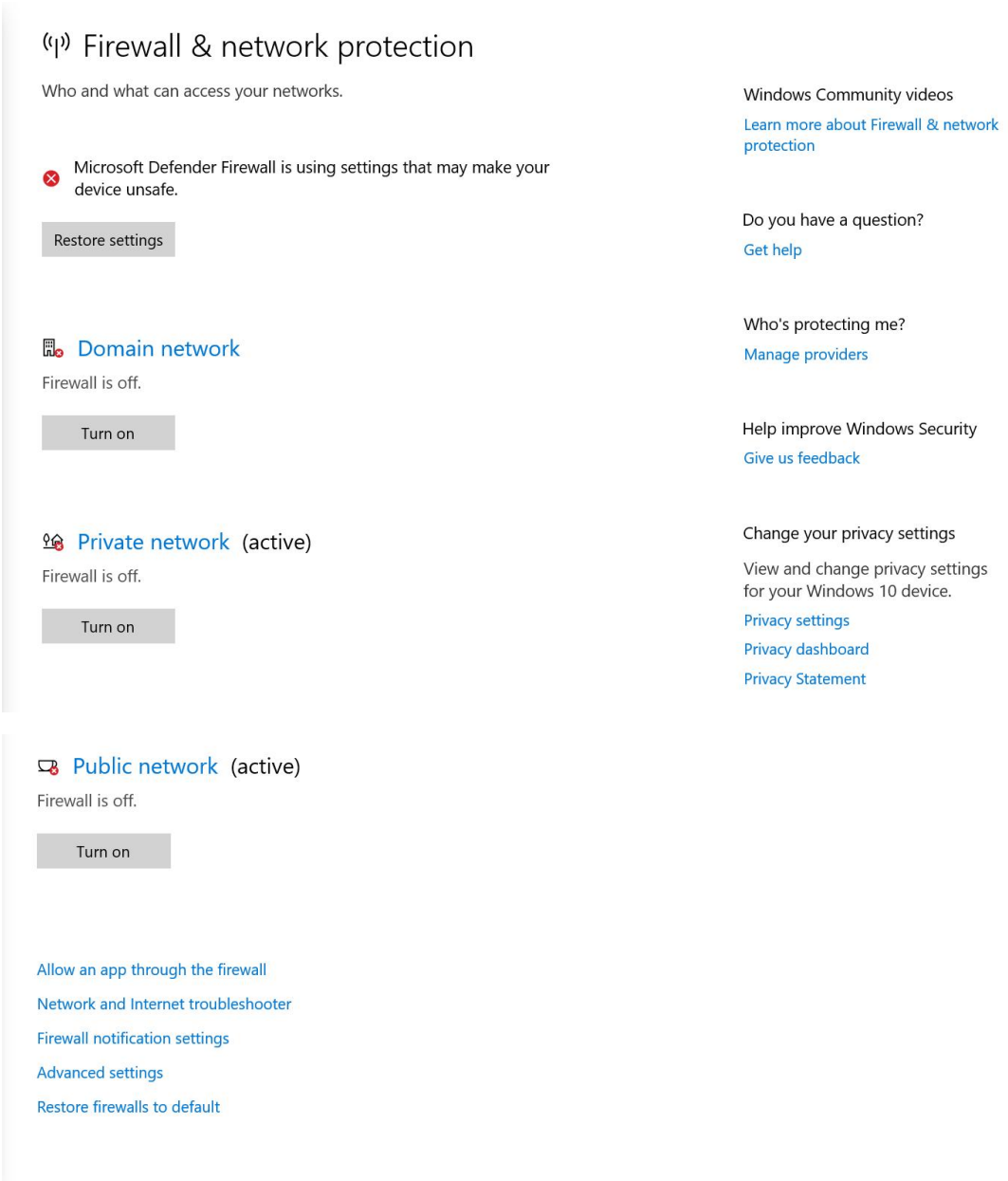
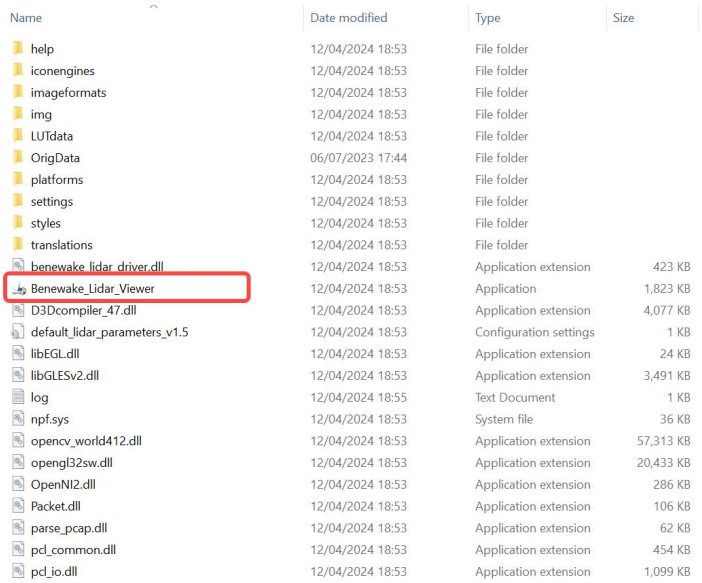


Figure. 2: Turning off firewall

2 File Structure

BLV file structure (part of the file) as shown in the figure, double-click **Benewake_LiDAR_Viewer.exe** to open the GUI program.



Name	Date modified	Type	Size
help	12/04/2024 18:53	File folder	
iconengines	12/04/2024 18:53	File folder	
imageformats	12/04/2024 18:53	File folder	
img	12/04/2024 18:53	File folder	
LUTdata	12/04/2024 18:53	File folder	
OrigData	06/07/2023 17:44	File folder	
platforms	12/04/2024 18:53	File folder	
settings	12/04/2024 18:53	File folder	
styles	12/04/2024 18:53	File folder	
translations	12/04/2024 18:53	File folder	
benewake_lidar_driver.dll	12/04/2024 18:53	Application extension	423 KB
Benewake_Lidar_Viewer	12/04/2024 18:53	Application	1,823 KB
D3Dcompiler_47.dll	12/04/2024 18:53	Application extension	4,077 KB
default_lidar_parameters_v1.5	12/04/2024 18:53	Configuration settings	1 KB
libEGL.dll	12/04/2024 18:53	Application extension	24 KB
libGLESv2.dll	12/04/2024 18:53	Application extension	3,491 KB
log	12/04/2024 18:55	Text Document	1 KB
npf.sys	12/04/2024 18:53	System file	36 KB
opencv_world412.dll	12/04/2024 18:53	Application extension	57,313 KB
opengl32sw.dll	12/04/2024 18:53	Application extension	20,433 KB
OpenNI2.dll	12/04/2024 18:53	Application extension	286 KB
Packet.dll	12/04/2024 18:53	Application extension	106 KB
parse_pcap.dll	12/04/2024 18:53	Application extension	62 KB
pcl_common.dll	12/04/2024 18:53	Application extension	454 KB
pcl_io.dll	12/04/2024 18:53	Application extension	1,099 KB

Figure. 3: Screenshot of file structure

3 Interface Introduction

The main interface of BLV is shown in the following figure:

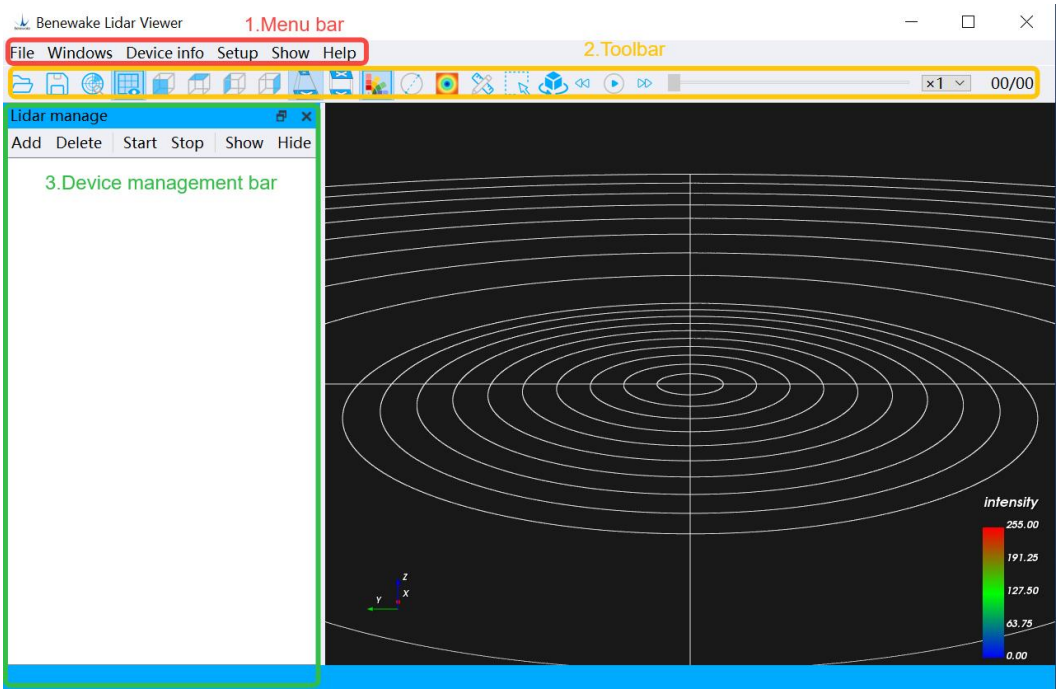


Figure. 4: Benewake LiDAR Viewer main interface

1. **Menu Bar:** Basic configuration options
2. **Toolbar:** Basic function options, the specific functions are as follows:

Icon	Function	Icon	Function
	Playback *. PCD file		Ortho Projection
	Save*. PCD file (from LiDAR).		Display the hue indicator map
	Search for devices in the current network		Set the point size
	Display the scale		Ranging
	Front view		Box selection
	Top view		Roaming rotation
	Left view		Play
	Right view		Time out
	Perspective projection		

Table. 2: Toolbar icons

3. **Device Management Bar:** Manage device addition and deletion,

control device start and stop, display device information and connection status, etc.

4. **Point cloud display area:** Displays real-time point clouds or plays point cloud data files.

4 Functions Introduction

4.1 Point Cloud Display Adjustment

4.1.1 Point cloud display

1. Please complete the configuration before use according to Chapter 1.4.
2. Open the BLV software, there are two ways to add LiDAR:

[Method 1]

(1) Click **Device Management Bar** → **Add** button to set the IP, PORT, DSOP of the LiDAR.

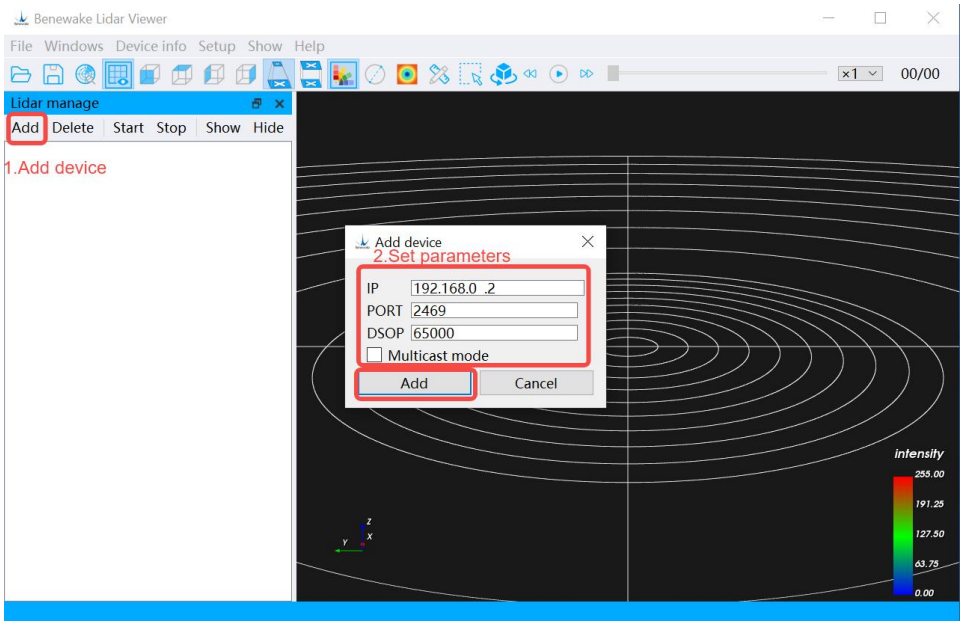


Figure. 5: Add device information

In general, the following table describes the parameters:

Parameter items	Parameter value
IP	192.168.0.2
PORT	2469
DSOP	62702
Multicast mode	Unchecked

Table. 3: Parameters for adding LiDAR

(3) Finally, confirm the addition.

[Method 2]

(1) Click the icon in the toolbar to search for the device (the search port is 62702), as shown in the figure, and click OK to complete the addition.

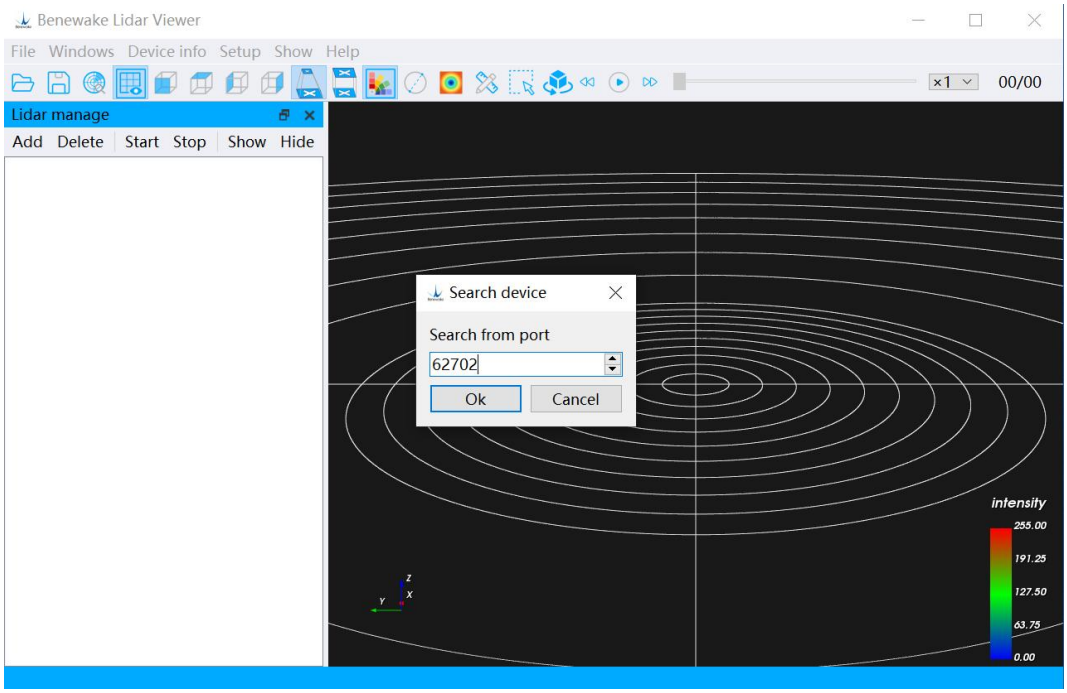


Figure. 6: Searching for a device

（2）After the addition is completed, the device information will be displayed in the **Device Management Bar**, as shown in the following figure:

(Due to different devices, the device information is not exactly the same, and the device information in the figure is for reference only).

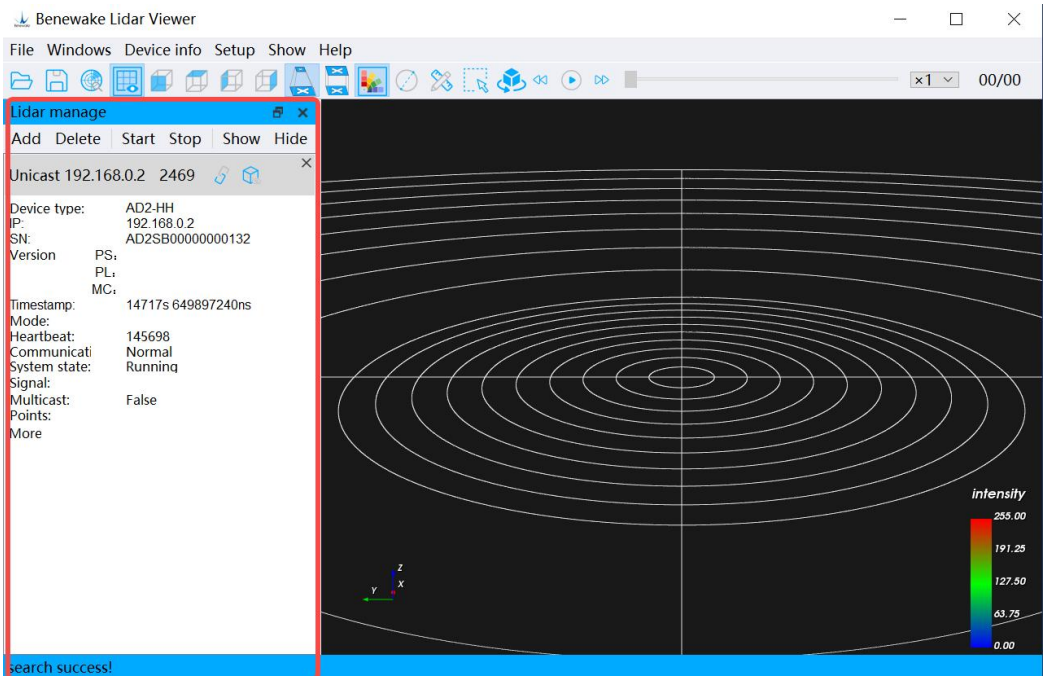


Figure. 7: Adding the device

Starting LiDAR

After completing the steps of adding the device, you can click the **Device Management Bar → Start** button, wait for a while, and then start to get the point cloud data, which will be displayed in the **Point Cloud**

Display Area in real time. Click the **Stop** button to stop the LiDAR from working.

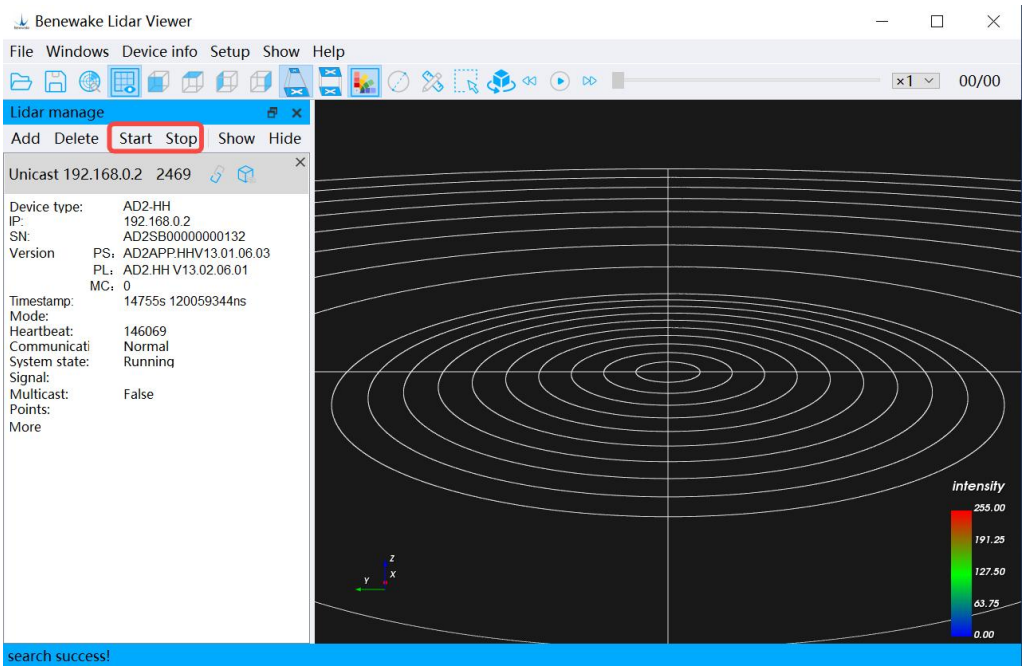


Figure. 8: Device start/shut down buttons

4.1.2 Point Cloud Display Adjustments

1.Point cloud display adjustment: as shown in the red box, the area encircled

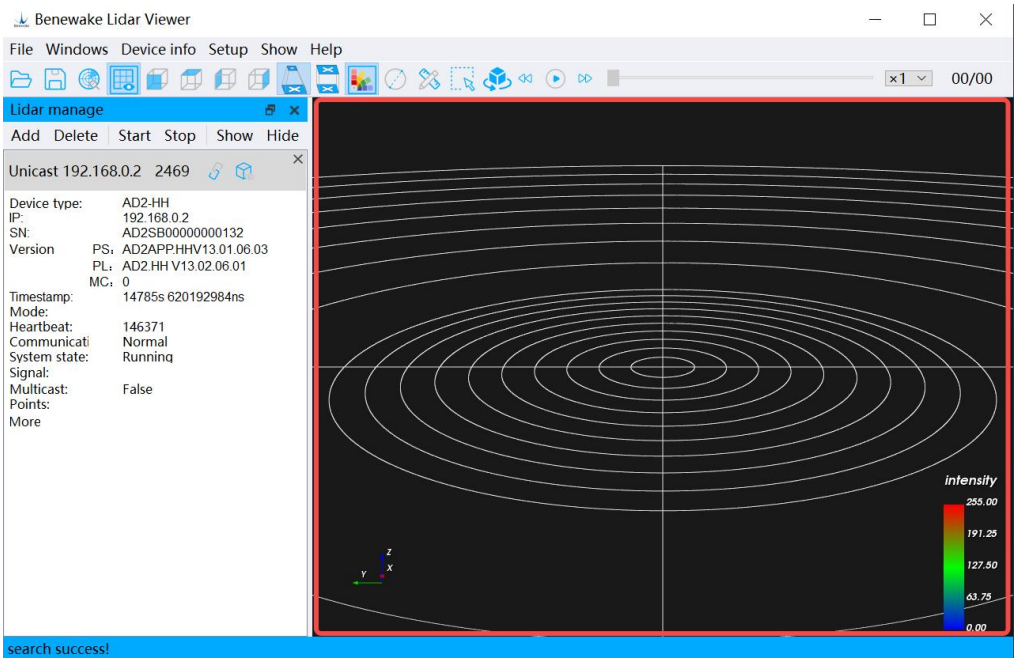


Figure.9: Point cloud display area

The following table describes how to do this:

Adjustment results:	How to do it:
Change the viewing angle of the	Hold down the left mouse button

point cloud display	and drag in different directions
Zoom in/out of the point cloud display	Slide the mouse wheel
Move the point cloud display as a whole	Hold down the mouse wheel (middle button) and drag in different directions.

Table. 4: Point cloud display adjustment method

Note: When you cannot continue to zoom in on the point cloud display using the mouse wheel, you can continue to zoom in on the point cloud display by clicking the **F key** on the keyboard. At this point, the point cloud display continues to zoom in centered on the mouse-over position:

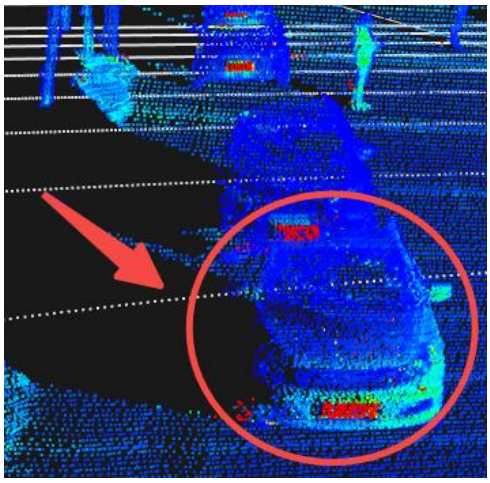


Figure. 10-a: Before zooming in with F key

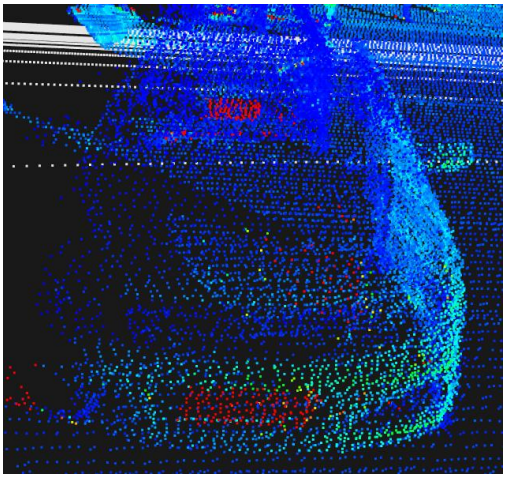


Figure. 10-b: After zooming in with F key

2. Angle Adjustment: select the following icons in the Toolbar to adjust the point cloud data display view, or in the Menu Bar → Point Cloud Display → Set View.

Icon	Function
	Front view
	Top view
	Left view
	Right view

Table. 5: Angle of view adjustment

3. Point Size Adjustment: Click the icon  in the Toolbar to change the size of the point, and a pop-up window will appear as shown in the following figure after clicking it (or set it in the Menu Bar → Point Cloud Display → Set Point Size). The point size range is 1~10, and the default setting is 2.

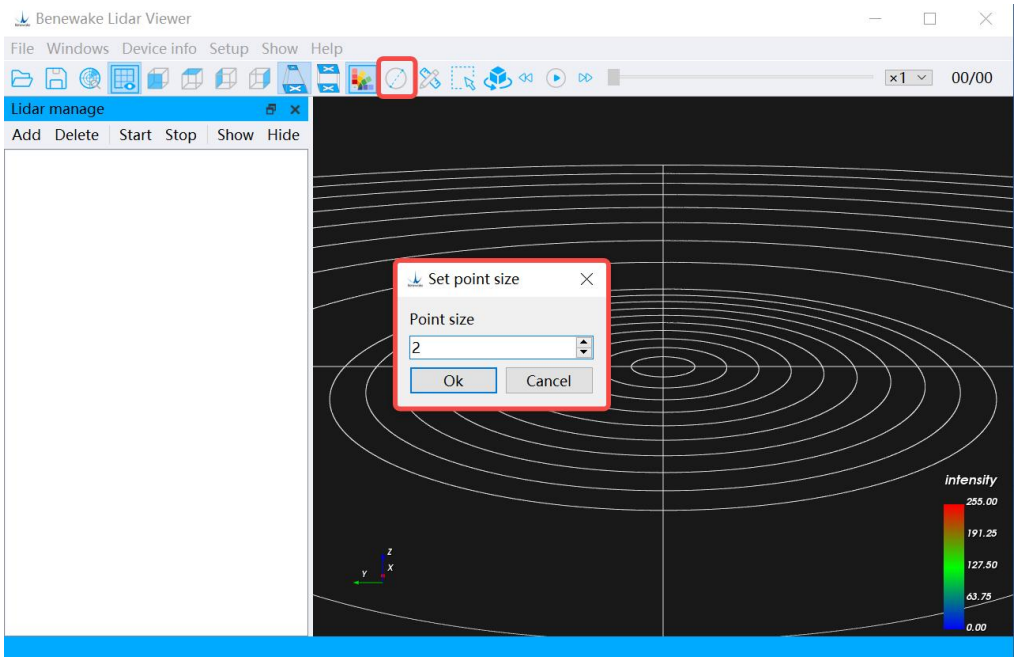


Figure. 11: Setting the point size

4. Set the color scheme: Set the color scheme in the Menu Bar → Point Cloud Display → Set color scheme to render point cloud display according to reflectivity, distance, and elevation

(In general, the default rendering color is to render at reflectivity).

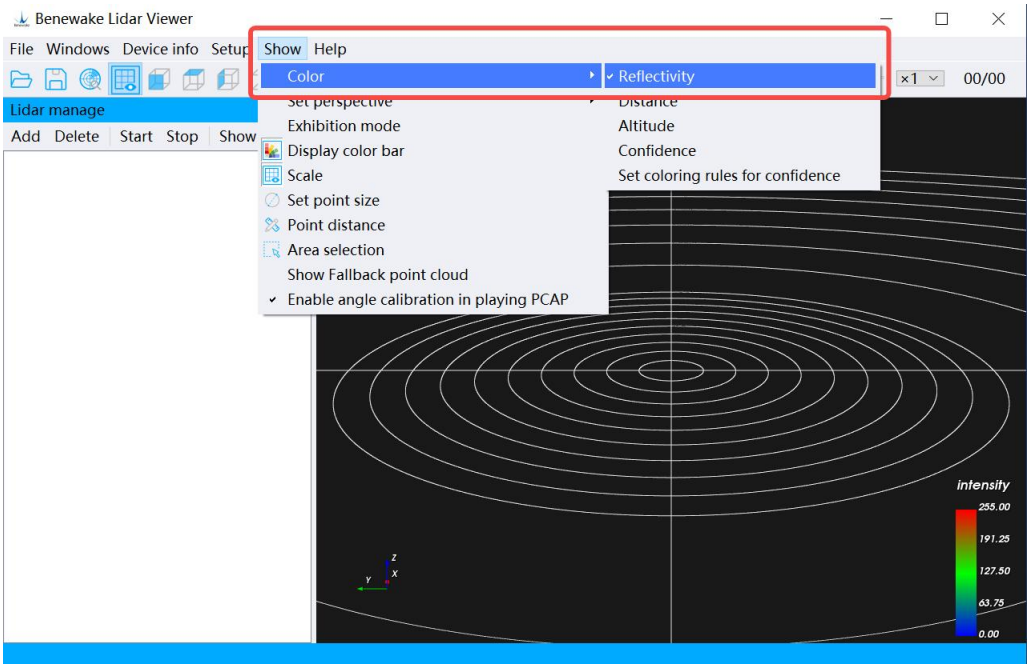


Figure. 12: Setting color scheme

4.2 Record and Playback Point Cloud Data

4.2.1 Recording & Playback *.PCD file

1. Click the **Menu Bar → File → Save File → Save PCD File** (from the device), select the save path to start recording (or click the Toolbar icon). If you need to end the recording, click the **Menu Bar → File → Save File → Stop Saving PCD File** (From Device) option to stop the recording (or click the Toolbar icon).

   (**Note:** You need to choose the storage location, it is recommended to create a new dedicated folder to save *PCD data).

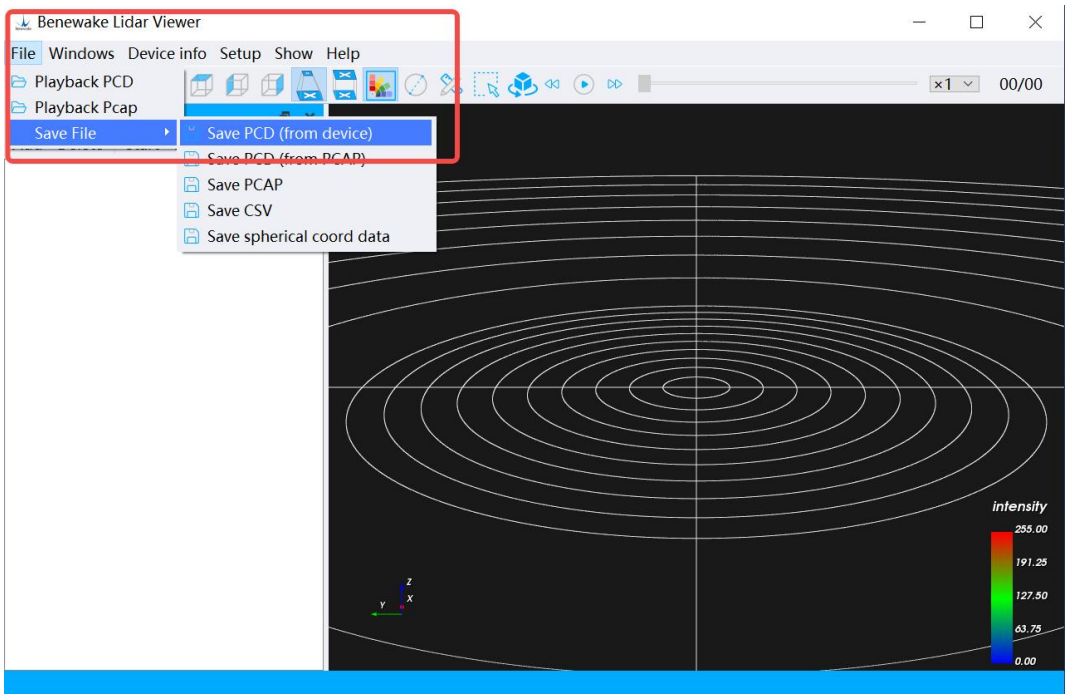


Figure. 13: Recording PCD file

2. After you start recording, you can find the generated *.PCD files under the saved path of the settings, which are the corresponding point cloud data, are named according to the timestamp.

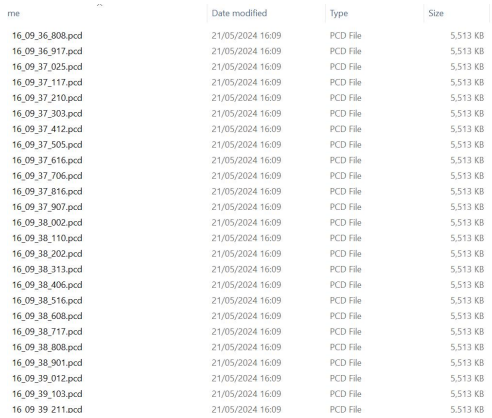


Figure. 14: *.PCD files generated during recording

3. Click the **Menu Bar → File → Playback PCD File** option (or **click the toolbar icon**) to find the saved path you have set after waiting for

a while, click the icon in the **toolbar** to play back *.PCD files.

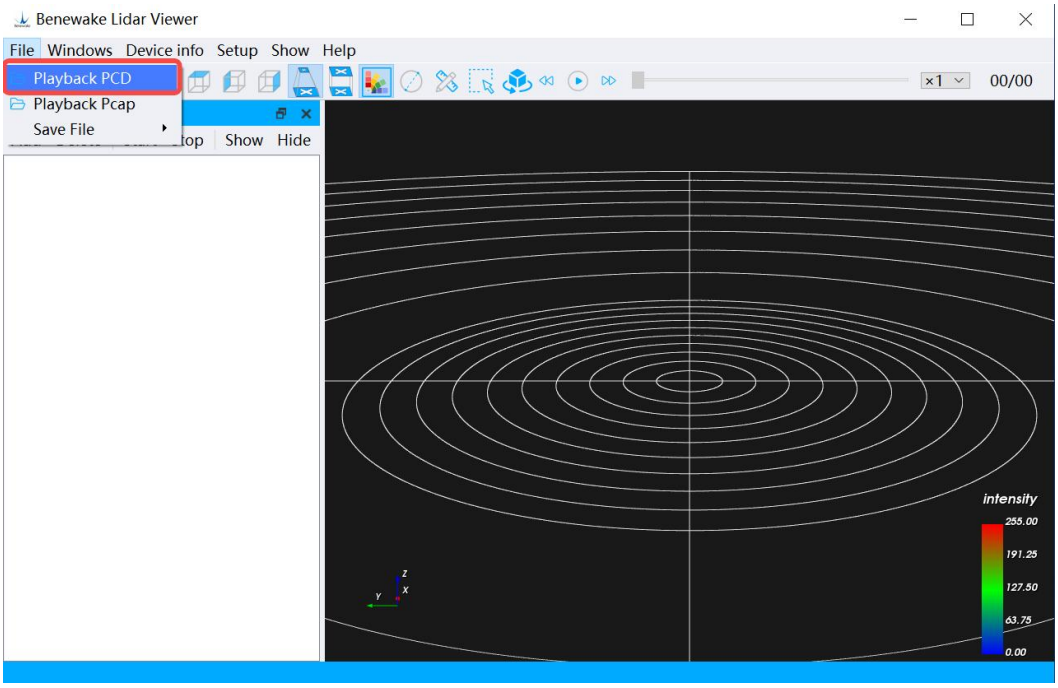


Figure. 15: Playback *. PCD file

4. Once playback starts, the icon will change to an icon, and you can tap to pause the playback data at any time. You can drag the progress bar to view the point cloud data you want to focus on.

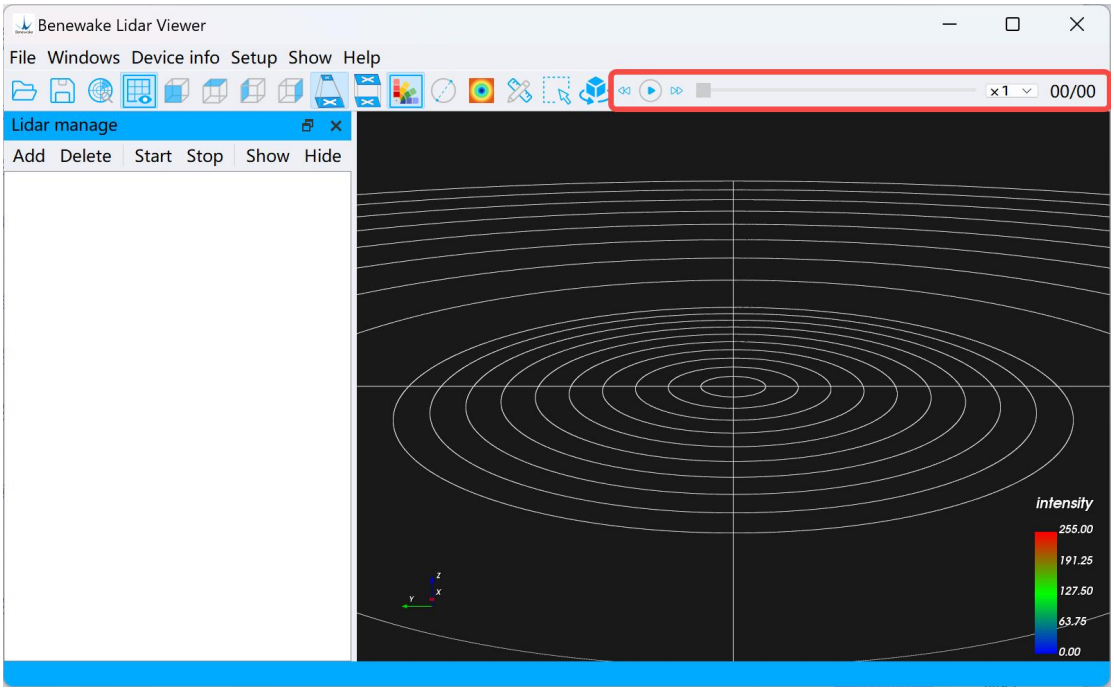


Figure. 16: Point cloud playback control bar

4.2.2 Recording & Playback *.PCAP file

1. Click the **Menu Bar → File → Save File → Save PCAP File** options, select the save path, set the file name, and start recording. If you

need to end the recording, click the **Menu Bar → File → Save File → Stop Saving PCAP File** options to **stop** the recording. If the recording is successfully stopped, a pop-up window will prompt that the saving is successful.

(**Note:** You need to choose the storage location, it is recommended to create a new dedicated folder to save *PCAP data).

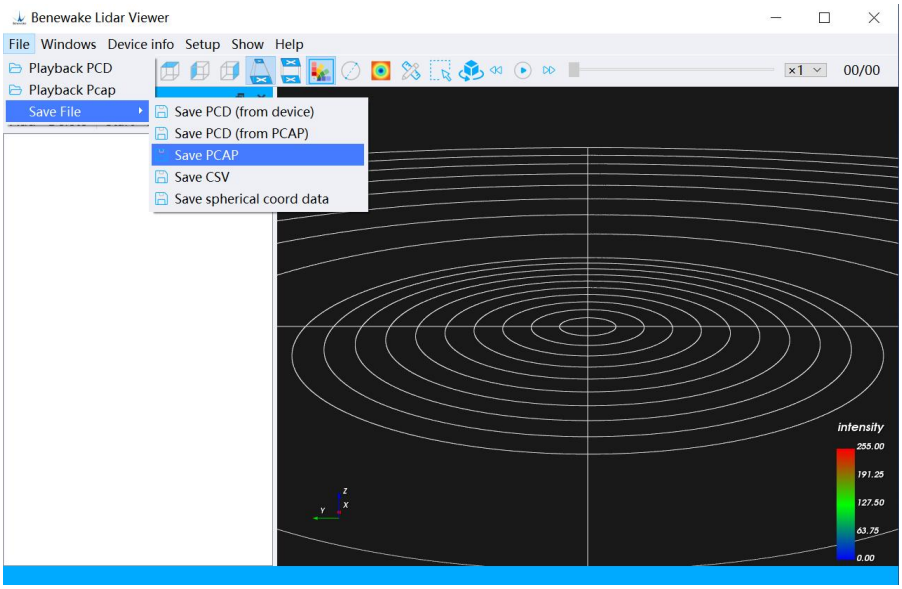


Figure. 17: Save *.PCAP file

2. Click on the **Menu Bar → File → Playback PCAP File** option, and select Save the finished *.PCAP file, after a while, a pop-up window will prompt that the file has been successfully imported. Click the icon in the **toolbar** to play back *.PCAP file.

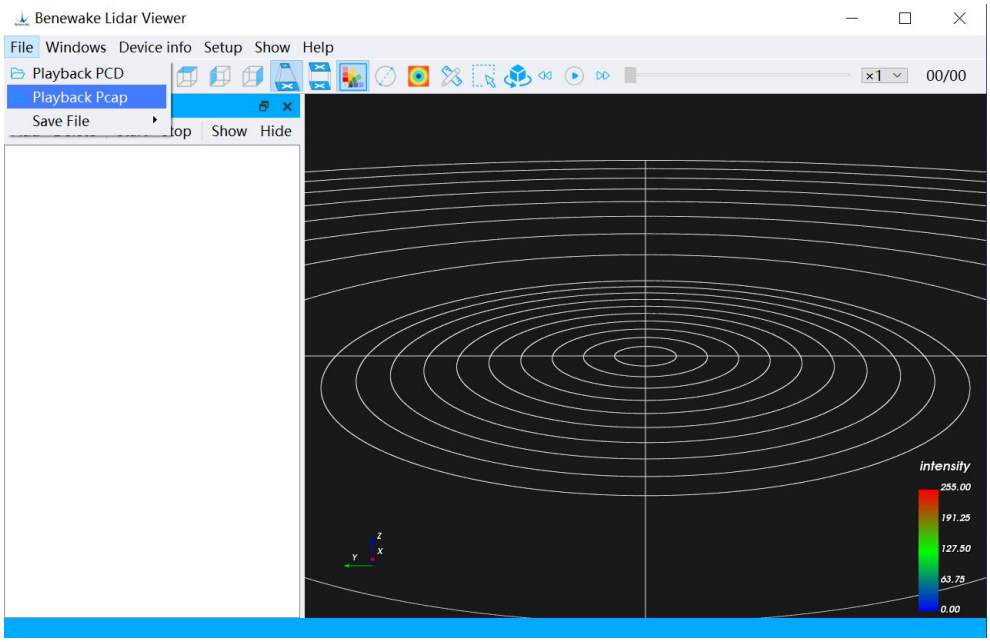


Figure. 18: Playback *.PCAP file

3. Follow-up and playback *. PCD files.

4.2.3 Save *.CSV file

1. Click the **Menu Bar → File → Save File → Save CSV File** option, and select the save path, you can save a frame of data in the save path, and the recorded file will be named according to the timestamp. Use Excel to open a saved *.CSV file.

(**Note:** You need to choose the storage location by yourself, it is recommended to create a new dedicated folder to save *. CSV data).

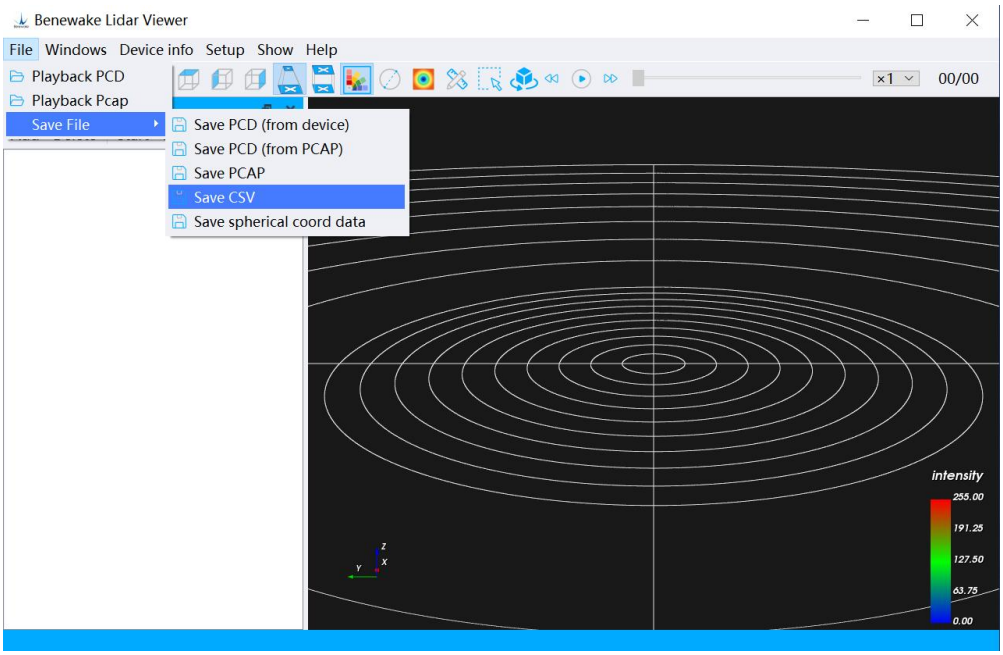


Figure. 19: Save *.CSV file

Figure. 20: Save the finished one*.CSV file

4.3 Functions Related to Device Management Bar

As shown in the figure below, click the corresponding button in the **Device Management Bar** to use the corresponding functions.

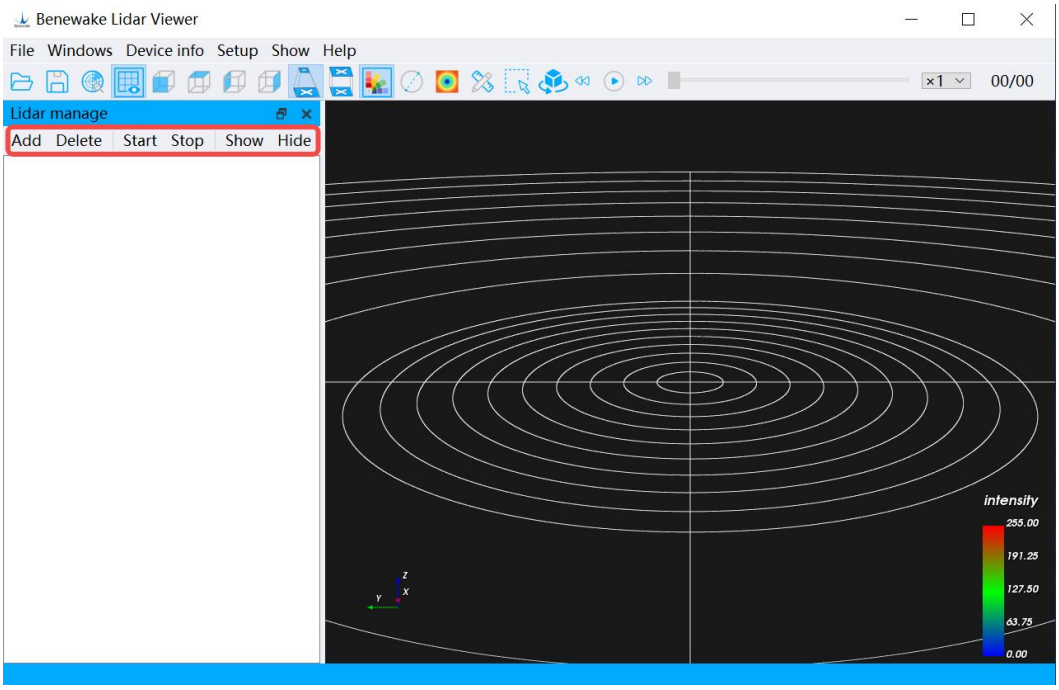


Figure. 21: Optional functions in device management bar

1. **Add:** Add a new LiDAR device
2. **Delete:** Delete the added device
3. **Start:** Run the devices that have been added
4. **Stop:** Stop the running device that you added
5. **Display**: Display the point cloud data of the selected device in the point cloud display area
6. **Hide:** Hide the point cloud data of the selected device

4.4 Toolbar Related Functions

4.4.1 Scale Display

Select/invert the icon in the toolbar to control whether the scale is displayed, and the contrast (comparison) effect is shown in the following figure:

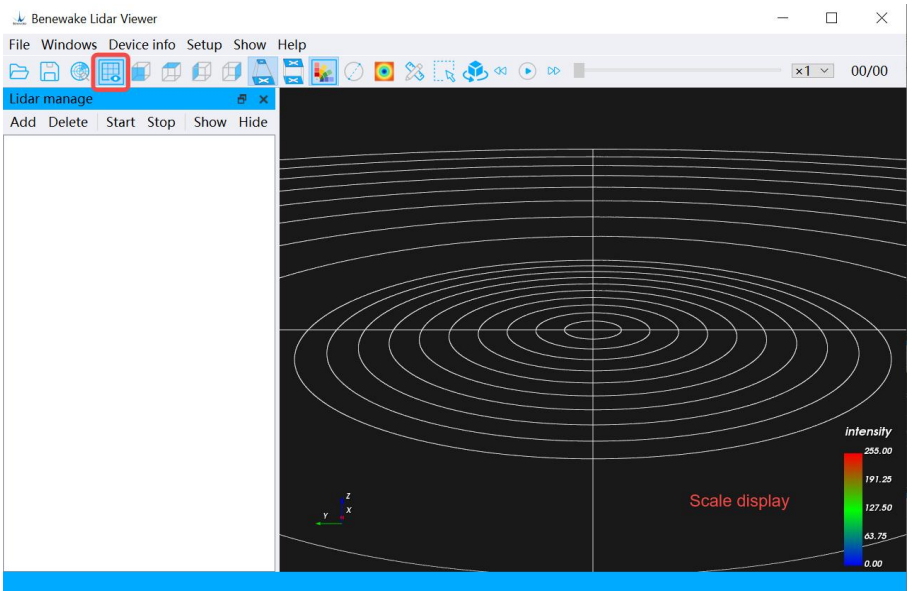


Figure. 22-a: Scale shows contrast (comparison)

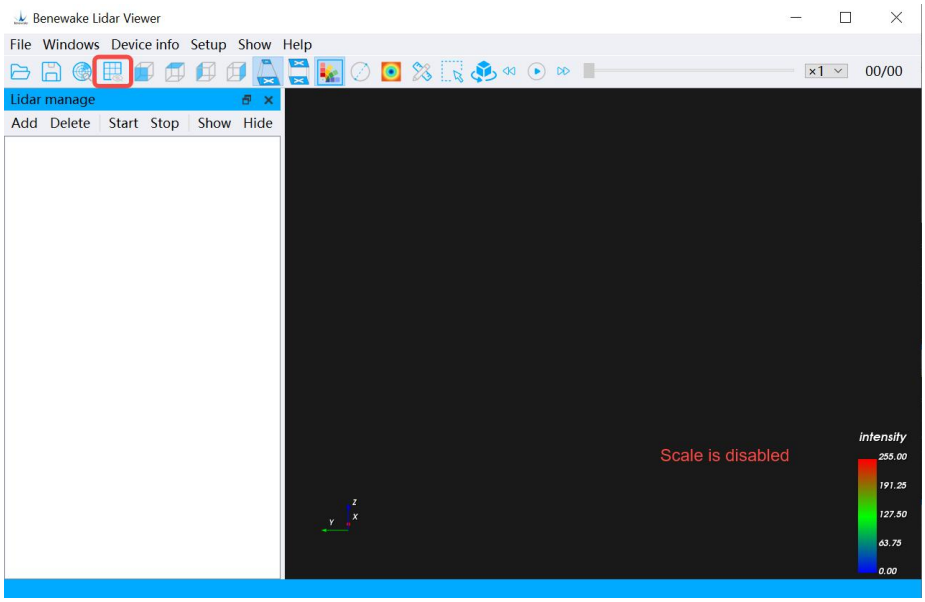


Figure. 22-b: Scale is disabled

4.4.2 Hue Indicator

Select/invert the icon in the toolbar to control whether the hue indicator bar is displayed, and the contrast effect is shown in the following figure:

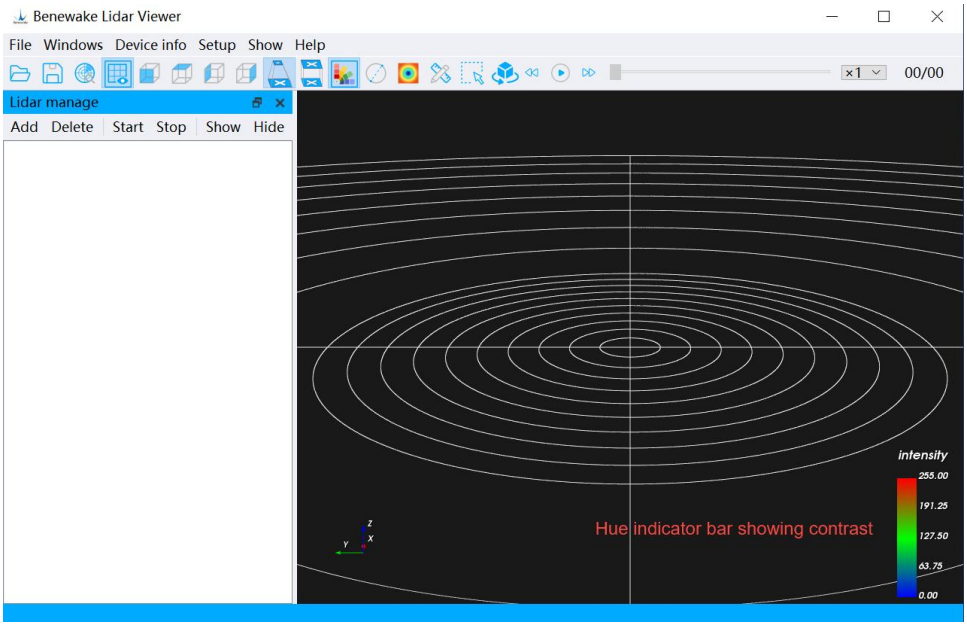


Figure. 23-a: Hue indicator bar showing contrast (comparison)

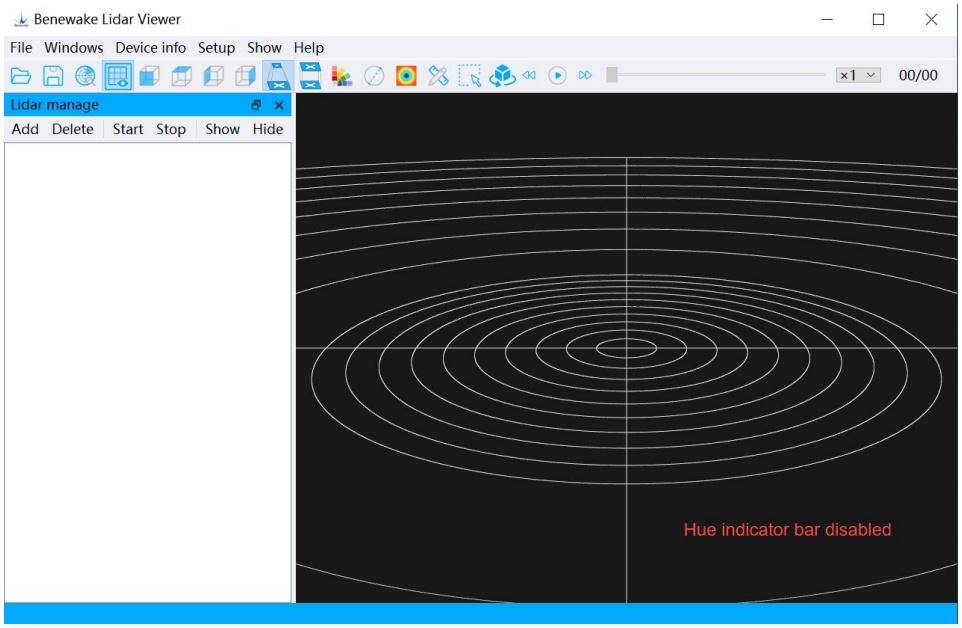


Figure. 23-b: Hue indicator bar disabled

4.4.3 Distance Measurement

Click the icon in the **toolbar** to perform ranging operations on the point cloud. Stop the device, click the icon, use the **left mouse button** to select the point to be measured on the point cloud data in the point cloud display area, the selected point will be displayed in red, after selecting two points, the distance between the two points can be automatically calculated, and the distance information will be displayed near the ranging line, and the distance measurement function can be turned off by clicking the icon again.

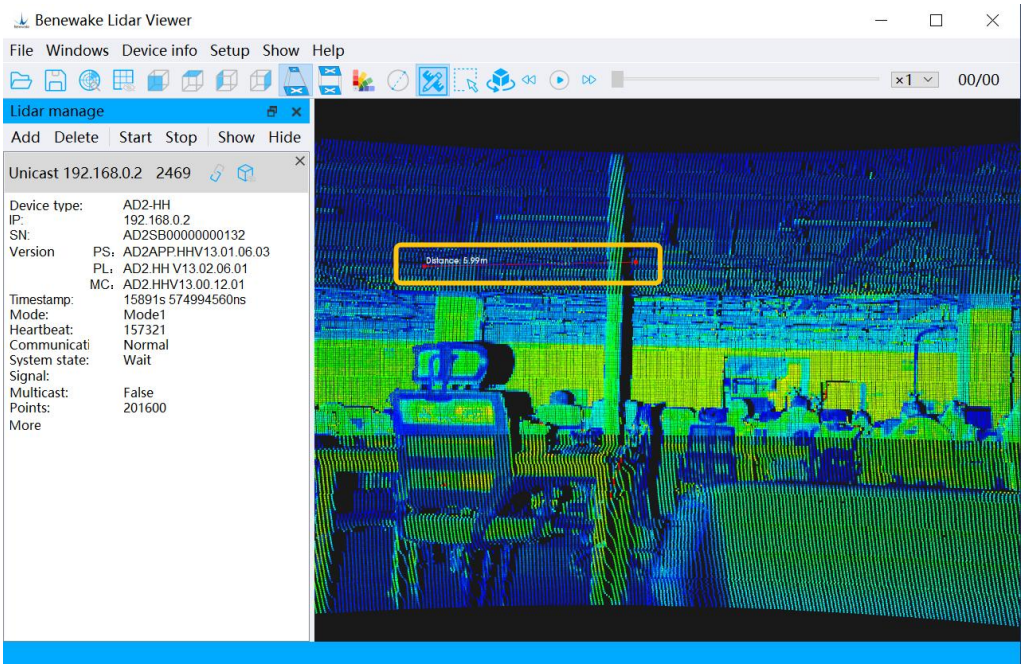
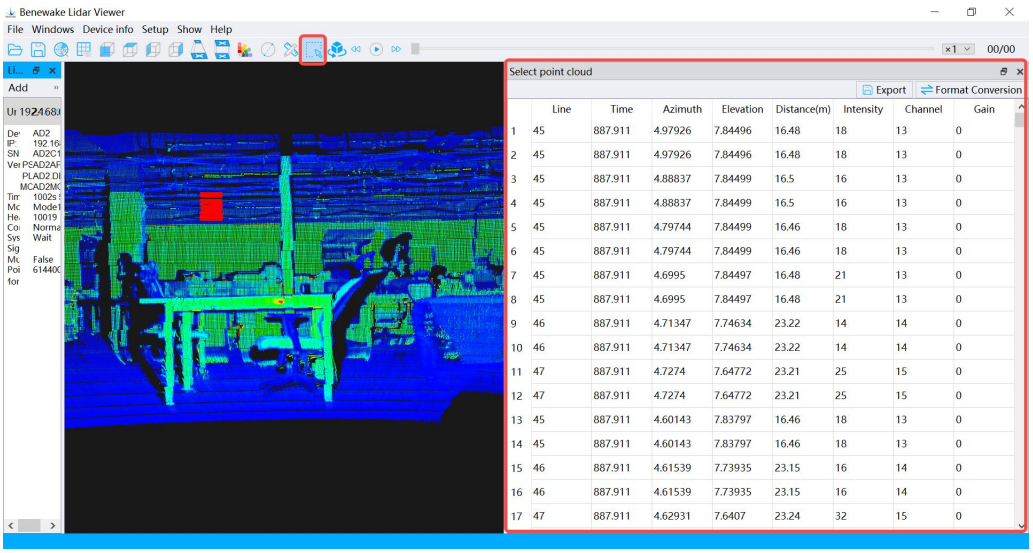


Figure. 24: Point cloud ranging

4.4.4 Point Cloud Frame Selection

Click the icon in the toolbar to select the point cloud. After clicking the icon, click the **Left Mouse Button** once in the **Point Cloud Display Area**, press the **X key** on the keyboard, then press and hold the **Left Mouse Button** to select the point cloud image (can be selected multiple times), and release the **Left Mouse Button** to complete the box selection. The selected **point cloud data** is shown in red, and an information window will appear on the right side of the **BLV interface** to display detailed information of the selected point cloud. Then press the X key on your keyboard and invert the icon to turn off the box selection.



	Line	Time	Azimuth	Elevation	Distance(m)	Intensity	Channel	Gain
1	45	887.911	4.97926	7.84496	16.48	18	13	0
2	45	887.911	4.97926	7.84496	16.48	18	13	0
3	45	887.911	4.88837	7.84499	16.5	16	13	0
4	45	887.911	4.88837	7.84499	16.5	16	13	0
5	45	887.911	4.79744	7.84499	16.46	18	13	0
6	45	887.911	4.79744	7.84499	16.46	18	13	0
7	45	887.911	4.6995	7.84497	16.48	21	13	0
8	45	887.911	4.6995	7.84497	16.48	21	13	0
9	46	887.911	4.71347	7.74634	23.22	14	14	0
10	46	887.911	4.71347	7.74634	23.22	14	14	0
11	47	887.911	4.7274	7.64772	23.21	25	15	0
12	47	887.911	4.7274	7.64772	23.21	25	15	0
13	45	887.911	4.60143	7.83797	16.46	18	13	0
14	45	887.911	4.60143	7.83797	16.46	18	13	0
15	46	887.911	4.61539	7.73935	23.15	16	14	0
16	46	887.911	4.61539	7.73935	23.15	16	14	0
17	47	887.911	4.62931	7.6407	23.24	32	15	0

Figure.25: Point cloud box selection

4.4.5 Perspective Projection

Depending on your display requirements, select the icon in the **Toolbar** to change the display of point cloud data. The point cloud display effect of perspective projection is closer to the visual effect of human eye.

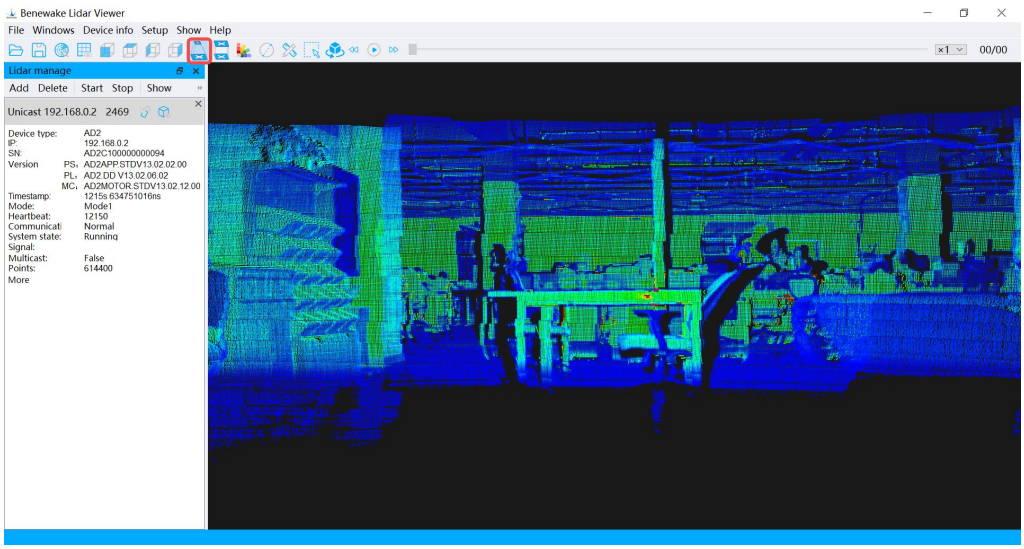


Figure. 26: Perspective projection display effect

4.4.6 Orthographic Projection

According to your requirements, click the icon in the **Toolbar** to change the display effect of the point cloud data to ortho projection. In the ortho projection effect, objects near and far are scaled at the same scale.

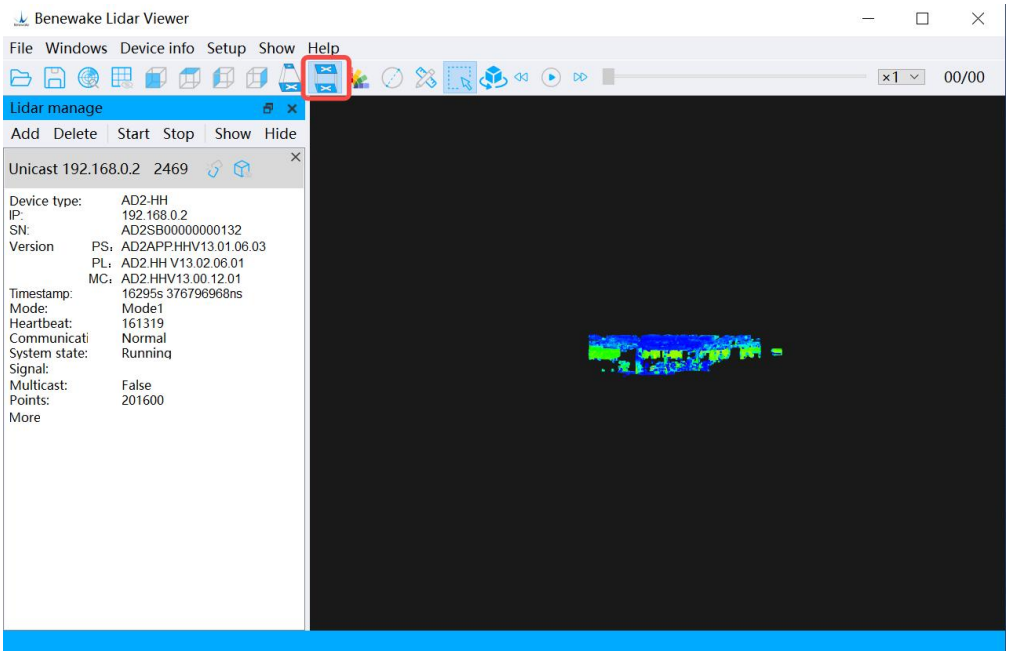


Figure. 27: Orthographic display effect

4.4.7 Rotation Function

Click the icon in the **toolbar** to turn on the rotation function. When enabled, the point cloud display will rotate slowly 360° horizontally along the plane formed by the **X-axis** and **Y-axis** of the LiDAR with the **Z-axis** of LiDAR as the rotation axis.

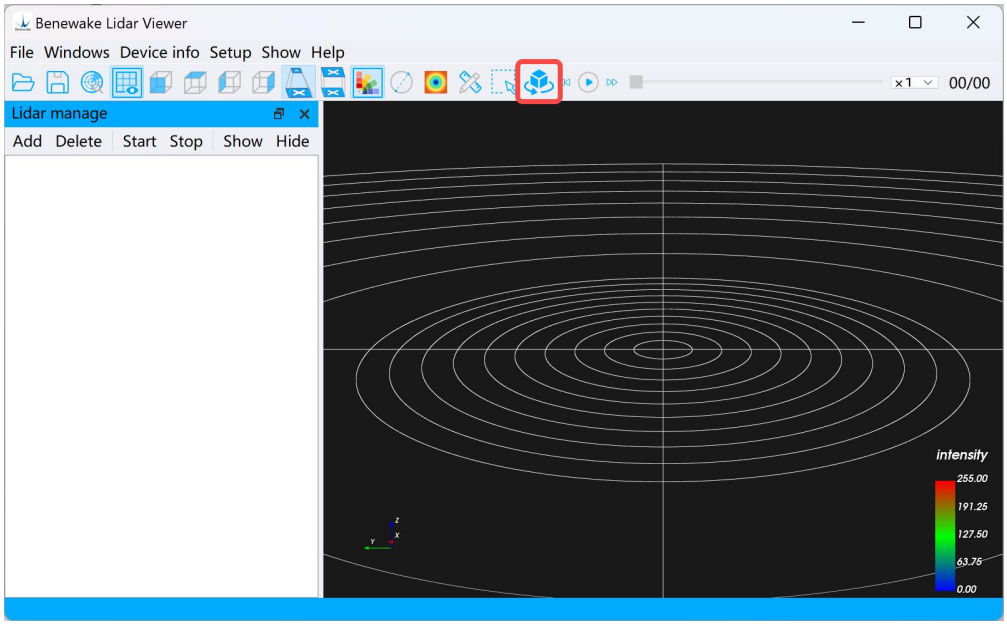


Figure. 28: Rotation function

4.5 Menu Bar Related Functions

4.5.1 File

As shown in the figure, file menu main functions are: playback PCD file, play back PCAP file, save PCD file, save CSV file, save the PCAP file, etc. For more information, please see 4.2 **Chapter**.

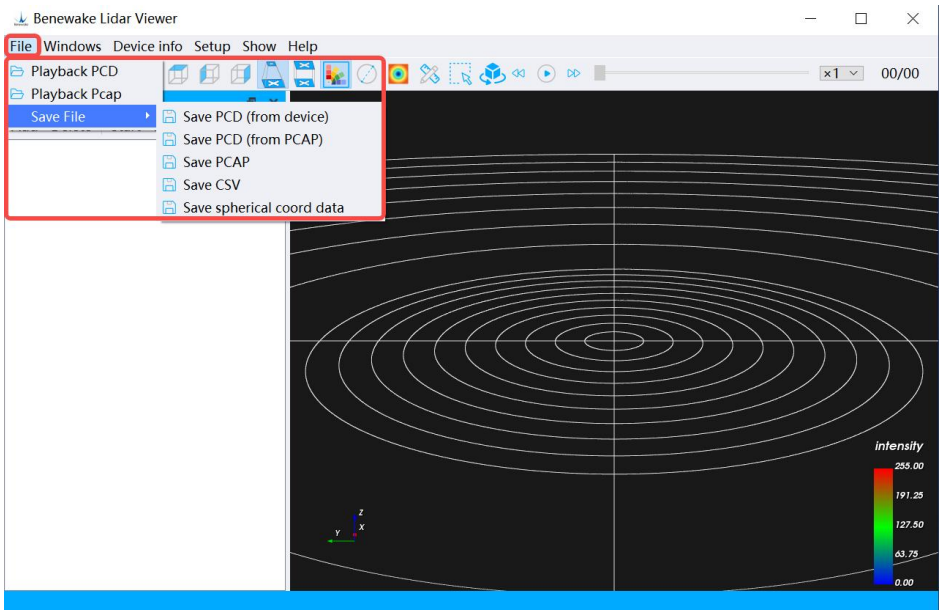


Figure. 29: File menu

4.5.2 Window

As shown in the figure, click the **Menu Bar → Window → Open/Close Device Window** options to display and hide the device management bar.

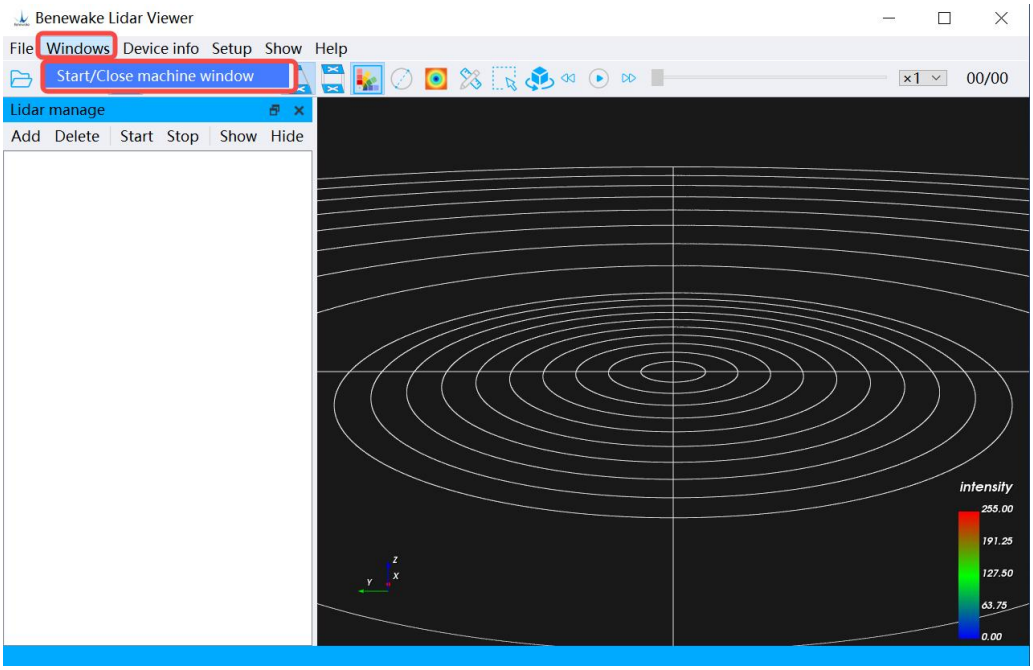


Figure. 30-a: Display device management bar

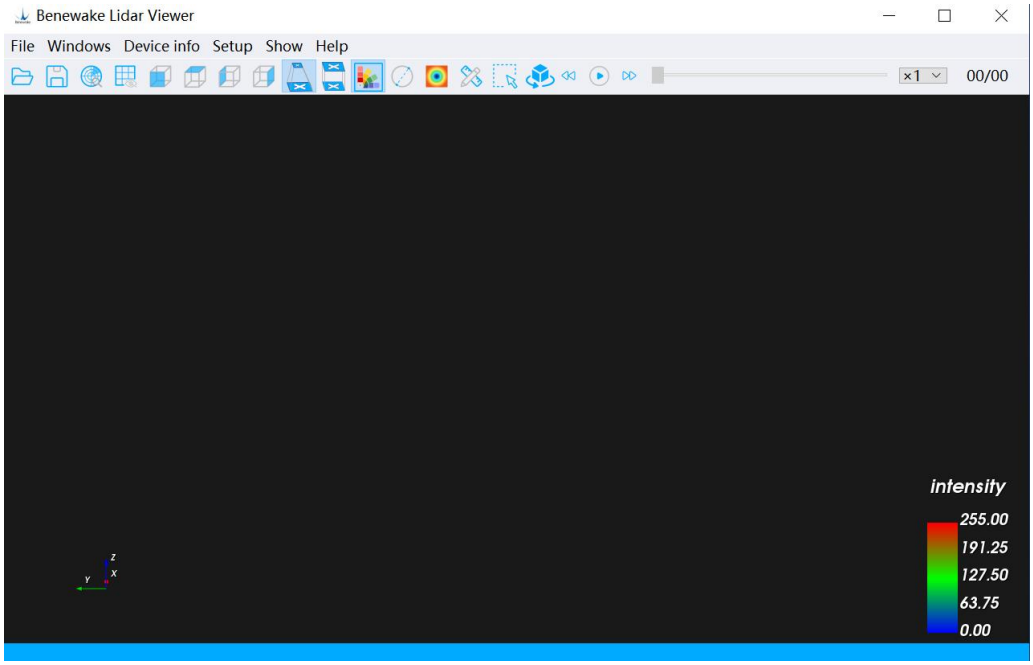


Figure. 30-b: Hide device management bar

4.5.3 Device Information

As shown in the figure, click the **Menu Bar → Device Information option**, and secondary options such as **Get Device Information**, **Get Device Heartbeat Information**, **Get Device Logs**, and **Search for Devices in the**

Current Network will appear. By clicking these options, you can understand the basic information of the LiDAR device.

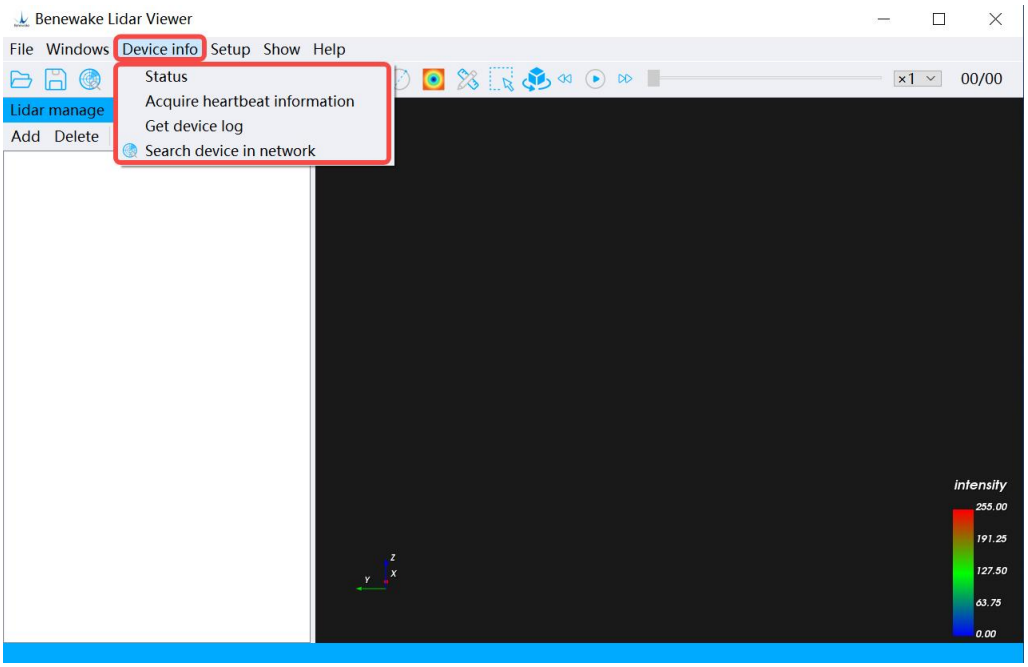


Figure. 31: Device information

1. **Get Device Information:** The SN number and firmware version of the current device are displayed.
2. **Obtain device heartbeat information:** The heartbeat signal of the current device can be detected.
3. **Get Device Logs:** displays the log information of the current device.
4. **Search for devices on the current network:** Search for radars waiting to connect in the current network segment.

4.5.4 Configuring Device

Click the **Menu Bar → Configure Device** option to configure some functions of the device (**Note:** If the LiDAR is in the running state, the **Configure Device** function is not available).

1. Click the **Menu Bar → Configure Device → LiDAR Operation Settings → Set Mode** options to make the LiDAR operate in different working modes. If you want to know the parameters of each mode, please contact Benewake technical support: support@benewake.com

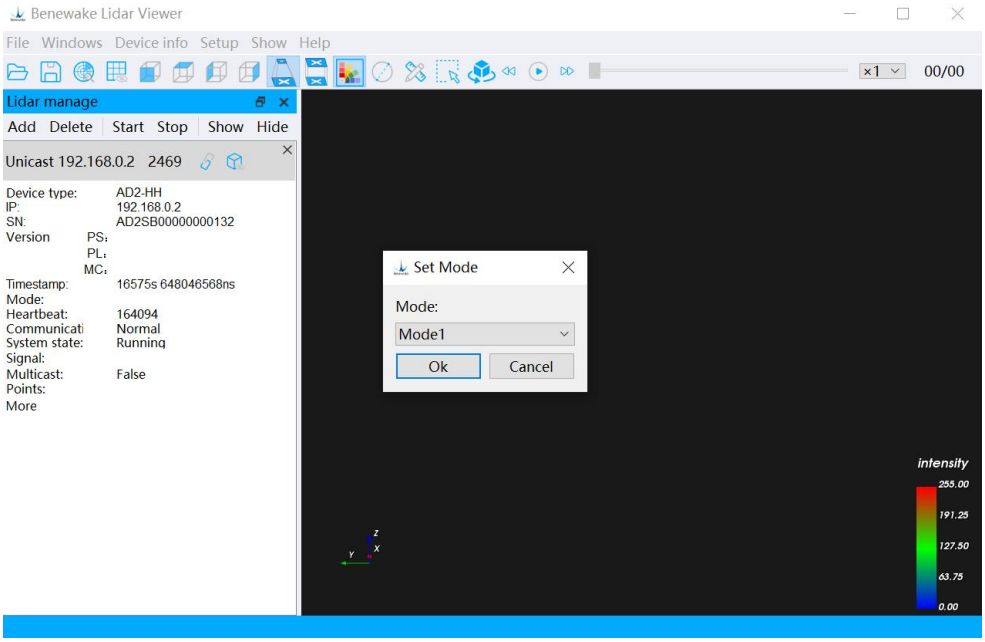


Figure. 32: Setting different modes

2.For other function configurations, please contact Benewake technical support team: support@benewake.com, and use the sensor under professional guidance.

4.5.5 Point Cloud Display

Point cloud display, the main functions are: set the color scheme, set the view, exhibition mode, display color bar, display scale, ranging box selection、set point size and so on. For more information, please visit 4.1 & 4.4 Chapter.

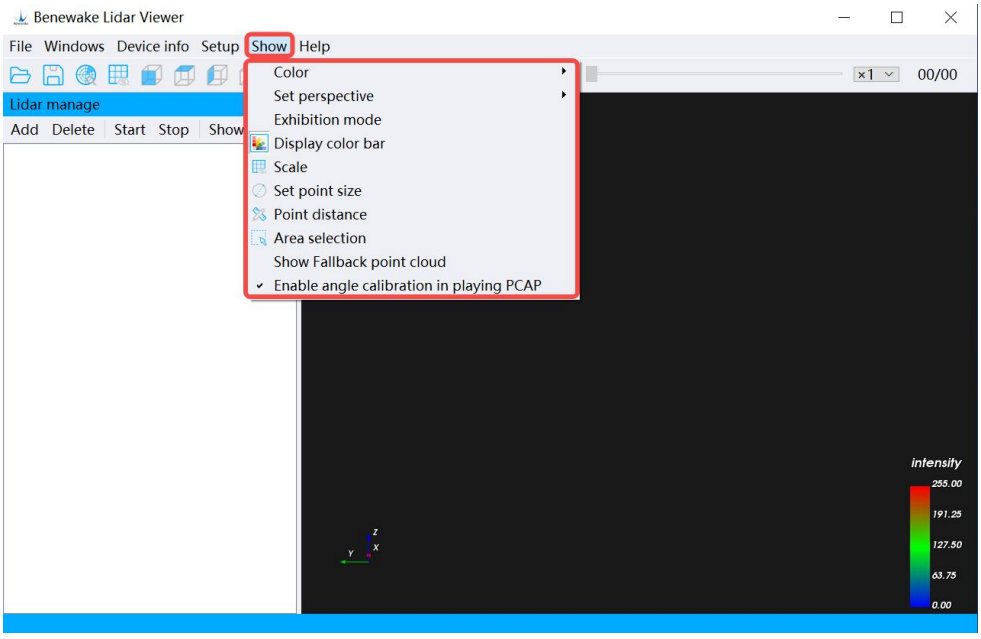


Figure. 33: Point cloud display

4.5.6 Help Menu

In addition to the above features, BLV offers a number of other features. Click the **Menu Bar** → **Help** option to view.

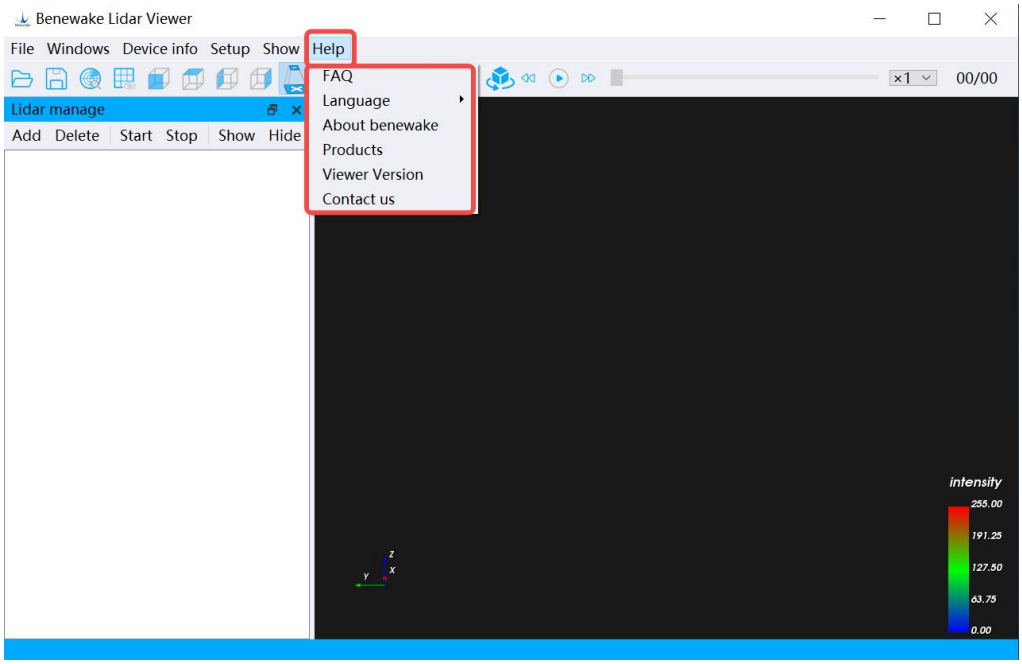


Figure. 34: Help menu

- **Frequently Asked Questions and Answers:** Frequently asked questions and explanations, including: the device does not start, the point cloud is displayed incorrectly or cannot be displayed, etc.
- **Select Language:** Select the display language of BLV interface.
- **About Benewake:** Company Introduction.
- **Product introduction:** Benewake product positioning, application fields, etc., please refer to the product introduction page of the official website for details.
- **Viewer Version:** GUI software version and release date.
- **Contact us:** If you encounter any problems during use, please contact Benewake technical support.