TeliViewer

User manual

Version 1.0.4 (2024/06/20)

Toshiba Teli Corporation

Information contained in this document is subject to change without prior notice.

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 https://www.toshiba-teli.co.jp/en/

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1. Introduction

This document is the user manual for TeliViewer. It is the tool for setup, image acquisition, and display for the camera products of Toshiba Teli, such as USB3/GigE/CoaXPress.

TeliViewer is available when TeliCamSDK is installed into your system since it is provided with TeliCamSDK package.

1.1. Terms

Following table explains the terms that are used in this document.

Term	Description
Main window	It is a centrally located window that displays images from the camera. Such a window is called as “Main window”.
Pane	It is a small window implemented for camera controls such as Discovery, FeatureView, etc. Such a window is called as “Pane”.
Stream Streaming	Image data form camera is called as “Stream”, and operation to acquire the image is called as “Streaming”.
Capture Rate	It is the frame rate (FPS) of currently acquiring the image from camera.
Display Rate	It is the frame rate (FPS) of currently displaying the image on Main window.
GEV	GigE Vision. It is a protocol supported by GigE cameras.
U3V	USB3 Vision. It is a protocol supported by USB3 cameras.
Plug-in Plug-out	The operation of connecting a camera to a system is called as “Plug-in”, and the operation of removing a camera from the system is called as “Plug-out”.
Context menu	This menu is displayed by right-clicking with the mouse on the window or pane. This allows users quick operations. Its usage will be explained in following sentences for each feature if it is available.
2in1 mode 4in1 mode	The “2in1” mode divides the main window into two windows, allowing two camera images to be displayed, and the “4in1” mode divides the main window into four windows, allowing four camera images to be displayed at the same time.
Current Area	In “2in1” or “4in1” mode, the main window is divided into multiple areas. When a divided area is selected by clicking on it with the mouse, the selected area is encircled by red frame, and targeted for operation, called as “Current Area”.
RW / RO / WO	They indicate the item's attributes as following. RW: ReadWrite, RO: Read-Only, WO: Write-Only
Hint	It explains regarding the recommended usage for users, or the supplemental remarks for reference.
Attention	It explains regarding the issue that user should pay attention for using TeliViewer.

2. System Configuration

TeliViewer works with TeliCamApi that is provided by TeliCamSDK. If users need detailed information on system configuration, etc., refer to the "TeliCamSDK Start-Up Guide" or "TeliCamSDK for Linux Start-Up Guide".

3. Operation Environment

The basic requirements for the working environment are same as for the TeliCamSDK. For more details, refer to the "Hardware Requirements" and "Software Requirements" in the "TeliCamSDK Start-Up Guide" or "TeliCamSDK for Linux Start-Up Guide".

This section describes the TeliViewer specific requirements.

3.1. Regarding Streaming of Multiple Cameras

The “Multi-Display” feature described in the following section can stream multiple cameras at the same time. This is a useful feature since it allows users to view images from multiple cameras on a single screen at the same time, but it requires high hardware performance.

The recommended specifications for streaming multiple cameras simultaneously are following.

Recommended PC Specs	• CPU : Intel Core i series 6th generation or later, 4 threads or more • Memory : 8Gbyte or more • Graphics : 2Gbyte or more VRAM with OpenGL support

Attention

Regarding the use of single board computers such as Raspberry Pi	Note that it is difficult to stream multiple cameras simultaneously on systems with low hardware specifications, such as the Raspberry Pi. Errors such as packet loss or else may occur and the expected performance may not be achieved.
Regarding the use of laptop PCs	Even if your system meets the above recommended specifications, on the laptop PC, there is a case streaming cannot be continued correctly. This depends on bandwidth of the data bus on the system, and if such bandwidth is insufficient, there is the possibility errors occur, such as packet loss. For this reason, it is recommended to use the desktop PC with sufficient bandwidth for data bus.

4. Installation

TeliViewer is installed with TeliCamSDK package. If it is required to know the detailed procedure to install the TeliCamSDK package, refer to “TeliCamSDK Start-up Guide” or “TeliCamSDK for Linux Start-up Guide”.

5. Launch of TeliViewer

To launch TeliViewer, refer to the following procedures.

5.1. Windows

The procedures for Windows 10 are follows.

5.1.1. Launch from Start menu

[Procedure]
1) Press the Start button of Windows.
2) Open TOSHIBA TELI.
3) Select TeliViewer and launch it.

5.1.2. Launch from Search result

[Procedure]
1) Right-click the Windows Start button with the mouse.
2) Select “Search” from the menu.
3) Type “TeliViewer” as the search word.
4) Select TeliViewer from the search result and launch it.

5.2. Linux

The procedures for ubuntu are follows.

5.2.1. Launch from Search result

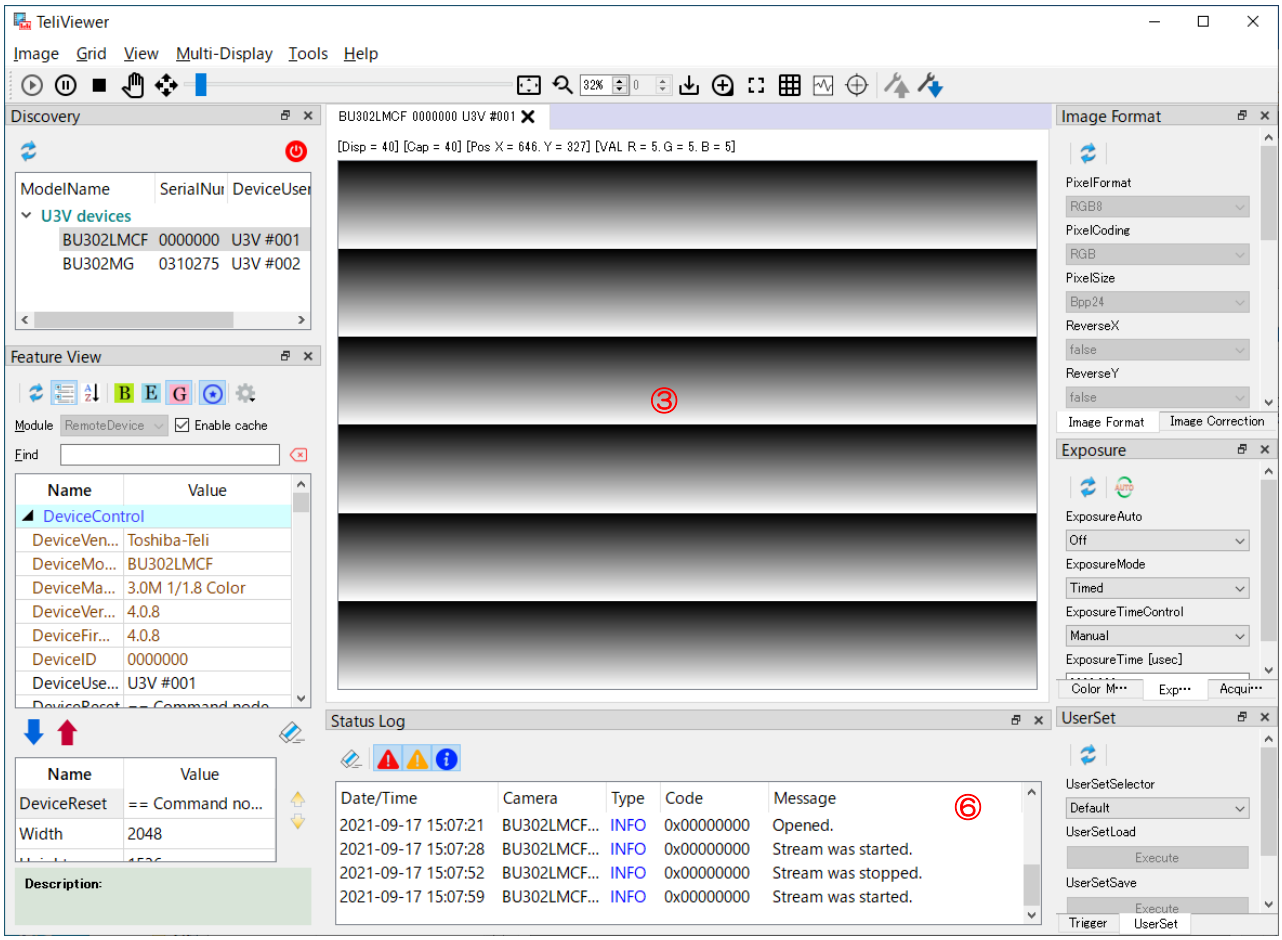
[Procedure]
1) Click the "Activities" button on the taskbar or the "Show Applications" icon at the bottom of the Dock.
2) Type “TeliViewer” as the search word.
3) Select TeliViewer from the search result and launch it.

5.2.2. Launch from filer or terminal

[Procedure]
1) Open a filer such as Nautilus or a terminal, and then go to /opt/TeliCamSDK/bin.
2) Execute the script “execute_TeliViewer.sh” to launch TeliViewer.

6. Structure of TeliViewer

The basic structure of TeliViewer is shown in the following figure.



The brief description of each component is following.

①Menu bar

②Tool bar

By using these features, various operations are available for the camera and images. Details are explained in the following sections on each feature.

③Main window

It is placed in the center of the TeliViewer to display the image from the camera. It also supports the feature of displaying images from multiple cameras simultaneously, such as “2in1” or “4in1”. Refer to the detailed description within “Main window” section.

TeliViewer also has small windows for controlling the camera and images, or for displaying information. They are called as “Pane” and follows are supported in TeliViewer

④Discovery

It supports features such as camera discovery, open/close the camera. Refer to the detailed description within “Discovery” section.

⑤FeatureView

It displays supported features within camera as the list. It is possible to confirm the current values or change the settings for each of features. Refer to the detailed description within “FeatureView” section.

⑥Status Log

It lists events that occurred on the TeliViewer. Refer to the detailed description within “StatusLog” section.

⑦Camera Control Panes

The most frequently used features for controlling the camera are collected into these panes. Refer to the detailed description within “Camera Control panes” section.

Hint

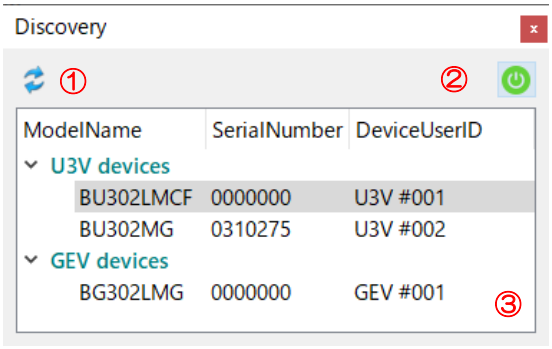
Regarding the setting of DeviceUserID	By using DeviceUserID, user can set a unique ID for each camera. When several cameras are available in the system, this makes easier identifying the cameras. Also, since TeliViewer uses the DeviceUserID assigned to each camera as part of the key to identify them, this setting affects the "Save/Restore Camera Settings" and "Save/Restore Line Drawing Status". Although this is not a requirement, in advance, it is recommended that DeviceUserID should be set appropriately. [Note] DeviceUserID can be set from “FeatureView”.

7. TeliViewer features

This section describes the features supported by TeliViewer.

7.1. Discovery

It searches cameras that are available on the system and displays them in Camera List. By opening a selected camera from the list, the camera becomes available to operate.



7.1.1. Updating Camera List

When the button ① in above figure is pressed, the Camera List is updated. If any camera is newly plugged into the system, by pressing this button, it will appear in the list. Also, if any camera is plugged out, by pressing this button as well, it will be deleted from the list

7.1.2. Camera Open/Close

When the button ② is pressed, the camera selected on the Camera List can be opened or closed. The color of the button is changed as follows, according to the current state of camera.

Button state	Description
In case of 	The selected camera is closed. When this button is pressed, the camera will be opened.
In case of 	The selected camera is opened. When this button is pressed, the camera is closed.

7.1.3. Camera List

In the camera list ③ in above figure, cameras plugged into system are listed. By clicking the camera with the mouse or using the arrow keys on keyboard, users can select the camera to operate.

Hint

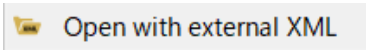
Regarding the display order of cameras	The cameras are listed in three categories, such as "U3V devices", "GEV devices" and "GenTL devices". In addition, cameras within each category are sorted and displayed in ascending order by ModelName + SerialNumber + DeviceUserID as the keys.
Using the context menu	If right-clicking with the mouse a camera in the list, it will open a context menu for opening/closing the camera. By using this, it is possible to perform quick operations equivalent to those described in ② above.
Plugged-in camera does not appear in the camera list	In such case, double-check whether connection between host and camera via the cable is correct, and then execute "Update Camera List". If it seems that there is no problem in camera connection, and the situation does not recover to correct state, refer to the support information on our website.

7.1.4. Open camera with external XML file

Attention

About this feature	This feature is intended for developers or specific users. If incorrect XML file is loaded, it may cause problems such as failure to configure the camera. So, it is required to pay attention for using this feature.

By right-clicking a camera in the list, the context menu will appear as following figure. By selecting this menu, the camera can be opened using an XML file stored in the local storage on the host.



By selecting this menu item, dialog to specify the XML file will be opened. Then, select the XML file and execute the steps to open the camera. Note that user must use correct XML file that matches to the current camera. Otherwise, the camera becomes out of control, as the result of loading incorrect XML.

Hint

In case incorrect XML file was loaded	The camera will return from failure to correct state if camera is closed and reopened, with procedure written in "Camera Open/Close".
Procedure for saving XML file from camera to local storage	Refer to sentence within "Save XML to file".

7.1.5. Features for GigE camera

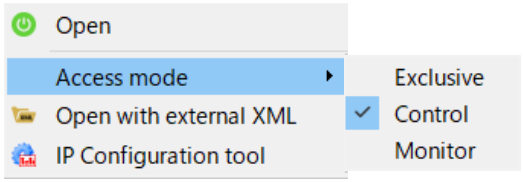
The descriptions in this sentence are **only available for GigE camera**.

In the Camera List described as ③ above, by right-clicking a GigE camera with the mouse, that is listed in the "GEV devices" category, the following context menu will appear, and it is available to setup the GigE camera.

7.1.5.1. Access mode selection

It is available to select Access mode for a GigE camera with menu as following figure. Default setting is Control access. Basically, it is recommended to use with default setting.

If user need to change the settings by any reason, select the appropriate mode from following menu, and then execute the steps to open the camera.

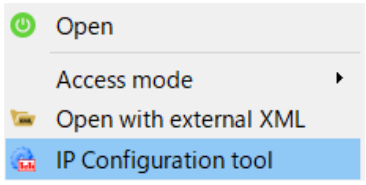


Details of each mode are described in following table.

Access mode	Description
Exclusive	Camera is opened with exclusive access rights. Then, registers on camera can be accessed with RW permission. If it is opened with this mode, it becomes to be inaccessible from other hosts.
Control	Camera is opened with control access rights. Then, registers on camera can be accessed with RW permission. If it is opened with this mode, accessing from other hosts is limited with RO permission.
Monitor	Camera is opened with monitor access rights. Then, since registers on camera can be accessed with RO permission, this host cannot write and change any setting on camera. This mode should be used when the camera is already opened from other host, with the control access rights, and it is needed to access from this host to such camera, with RO permission. Basically, monitor access is used to open the camera as a listener, when "Multicast" is activated.

7.1.5.2. Launch "IP Configuration tool"

From following context menu, it is available to launch the external tool, such as "IP Configuration tool".



This allows users to change the IP address settings for the GigE camera on current network. Note that "IP Configuration tool" can change the settings of products of Toshiba Teli only.

7.2. Main window

Main window is a centrally placed window for displaying camera images. It supports various features to assist users, such as zoom in/out, drawing lines on the image, or etc. Also, it supports the "Multi display" feature, which allows to display multiple camera images on a single screen, such as 2in1/4in1.

The following descriptions explain how to use these features.

7.2.1. Control for stream

This section describes the operations for streaming from the camera. The basic controls can be operated from the toolbar as following.

7.2.1.1. Start

By pressing the button ① in above figure, streaming is started with current camera.

7.2.1.2. Pause

By pressing the button ② in above figure, updating of images is temporarily paused. Even if it is paused, capturing of images from camera is continued. This feature is useful when user need to confirm the actual capture rate from camera, without any overhead relating to image rendering.

If this button is pressed again, updating of images is resumed immediately.

7.2.1.3. Stop

By pressing the button ③ in above figure, streaming is stopped.

Hint

Using the context menu	When the camera is already opened, to right-click the image display area with the mouse displays a context menu for controlling the stream as following figure.  By using this, it is possible to perform quick operations for streaming, such as Start/Pause/Stop.

7.2.2. Scroll feature

When part of the camera image is outside the current display area, the scroll feature enables users to view and confirm the outlying image area. This feature is supporting 2 modes as follows. Users can select appropriate mode for current situation or preference. It is selectable on toolbar after stream is started.

7.2.2.1. Drag mode

By pressing the button ① in above figure, scroll mode will be changed to drag mode. When this mode is selected, users can scroll the image by following steps.

Additionally, if this button is pressed again, the drag mode will be turned off.

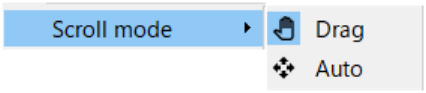
[Steps]
1) When the mouse cursor is on the camera image, confirm that the cursor shape is the same as the "palm" as shown in the above figure ①.
2) Click anywhere on the camera image with the left mouse button.
3) Move the mouse with dragging to scroll the image.
4) Release the left mouse button.
5) Move to the target coordinate by repeating the above steps 2 to 4.

7.2.2.2. Auto mode

By pressing the button ② in above figure, scroll mode will be changed to auto mode. When this mode is selected, moving the mouse cursor to any point on the camera image will bring automatically scrolling, in sync with the cursor movement.

Additionally, if this button is pressed again, the auto mode will be turned off.

Hint

Using the context menu	When the camera image is displayed, right-clicking on the image area with the mouse displays a context menu for switching the scroll mode, as following figure.  By using this, it is possible to perform quick operations for selecting scroll mode, such as Drag/Auto or turning off them.

7.2.3. Zoom feature

This section describes operations to zoom in or out the camera image. Basically, operations can be done from the toolbar. In addition to that, if a wheel-equipped mouse is connected to the host, user can also use this wheel to zoom in/out.

The available range for zoom is from 3% to 800%.

7.2.3.1. Using the slider

By dragging the handle (knob) with the mouse, on the slider ① in above figure, the value can be changed continuously. Also, by clicking on the guide areas, users can change the zoom setting in smaller steps.

The changed result is automatically reflected to ④ in above figure. By the value of ④, users can confirm the current actual value anytime.

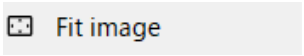
7.2.3.2. Fit mode

By pressing the button ② in above figure, image is displayed with Fit mode. In Fit mode, the image is continuously displayed under the following conditions.

Image Direction	Display Effects
Vertical	Fit image to height of display area
Horizontal	Centering image to display area

Even if display area is resized, image will be displayed with above conditions. Additionally, Fit mode will be canceled forcedly, by pressing ①, ③, ④ in above figure, or the result of operating Ctrl key + mouse wheel, as described in this section.

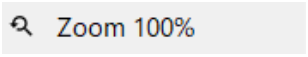
Hint

Using the context menu	When the camera image is displayed, right-clicking on the image area with the mouse displays a context menu for changing into the Fit mode, as shown in following figure.  By using this, it is possible to perform quick operations for changing into this mode.

7.2.3.3. Actual size (100%)

By pressing the button ③ in above figure, image is displayed with actual size (Zoom: 100%).

Hint

Using the context menu	When the camera image is displayed, right-clicking on the image area with the mouse displays a context menu for displaying the image with actual size, as shown in following figure.  By using this, it is possible to perform quick operations for changing the magnification to actual size.

7.2.3.4. Using the spin box

By using the spin box ④ in above figure, it is available to enter values directly, or to change values in small steps using the spin buttons.

If value is changed by this method, the changed result is automatically reflected into ①.

7.2.3.5. Using the Ctrl key + mouse wheel

[Note] It is required a wheel-equipped mouse to accomplish this operation.

After clicking on an image area, the image can be zoomed in or out by holding down the Ctrl key on keyboard and moving the mouse wheel up or down.

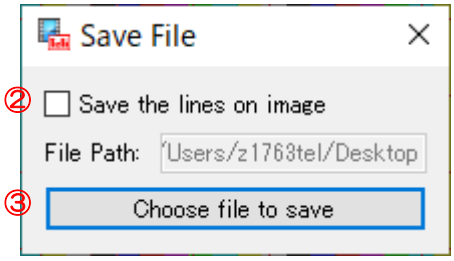
Operation	Effects
Ctrl key + mouse wheel Up	Zoom in the image
Ctrl key + mouse wheel Down	Zoom out the image

7.2.4. Save image to file

The currently displayed image can be saved as a still image. To save the image, click the following button on the toolbar.

7.2.4.1. Dialog for save

By pressing the button ① in above figure, following dialog will appear.



7.2.4.2. Save the lines on image

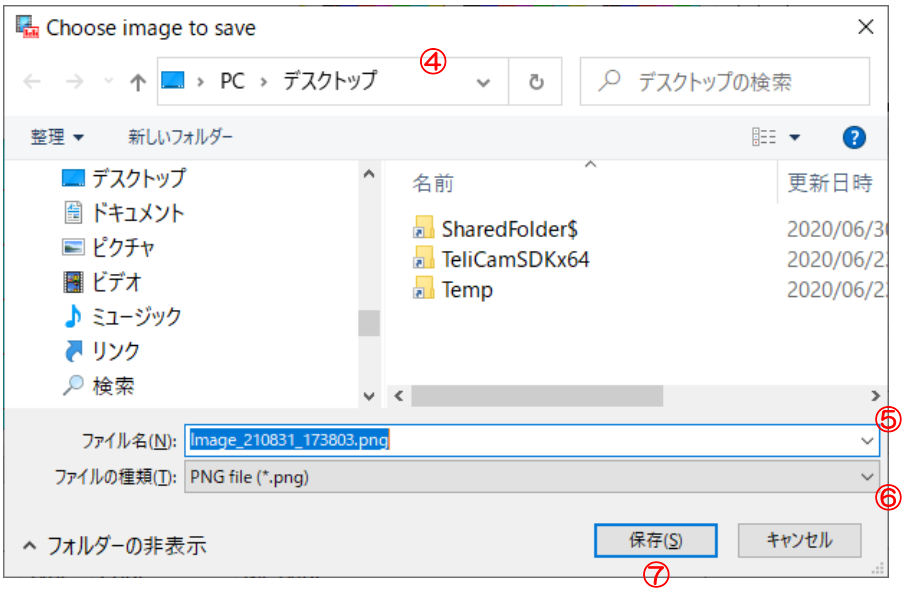
When Grid or 4x4 is enabled with “Draw lines on image” setting, check box ② in above figure is available. By checking it, the lines drawn on current image can be saved to a file,.

Attention

Saving the image with RAW format	Note that if "RAW" is selected for file format, any lines drawn on current image cannot be saved to the file.

7.2.4.3. Setting for save

By pressing the button ③ in above figure, the dialog as following is displayed. In this dialog, it is available for users to select the folder, filename, and file format.



7.2.4.4. Folder

By using ④ in above figure, users can select the folder on the host, where the file is to be saved.

7.2.4.5. Filename

By using ⑤ in above figure, users can specify the filename to be saved. Initially, the filename is shown in "Image_yymmdd_hhmmss" style.
(yymmdd: Date when ③ was pressed; hhmmss: Time when ③ was pressed)

7.2.4.6. File format

By using ⑥ in above figure, users can select a format from 4 types in following table.

Format	Description
PNG	Image is saved as PNG format. Bit depth can be selected from 8, 16, 24, 32, or 48 bpp.
JPG	Image is saved as JPG format.
BMP	Image is saved as BMP format. Bit depth can be selected from 8, 24, or 32 bpp.
RAW	Image is saved as RAW format.

7.2.4.7. Header of RAW format

When the image is saved with RAW format, the beginning of the saved file contains 32 bytes of header information as follows. The actual image data is stored immediately after it.

Structure	Size (Byte)	Description
Flag	4	0x00574152 indicating RAW format is always stored.
File size	4	Size of this file.
Image format	4	Image format stored in this file.
Width	4	Width of image.
Height	4	Height of image.
Reserved	12	This field is reserved for future extension.

7.2.4.8. Save button

By pressing the button ⑦ in above figure, image data is saved into file with specified condition.

Hint

Working with trigger mode	By using the trigger mode, user can explicitly capture the still images. If necessary, user can use it within “Trigger” pane of “Camera Control panes”.

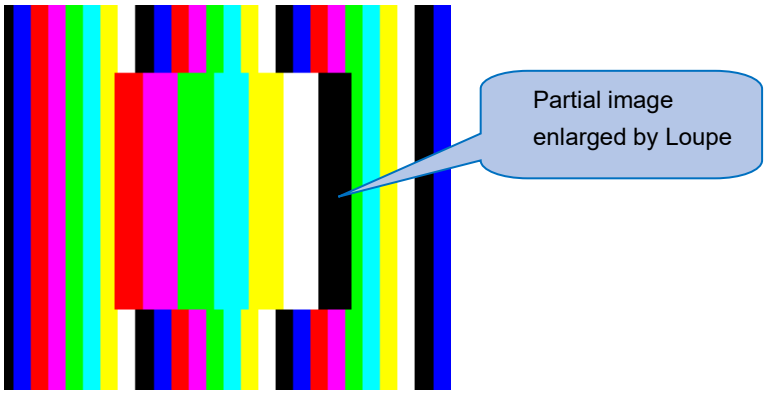
7.2.5. Loupe

Loupe tool is available to enlarge the part of image. It enlarges as doubled size of the image, in current cursor position.

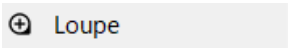
7.2.5.1. Launch of Loupe

By pressing the button ① in above figure on toolbar, Loupe tool is launched. Loupe is moved in sync with current mouse cursor. When this button is pressed again, Loupe is closed.

Following figure is showing the overview when it is enabled, and image is enlarged.



Hint

Using context menu	When the camera image is displayed, right-clicking on the image area with the mouse displays a context menu for launching the Loupe, as shown in following figure.  By using this, it is possible to perform quick operations for it.

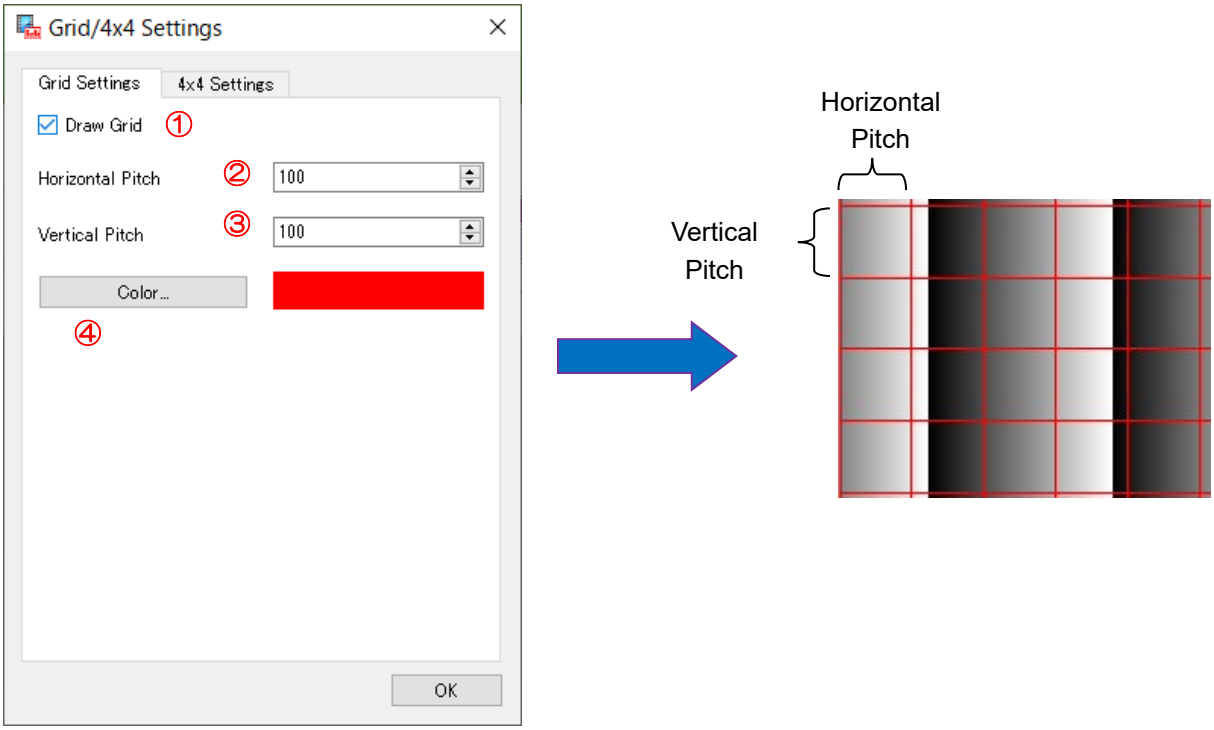
7.2.6. Draw lines on image

This feature is available for drawing the lines on current image. By selecting the menu ① on menubar, or button ② on toolbar as following figures, users can draw them. The same dialog will appear for both selections.

The above operation opens the "Grid/4x4 Settings" dialog, and the usage for each of “Grid” and “4x4” is following.

7.2.6.1. Grid

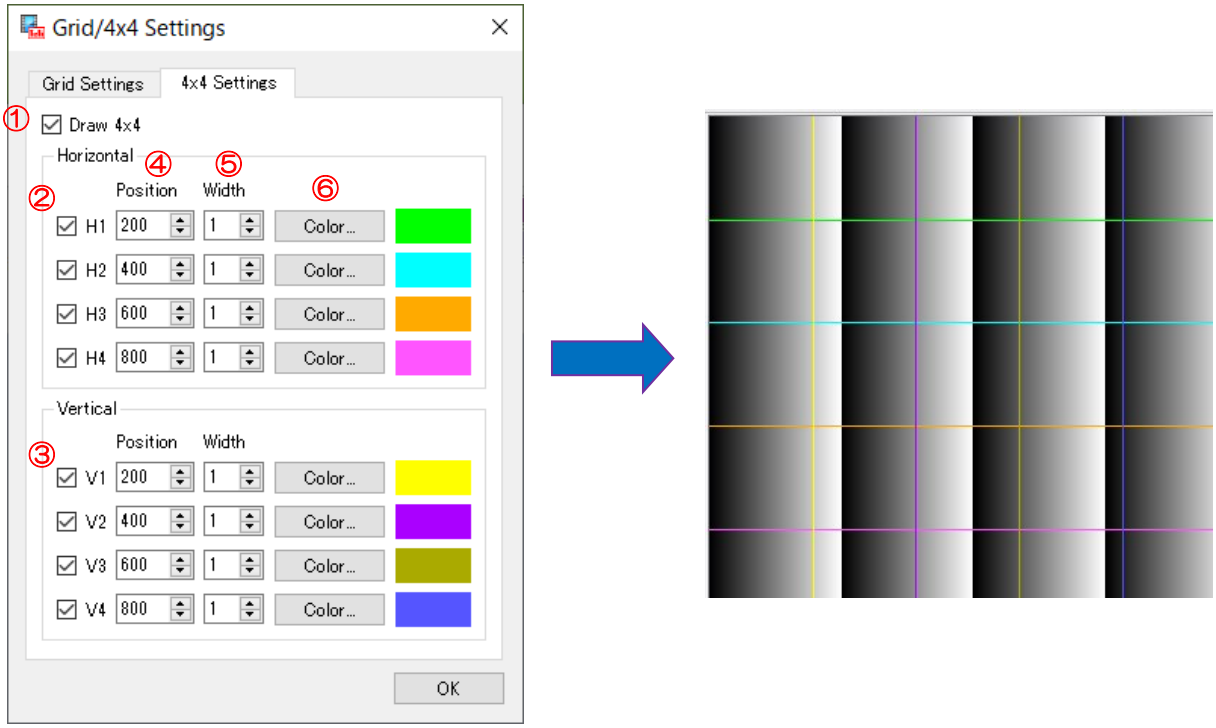
By selecting the “Grid Settings” tab on the “Grid/4x4 Settings” dialog, the following dialog will appear. In addition, the image on the right shows the actual image with the Grid lines, according to the current settings.
The width of lines is fixed as 1Pixel.



①Draw Grid check box
When it is checked, Grid lines are drawn on current image.
②Horizontal Pitch
It specifies the pitch of horizontal lines. The unit of the value is pixel.
③Vertical Pitch
It specifies the pitch of vertical lines. The unit of the value is pixel.
④Color
When this button is pressed, the dialog for selecting the color is displayed. Users can change the color of them by it.

7.2.6.2. 4x4

By selecting the “4x4 Settings” tab on the “Grid/4x4 Settings” dialog, the following dialog will appear. By using this feature, four horizontal lines and four vertical lines can be drawn on the image. In addition, the image on the right shows the actual image with the 4x4 lines, according to the current settings.



①Draw 4x4 check box

When it is checked and additionally following ② or ③ is checked, each 4x4 lines are drawn on current image.

②H1～H4 (Horizontal Line #1～#4) check box

When it is checked, horizontal line is drawn. After checking the above “①: Draw 4x4 checkbox”, check any of H1～H4 to draw the corresponding horizontal line.

③V1～V4 (Vertical Line #1～#4) check box

When it is checked, vertical line is drawn. After checking the above “①: Draw 4x4 checkbox”, check any of V1～V4 to draw the corresponding vertical line.

④Position

It can specify the position of each line. The unit of the value is pixel. The setting and effects for horizontal and vertical lines are following.

Position setting	Effects
H1～H4	Draw the horizontal line according to current setting, for position based on the upper left corner of the image. It is drawn on specified pixel position toward Y-axis.
V1～V4	Draw the vertical line according to current setting, for position based on the upper left corner of the image. It is drawn on specified pixel position toward X-axis.

⑤Width

It specifies the width of each line. The unit of the value is pixel. The available range is from 1 to 10.

⑥Color

When this button is pressed, the dialog for selecting the color is displayed. Users can change the color of them by it.

7.2.6.3. Move 4x4 by mouse drag

Each 4x4 line drawn in the image can be moved by dragging with the mouse. Refer to the following procedure to move them.

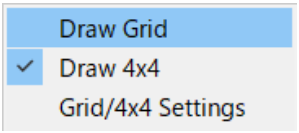
[Steps]

1) Draw 4x4 lines according to the "4x4" procedure described in the previous section.
2) Move mouse cursor on 4x4 lines drawn on image.
3) Click the line with left mouse button and drag to move it.
4) When it has finished to move the line to the desired position, release the left mouse button.
5) With the above operations, the line can be moved to any desired position on the image.

Attention

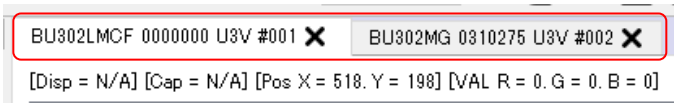
Under the drag mode	This feature is not available under the "Drag mode". Drag mode should be disabled to use this feature.

Hint

Using context menu	When the camera image is displayed, right-clicking on the image area with the mouse displays a context menu as following.  1) Draw Grid Grid can be turned on and off by this. The effect is the same as if the operation ① had been done in the "Grid" description. 2) Draw 4x4 4x4 can be turned on and off by this. The effect is the same as if the operation ① had been done in the "4x4" description. 3) Grid/4x4 Settings "Grid/4x4 Settings" dialog can be opened. By using this, it is possible to perform quick operations for Grind/4x4.
Regarding save and restore Grid and 4x4 settings	When the check box of "Save and Restore Grid/4x4 settings" in options dialog is checked, it is enabled to save and restore current line drawing states. Saving the settings is executed when the camera is closed, and data is saved into "Line configuration file". Also, data is restored when the camera is opened. If a "Line configuration file" exists that matches the three keys "ModelName / SerialNumber / DeviceUserID" of the current camera, it will be restored. **Attention** Note that if the DeviceUserID of the camera is changed, it will no longer match the DeviceUserID stored in the "Line configuration file". As the result, previously saved data will not be restored.

7.2.7. Tab control

When the screen is displayed in normal mode (not multi-display) and multiple cameras are opened, tabs as following figure will appear at the top of the display area. This section describes the operation for tabs.



7.2.7.1. Change current camera

By left-clicking on a tab with the mouse, camera selection can be changed.

7.2.7.2. Tab detachment

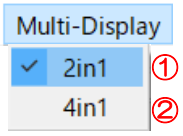
Tabs can be detached by double-clicking on them. As the result, camera image is displayed with independent window. By utilizing this feature, the image display area can be arranged in a layout for user's preferences.

Also, double-clicking on the title bar of a detached window will re-tab it and return it to its original state.

7.2.8. Multi display

By clicking the "Multi-Display" on menubar, it is available to utilize 2in1 or 4in1 mode as following figure. By selecting one of these options, multi-display mode will be activated.

In following figure, 2in1 is checked and the viewer is working in 2in1 mode. If this is clicked again, the checked state is cancelled, and TeliViewer returns to normal mode. This operation is same for 4in1.



Attention

Attention for changing mode	Note that if the mode is changed when the camera is open, all opened cameras will be forced to close.
Regarding the requirements for Multi-Display mode	Streaming multiple cameras with "Multi-Display" modes simultaneously requires high hardware performance. Please refer to the description in "Operation Environment" for requirements, etc.

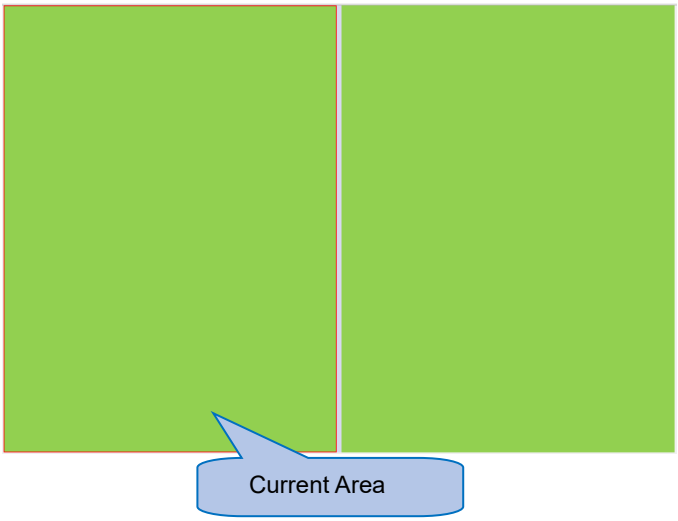
7.2.8.1. 2in1

By selecting ① in above figure, TeliViewer will enter into 2in1 mode. In 2in1 mode, two camera images can be displayed simultaneously in the main window.

The following section describes the procedure for displaying camera images in 2in1 mode.

[Steps]

1) By using the mouse, select any of the divided image display areas. The selected area (Current Area) is encircled by a red frame.



2) Open the camera to the Current Area according to the procedure "Camera Open/Close" in Discovery.
3) Start streaming to the opened camera in the Current Area with the "Start" procedure of the stream operation.
4) By using the mouse, select the area where the camera is not open and change the Current Area.
5) Repeat steps 2) to 4) above to start streaming for all cameras for which images are to be displayed.

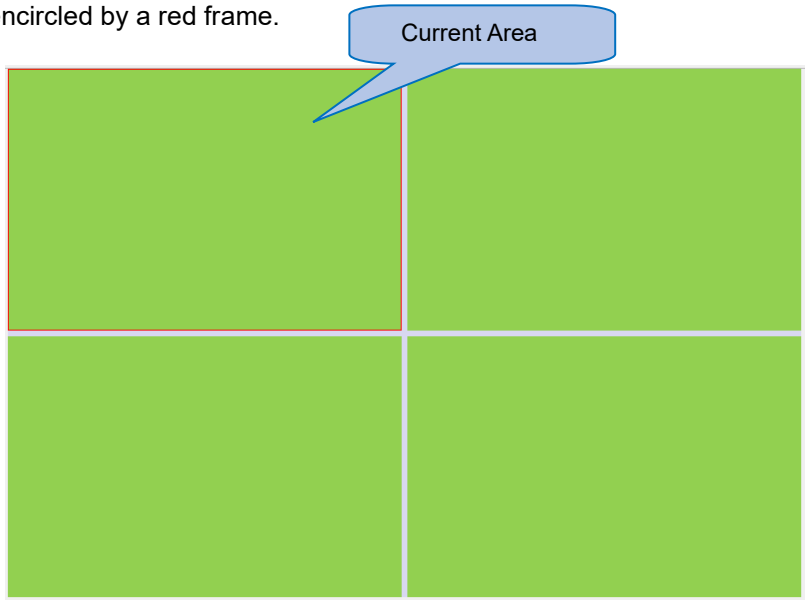
7.2.8.2. 4in1

By selecting ② in above figure, TeliViewer will enter into 4in1 mode. In 4in1 mode, four camera images can be displayed simultaneously in the main window.

The following section describes the procedure for displaying camera images in 4in1 mode.

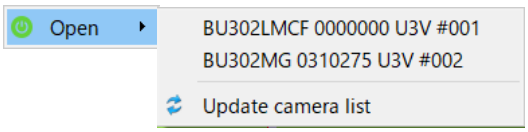
[Steps]

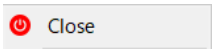
1) By using the mouse, select any of the divided image display areas. The selected area (Current Area) is encircled by a red frame.



2) Open the camera to the Current Area according to the procedure “Camera Open/Close” in Discovery.
3) Start streaming to the camera in the Current Area with the “Start” procedure of the stream operation.
4) By using the mouse, select the area where the camera is not open and change the Current Area.
5) Repeat steps 2) to 4) above to start streaming for all cameras for which images are to be displayed.

Hint

<table>
<tr><td rowspan="3">Using context menu</td><td>Quick operation for camera open</td><td>When the camera is not open, right-clicking on the Current Area displays the Camera Open menu as following.
 

By using this, it is possible to perform quick operations for opening the camera. Even in full screen mode, where the Discovery pane is not displayed, this can be used to open the camera.</td></tr>
<tr><td>Quick operation for camera close</td><td>When the camera is open, right-clicking on the Current Area displays the Camera Close menu as following.
 

By using this, it is possible to perform quick operations for closing the camera. For example, if users want to change the positioning of the camera while in full screen mode, users can use this and the open context menu as above to change it easily.</td></tr>
<tr><td>Focusing the display on a specific camera in 2in1/4in1 mode</td><td>When the camera image is displayed, right-clicking on the image area with the mouse displays a context menu as following.
 

By using this, the current image can be displayed alone in full screen mode. Use this option when users want to focus on a specific image.</td></tr>
<tr><td>How to display or hide the scroll bar</td><td colspan="2">Refer to the “Display Scrollbar” description for the scroll bar display settings within each of the divided image display areas.

Attention
Scroll bar is not available under the “Fit mode” mode.</td></tr>
<tr><td>How to display or hide the current frame rate, coordinate information, and RGB values</td><td colspan="2">For the information display, “TabBar” or “Overlay” can be selected. It is possible to choose the most suitable method according to user’s preferences.</td></tr>
</table>

7.2.9. Full Screen display

By pressing the Full Screen button on the toolbar, the image can be displayed in Full Screen mode.

 ①

7.2.9.1. Start Full Screen

By pressing ① in above figure, the current main window can be displayed in Full Screen. It is available in following conditions.

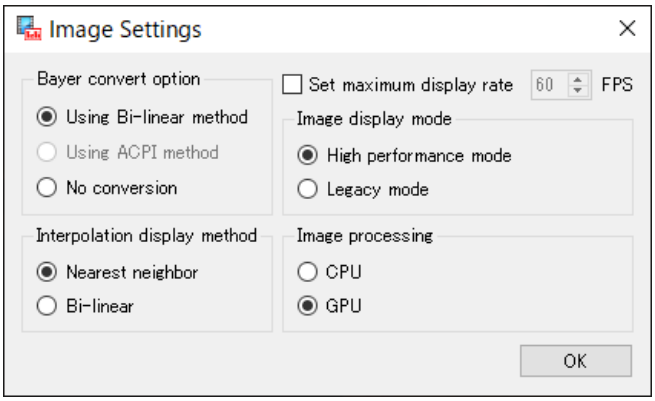
Display mode	Effects
Normal	When the camera image is displayed in normal mode, pressing ① will display the current image in Full Screen.
2in1	When the camera image is displayed in 2in1 mode, pressing ① will display the 2in1 image in Full Screen.
4in1	When the camera image is displayed in 4in1 mode, pressing ① will display the 4in1 image in Full Screen.

7.2.9.2. End Full Screen

When the ESC key is pressed, the Full Screen returns to the previous screen.

7.2.10. Image Settings

By selecting the [Image] → [Settings] option in menubar, Image Settings dialog will appear as following. In this dialog, configuration settings for image rendering can be changed.



7.2.10.1. Bayer convert option

When the image format is Bayer type, pixel interpolation method can be changed with this option. It is possible to select from three types: Bi-Linear, ACPI, or No conversion. Default setting is Bi-Linear.

Attention

Regarding the ACPI method	ACPI is only available with Bayer 8 bit. If current pixel format is Bayer 10 or 12 bit, ACPI is not selectable.

7.2.10.2. Interpolation display method

When the image is zoomed in or out, pixel interpolation method can be changed with this option. It is possible to select from two types: Nearest neighbor or Bi-Linear. Default setting is Nearest neighbor.

7.2.10.3. Set maximum display rate

It is possible to set the upper limit of the Display Rate. For example, in environments with low hardware performance, when the Capture Rate does not achieve the maximum camera FPS, it is typically due to system resources being drained by stress from the image rendering. In that case, by limiting the upper limit of the Display Rate, users can ensure that “maximum Display Rate with keeping the maximum Capture Rate” in current environment.

Specifically, refer to the following procedure.

[Steps]
1) Check the check box of “Set maximum display rate”
2) Input Zero to spin box
3) Confirm the Capture Rate
4) Increase the value of the spin box in small steps by about 1 or 2
5) Repeat steps 3 through 4 above to find a Display Rate that can keep the maximum Capture Rate

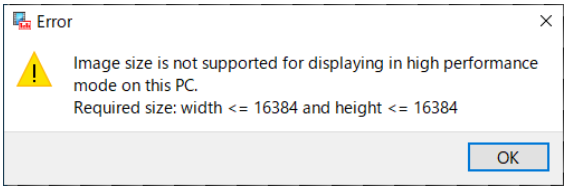
[Note] The maximum value that can be set here depends on the refresh rate of the monitor hardware currently in use.

7.2.10.4. Image display mode

It is possible to select the method to display the image from following 2 options. Default setting is High performance mode. Basically, please use with default setting. Regarding the utilization of Legacy mode, please understand the following descriptions and limitations.

Image display mode	Effects
High performance mode	This option realizes the high performance rendering of images with OpenGL. However, as following hint description, since it is affected by a value of GL_MAX_TEXTURE_SIZE, it has possibility that large image size cannot be rendered.
Legacy mode	This option doesn't utilize the OpenGL. So, performance of rendering is lesser than High performance mode. However, as following hint description, since it is not affected by a value of GL_MAX_TEXTURE_SIZE, it is possible to render the larger image size than High performance mode. Also, in this option, only CPU mode is available in "Image Processing".

Hint

About GL_MAX_TEXTURE_SIZE and utilization of Legacy mode	There is a limit in OpenGL regarding max image size to be rendered. It is called as GL_MAX_TEXTURE_SIZE and depending on GPU. For instance, if the value is 16K (16384), under this GPU, the image larger than 16K cannot be rendered with OpenGL. Then, TeliViewer will display following message when streaming is started:  If it is displayed, please try to render the image by using Legacy mode. However, note that performance is lesser than High performance mode.

7.2.10.5. Image processing

It is possible to select whether the image conversion is to be processed by the CPU or the GPU. Default setting is GPU.

Basically, by processing the images in GPU mode, the CPU stress can be kept low. As the result, the impact on other processes is reduced, and the entire system may be run more smoothly. So, it is recommended that users should work with GPU mode. Only if user meet any problem in displaying images while using the GPU mode, it is recommended to switch to the CPU mode as the workaround and confirm whether there is any improvement.

[Note] In some environments such as graphic driver without OpenGL support is installed, users cannot select the GPU mode. In that case, it will automatically work in CPU mode.

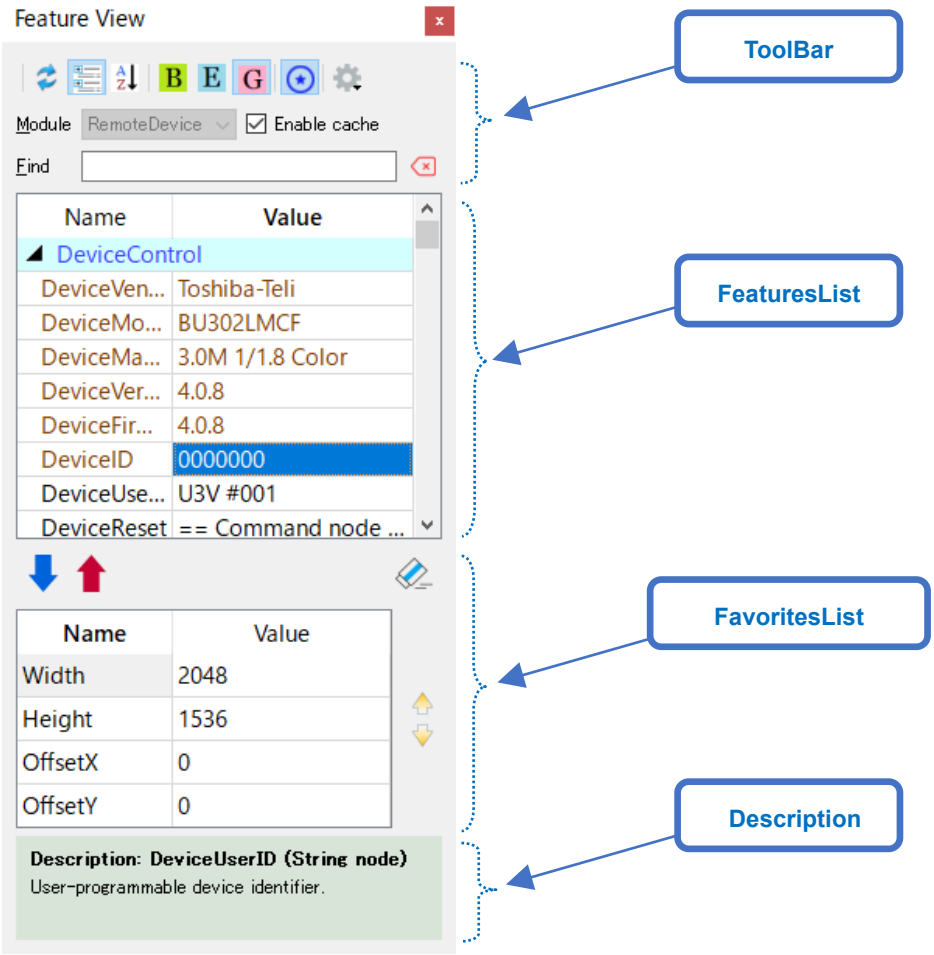
Hint

In case there is no difference in CPU stress between GPU and CPU mode	If inappropriate driver is installed for the graphics card, there is a possibility that the GPU processing will not work correctly. For information on how to install the most appropriate driver, refer to the website of vendor of graphics card.

7.3. FeatureView

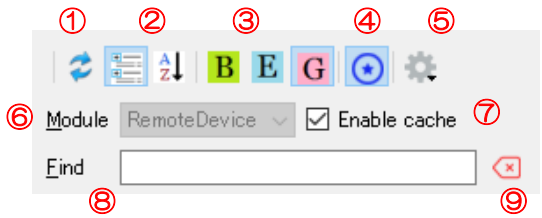
This displays a list of features supported by the camera that is currently opened. It displays the current value of each feature and if it is editable, provides a method for editing.

FeatureView is consisted with the ToolBar, FeaturesList, FavoritesList, and Description area. The following section describes the usage of these components.



7.3.1. ToolBar

ToolBar is consisted with following features. This section describes how to operate each of them implemented here.



7.3.1.1. Reload

By pressing ① in above figure, the FeaturesList and FavoritesList will be updated to the current value.

7.3.1.2. Format Selection

By selecting ② in above figure, the display format of the FeaturesList can be changed as follows.

Buttons	Effects
button	Display by category.
button	Sort and display in alphabetical order

7.3.1.3. Filter Selection

By changing the selection of ③ in above figure, it is possible to filter the items that are displayed in FeaturesList. Each item supported by the camera has the attribute of Beginner/Expert/Guru, and the display of FeaturesList can be switched by selecting one of the follows.

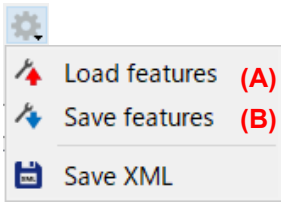
Display Mode	Effects
B button	Beginner mode. It displays the items only for Beginner.
E button	Expert mode. It displays the items for Beginner and Expert.
G button	Guru mode. It displays the items for Beginner, Expert and Guru.

7.3.1.4. Enable FavoritesList

By pressing ④ in above figure, toggles the FavoritesList pane ON or OFF. When it is ON, FavoritesList is available.

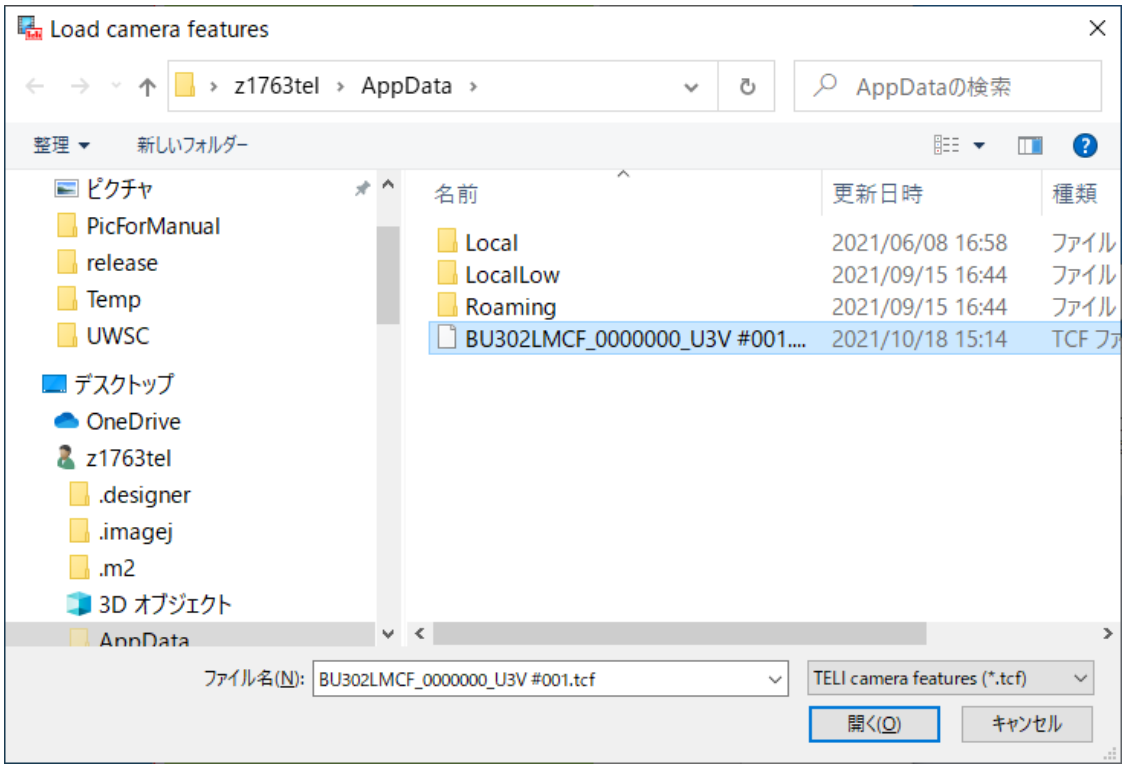
7.3.1.5. Save/Load camera features

By pressing ⑤ in above figure, submenu for saving or loading the settings of camera features will appear as following figure. This section describes how to use them.

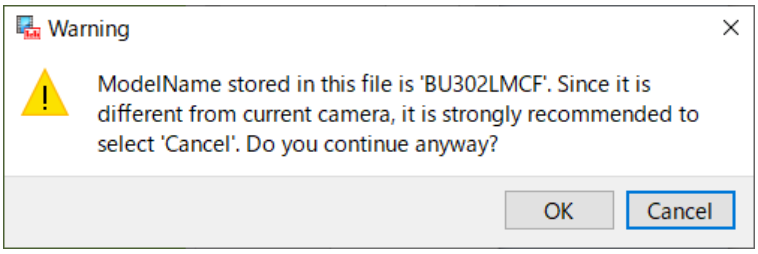


7.3.1.5.1. Load features

By selecting (A) in above figure, following dialog is opened. It is possible to load the camera settings by selecting a file that was previously saved in the "Save features" steps.

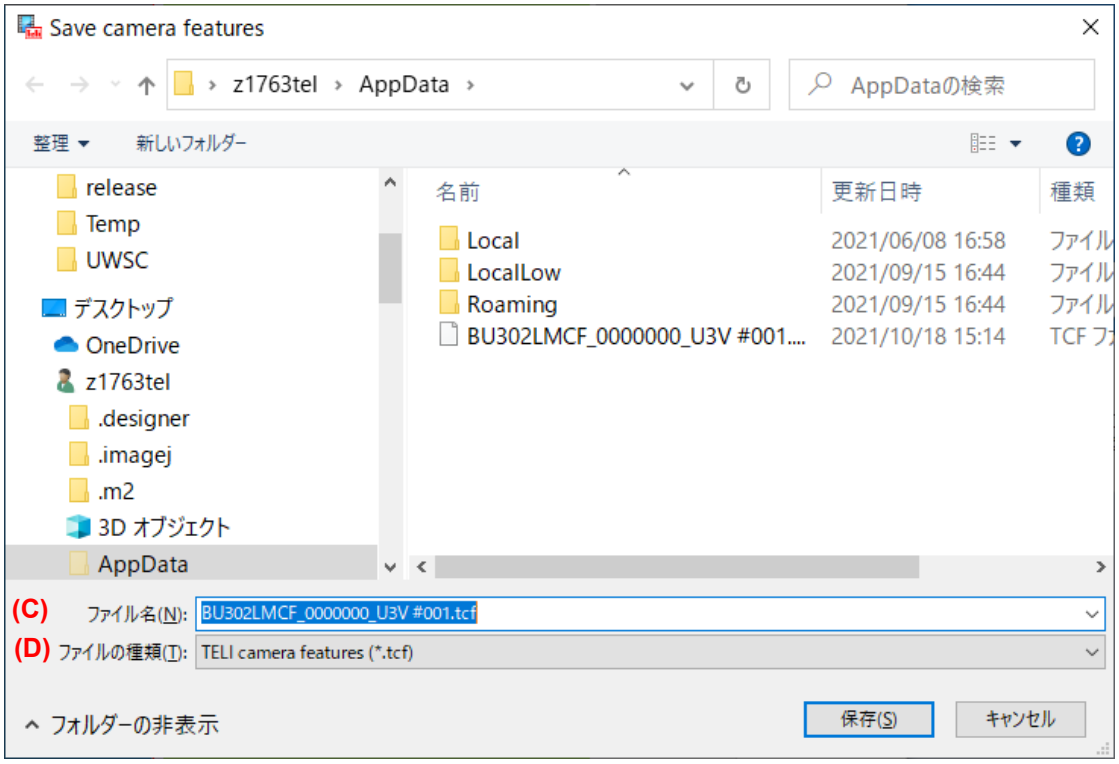


Attention

In case the camera is in streaming	The Load feature is not available when the camera is in streaming mode. It is required to stop the camera streaming at once before using Load feature.
In case the configuration file with different model name is selected	If a configuration file with a model name different from the currently opened camera is attempted to load, warning will be displayed as following.  In this case, it is recommended to abort the operation by pressing Cancel. If OK is pressed to continue, the loading will fail in most cases and cause unexpected result. Although it is possible to continue by pressing OK, note that if the camera becomes abnormal state as the result, it is the user's responsibility.
In case the incorrect file was loaded	If the incorrect file is loaded, the camera will fall into abnormal state as the result. In such case, the camera can be recovered to its initial state by re-plugging or executing Device Reset.

7.3.1.5.2. Save features

By selecting (B) in above figure, the camera settings can be saved into a file with following dialog.



➢ Filename

(C) displays the initial string of file names. The string is constructed from “(ModelName)_(Serial Number)_(DeviceUserID)”. If needed, the name can be changed to another one according to user’s preferences.

➢ File format

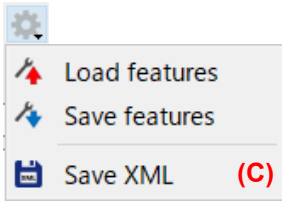
In (D), only the tcf (TELI camera features) format can be selected. Only this format can be loaded by steps (A) in above description.

Attention

In case using CoaXPress camera	Under the CoaXPress, there are two types of settings: those belonging to the camera and those belonging to the capture board. Note that only the limited number of capture board settings will be saved into the file but not all settings.

7.3.1.6. Save XML to file

By pressing ⑤ in above figure, submenu for saving the XML file is displayed. It allows users to save XML data of currently opened camera into the file.



By selecting (C) in above menu, dialog for saving the XML file is displayed. Then, select the filename and folder, and click the [Save] button to save the file.

7.3.1.7. Access module selection

[Note] This feature is only available when current camera is GenTL device. When current camera is USB3 or GigE, it is N/A.

By changing the selection of ⑥ in above figure, the setting items for each module can be selected.

Items	Description
RemoteDevice	Displays items categorized as RemoteDevice. They are settings for the camera.
System	Displays items categorized as System. They are settings for the capture board.
Interface	Displays items categorized as Interface. They are settings for the capture board.
Device	Displays items categorized as Device. They are settings for the capture board.
Stream	Displays items categorized as Stream. They are settings for the capture board.

7.3.1.8. GenICam cache setting

By changing ⑦ in above figure, the GenICam cache can be turned ON or OFF.

This is a setting for developer. Default setting is ON. Basically, it should be left ON.

For example, if it is needed to reflect the current value in the FeaturesList or FavoritesList after writing the value directly to the camera register, by using the Write command, turn off this check box and then press the Update button ①. By this operation, the current value stored in the camera register can be directly read out, instead of the value stored in the cache.

[Note] If it is used with the OFF setting, I/O performance with the camera may be slower.

7.3.1.9. String search

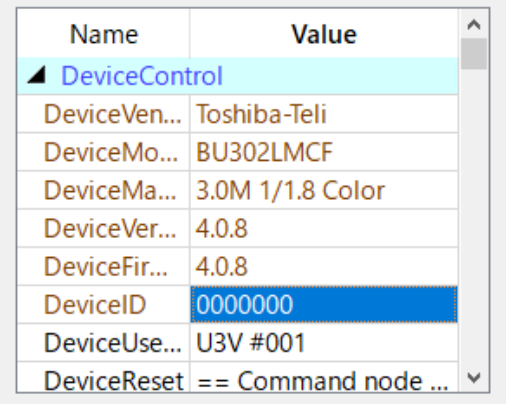
By entering the string into ⑧ in above figure, it will search the items in FeaturesList with case-insensitive condition. In FeaturesList, all items that partially contain the entered string are searched, and the search results are displayed.

7.3.1.10. Delete button for string search

By pressing the button ⑨ in above figure, the all text entered into the string search will be deleted. Also, pressing Ctrl key + Del button works as a shortcut key for this feature.

7.3.2. FeaturesList

The supported features in current camera are displayed as following list.



7.3.2.1. Color of feature in list

Each feature in the list is displayed in a different color. The meaning of each color is following.

Color	Details
Black	Indicating that the attribute of the item is RW (ReadWrite). The value can be edited.
Brown	Indicating that the attribute of the item is RO (Read-Only). The value cannot be changed.
Green	Indicating that the attribute of the item is WO (Write-Only). When an editor for this feature is opened, a command button will appear.

7.3.2.2. How to change the value

If the attribute of the feature is RW or WO, it can be edited by opening a user interface for changing the value. This user interface is called as Editor. The following describes how to use it.

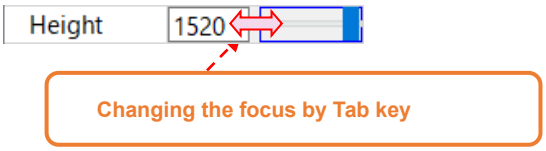
7.3.2.2.1. How to open/close the Editor

Editor can be opened or closed with following operation. When Editor is open, the value is editable.

Purpose	Operations
Open the Editor	• Left-click the value with mouse • With the feature on the "Name" column selected, press the right arrow key
Close the Editor	• Left-click with mouse anywhere other than the opened editor • Press Enter key • Press ESC key

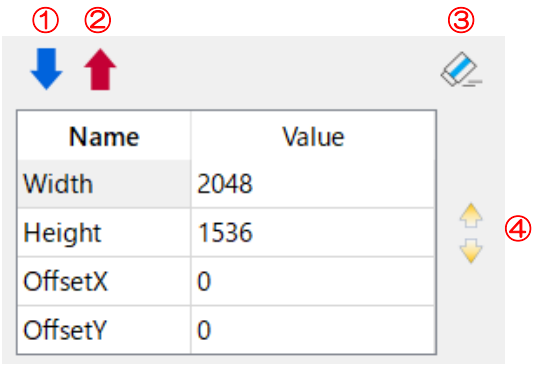
7.3.2.2.2. How to input to Editor

The following types of editors are available. This section describes how to change each value.

Type of Editor	Descriptions
Line editor	Integer values, floating-point values, and character strings can be entered directly. For GigE cameras, IP addresses can also be entered by it. The format of the values that can be entered depends on each feature. For details, refer to the instruction manual of current camera.
Drop-down list	By opening the editor, a list of selectable values is displayed. Users can select the value from it.
Command button	By pressing the displayed button, the selected operation is executed.
Composite editor	In this editor, both line editor and slider are available like following figure. Use these editors appropriately according to user's preferences. **Hint** • Using the Tab key Additionally, instead of using the mouse, it is possible to switch the focus between the line edit and the slider by pressing the Tab key or Shift+Tab key. 

7.3.3. FavoritesList

By registering frequently used features into FavoritesList, users can quick access to them. The all features registered here will be restored at the next launch of TeliViewer.



7.3.3.1. Add feature

By selecting a feature on the "FeaturesList" and press ① in above figure, it will add the feature to the FavoritesList.

7.3.3.2. Remove feature

By selecting a feature on the FavoritesList and press ② in above figure, it will remove the feature from the FavoritesList.

7.3.3.3. Remove all features

If button ③ in above figure is pressed, all features in FavoritesList will be deleted.

7.3.3.4. Sort features

After selecting a feature on the FavoritesList, users can move it up or down, by clicking the up or down arrow button ④ in above figure. Items can be sorted in any order by user's preferences.

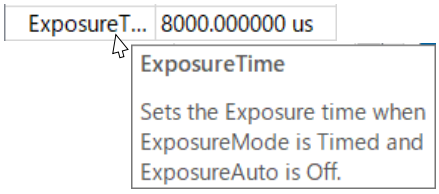
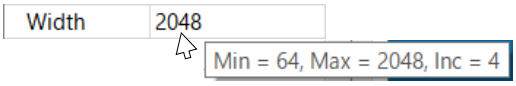
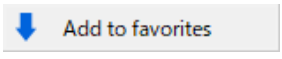
7.3.3.5. How to change the value

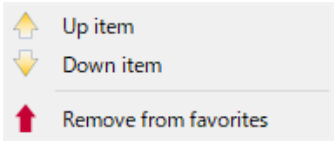
The method of editing a value is the same as on the FeaturesList. For more information, refer to "How to change the value".

7.3.4. Description pane

When any feature is selected on the FeaturesList or FavoritesList, detailed description of the feature will be displayed in this pane as following figure. If it is needed to know more about each feature, refer to it.

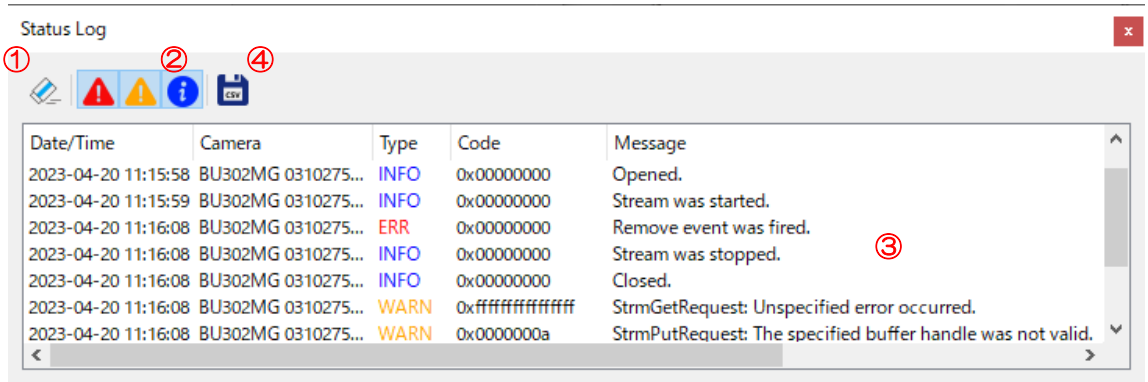
Hint

Show tool tip ① (Feature name and description)	When mouse cursor is moved over the name in FeaturesList or FavoritesList, a tool tip will appear as following.  It is possible to see the entire name of a feature even if it is partially hidden. Also, a brief description of it will be displayed for reference.	
Show tool tip ② (Info for settable values)	If a feature has the predefined value range, moving the mouse cursor to the Editor will display the Min/Max/Inc values as following.  It is available to confirm the range of values that can be set.	
Using context menu	Add feature to FavoritesList	By right-clicking a feature in FeaturesList, context menu is displayed as following.  It is possible to use it for quick registration to the FavoritesList.

	Operation for FavoritesList	By right-clicking a feature in FavoriresList, context menu is displayed as following.  It is possible to perform quick operations for sorting or removing the feature in FavoritesList.

7.4. StatusLog

It lists the events occurred in TeliViewer.



7.4.1. Clear Event list

When button ① in above figure is pressed, all events displayed in the event list will be cleared.

7.4.2. Event filter selection

By pressing any button ② in above figure, it is possible to filter the events displayed.

Filter	Effects
button	Displays Error information. It corresponds to an event type of **ERR**. It is an error that prevents to continue the processing.
button	Displays Warning information. It corresponds to an event type of **WRN**. It is a warning that can continue the processing.
button	Displays Info information. It corresponds to an event type of **INFO**. It is information but not error such as status change or else.

7.4.3. Details of Event list

In field ③ in above figure, each listed event is consisted with following information.

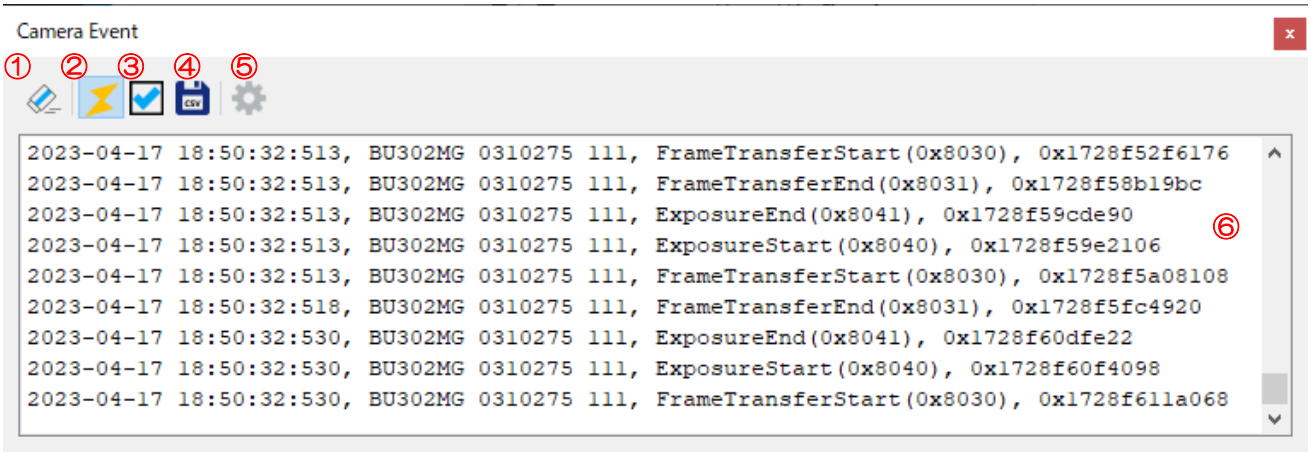
Item	Descriptions
Data/Time	Indicates the date and time of the event.
Camera	Indicates the ModelName, SerialNumber and DeviceUserID of the camera that the event occurred on.
Type	Indicates the type of event that occurred. As described in the previous section, there are three event types: ERR/WRN/INFO.
Code	Indicates the event code.
Message	Indicates the detailed description of the event.

7.4.4. Save events

By pressing the button ④ in above figure, a dialog to save the all events currently displayed in ③ will be opened. It can save them into CSV file. User can use it to analyze them on demand.

7.5. Camera event

By this pane, event from camera can be retrieved and displayed. It can be opened by selecting [View] → [Camera Control] → [Camera Event] on toolbar.



7.5.1. Clear camera events

When button ① in above figure is pressed, all events displayed in the event list will be cleared.

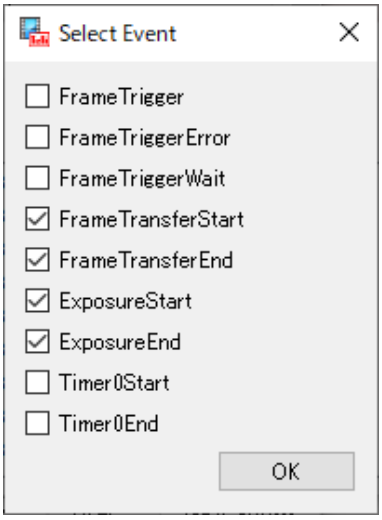
7.5.2. Turn ON/OFF camera event

By pressing the button ② in above figure, user can switch ON or OFF the camera event. The status of button will be changed as follows as toggle.

Status	Effect
 button	It means camera event is disabled. If the button is pressed, camera event becomes enable, and status of button will be changed as following.
 button	It means camera event is enabled. If the button is pressed, camera event becomes disable, and status of button will be changed as above.

7.5.3. Select camera event

By pressing the button ③ in above figure, a dialog as following will be displayed. This dialog shows the available events in current camera. By checking each checkbox on dialog, user can select the camera event to be retrieved



Hint

Regarding the selectable event	The selectable event here is different in each camera model. If it is required to know the more detailed information for each event, users can confirm it with user manual for current camera. It can be downloaded from our website.

Attention

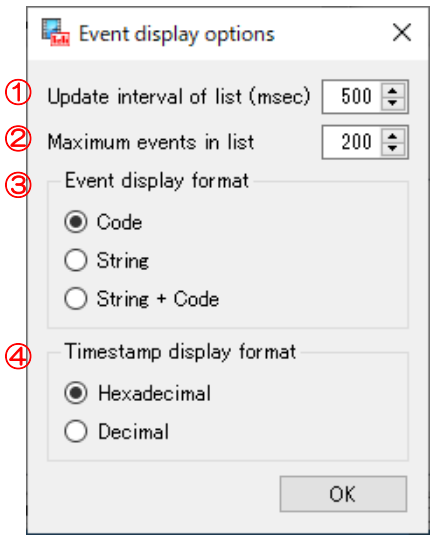
If several events are selected at the same time	The CPU load will be increased due to increasing the number of events received. As the result, the capture or display rate will be decreased. If user want to avoid this situation, please enable the minimum number of events required.

7.5.4. Save camera events in list

By pressing the button ④ in above figure, a dialog to save the all events currently displayed in ⑥ will be opened. It can save them into CSV file. User can use it to analyze them on demand.

7.5.5. Option settings

By pressing the button ⑤ in above figure, a dialog “Event Display options” as following will be displayed. User can configure the display settings for the events shown in ⑥ as follows.



	Item	Description
①	Update interval of list	It specifies refresh interval of the list in milliseconds, which can be set between 100 and 3000 milliseconds. The default is 500 milliseconds.
②	Maximum events in list	It specifies the maximum number of events to be displayed in the list, which can be set between 10 and 1000. The default is 200 events.
③	Event display format	It specifies the event display format. User can select from any of the following. ➢ Code Displays event code only. ➢ String Displays the event name string. ➢ String + Code Displays the event name string and event code at the same time.
④	Timestamp display format	It specifies the timestamp display format. User can select from any of the following. ➢ Hexadecimal Displays in hexadecimal. ➢ Decimal Displays in decimal.

Attention

Regarding settings ① or ②	If the setting value of ① is decreased or the setting value of ② is increased, the CPU load for the list update process will increase. Note that, as a result, capture rate or display rate will be decreased.

7.5.6. Camera evet list

The events retrieved from the camera are displayed in ⑥, in the order which they were received. The one line displays the information for one event. The events are displayed in the following format.

[Date and time of event acquisition], [Camera identification], [Event], [Timestamp]

Item	Description
Date and time of event acquisition	It indicates the date and time on the host terminal side at which the event was acquired.
Camera identification	It indicates information to identify the camera that sent the event, consisting of ModelName + SerialNumber + DeviceUserID.
Event	It indicates the event acquired from the camera. It is displayed in the format specified in ③ under "Option settings".
Timestamp	It indicates the Timestamp information transmitted from the camera. The display format can be selected from either decimal or hexadecimal using ④ under "Option settings".

7.6. Camera Control panes

TeliViewer is supporting Camera Control panes that provide the method for quickly accessing to frequently used features.

The following describes the explanation for using them and recommended usage.

7.6.1. Type of panes

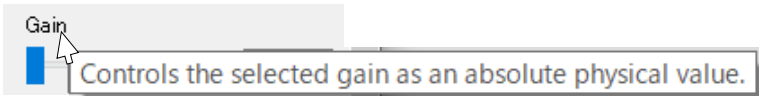
The following type of panes are supported in TeliViewer.

Pane	Descriptions
Image Format	PixelFormat, Width/Height and else can be controlled in this pane. It supports to control the features relating to Image Format.
Image Correction	Gain, Gamma, WhiteBalance and else can be controlled in this pane. It supports to control the features relating to Image Correction.
Color Masking	Color Masking can be controlled in this pane. [Note] This pane is only available for the camera that is supporting the Color Masking.
Exposure	Exposure and relating features can be controlled in this pane.
Acquisition	Acquisition and relating features can be controlled in this pane.
Trigger	Trigger and relating features can be controlled in this pane.
UserSet	UserSet and relating features can be controlled in this pane.
GEV Setting	The features relating to GigE camera can be controlled in this pane.
U3V Info	The information relating to USB3 camera can be shown in this pane.
Register R/W	Register Read/Write can be executed in this pane.

7.6.2. Display the details of feature

When mouse cursor is moved over the label of each feature, the details of feature will be displayed as the tooltip. Users can confirm the brief description for the feature by it.

For example, when mouse cursor is moved over the label of Gain, tooltip is displayed as following figure.



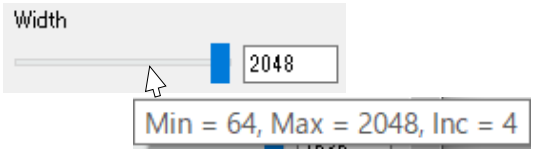
Hint

In case the more detailed information for each feature is required	If it is required to know the more detailed information for each feature, users can confirm it with user manual for current camera. It can be downloaded from our website.

7.6.3. Display the settable value range

When mouse cursor is moved over the slider of edit box of each feature, the value of Min/Max/Inc is displayed as following figure. Users can confirm the settable value range for the feature by it.

For example, when mouse cursor is moved over the Width, they are displayed as following figure. It is indicating settable value on camera as Min is 64, Max is 2048 and Inc is 4.



Attention

Regarding the Inc value	There is the case that feature doesn't support Inc value. Then, Inc is not displayed in settable value range.

7.6.4. Utilizing the Update Buttons

The following two Update buttons are available on toolbar in Camera Control panes. The descriptions for them are follows.

7.6.4.1. Update button

When the button ① in above figure is pressed, all features existing on current pane are reloaded, and updated with latest value on the camera.

For example, when the value of feature is updated from FeatureView, and even if such update will affect to the current value of any feature on Camera Control panes, it is not automatically reloaded into features on panes. Then, by pressing the button ① in above figure, it is available to manually reload the current value.

7.6.4.2. Auto Update button

The button ② in above figure is only available in Image Correction and Exposure pane. This button works with toggle. When it is enabled, the features in current pane are automatically and repeatedly reloaded with fixed interval.

If it is required to trace the specific value of some features, such as Gain, WhiteBalance or ExposureTime which its value is changed autonomously, this button will work effectively as the solution for users.

The update interval for Auto Update is 1000msec. In addition, if this button is pressed again, it becomes unchecked state and Auto Update is disabled.

7.6.5. Regarding grayed out features

If any feature placed in current pane is grayed out, it is indicating the feature is within one of the following states.

- **N/A because of current camera state**

  There are some features such as PixelFormat, Width, Height or else which its value cannot be changed while camera is in streaming. Such features can be changed when streaming is stopped. So if streaming is stopped with steps in "Stop", the state of feature recovers from grayed out to normal and it will become able to change the value.

- **N/A because of relationship with other features**

  There is a case that the feature is grayed out relating to current setting of other features. For example, AcquisitionFrameRate is available when AcquisitionFrameRateControl is set to "Manual". When current value of AcquisitionFrameRateControl is other than that, it is grayed out and N/A.

- **N/A in current camera**

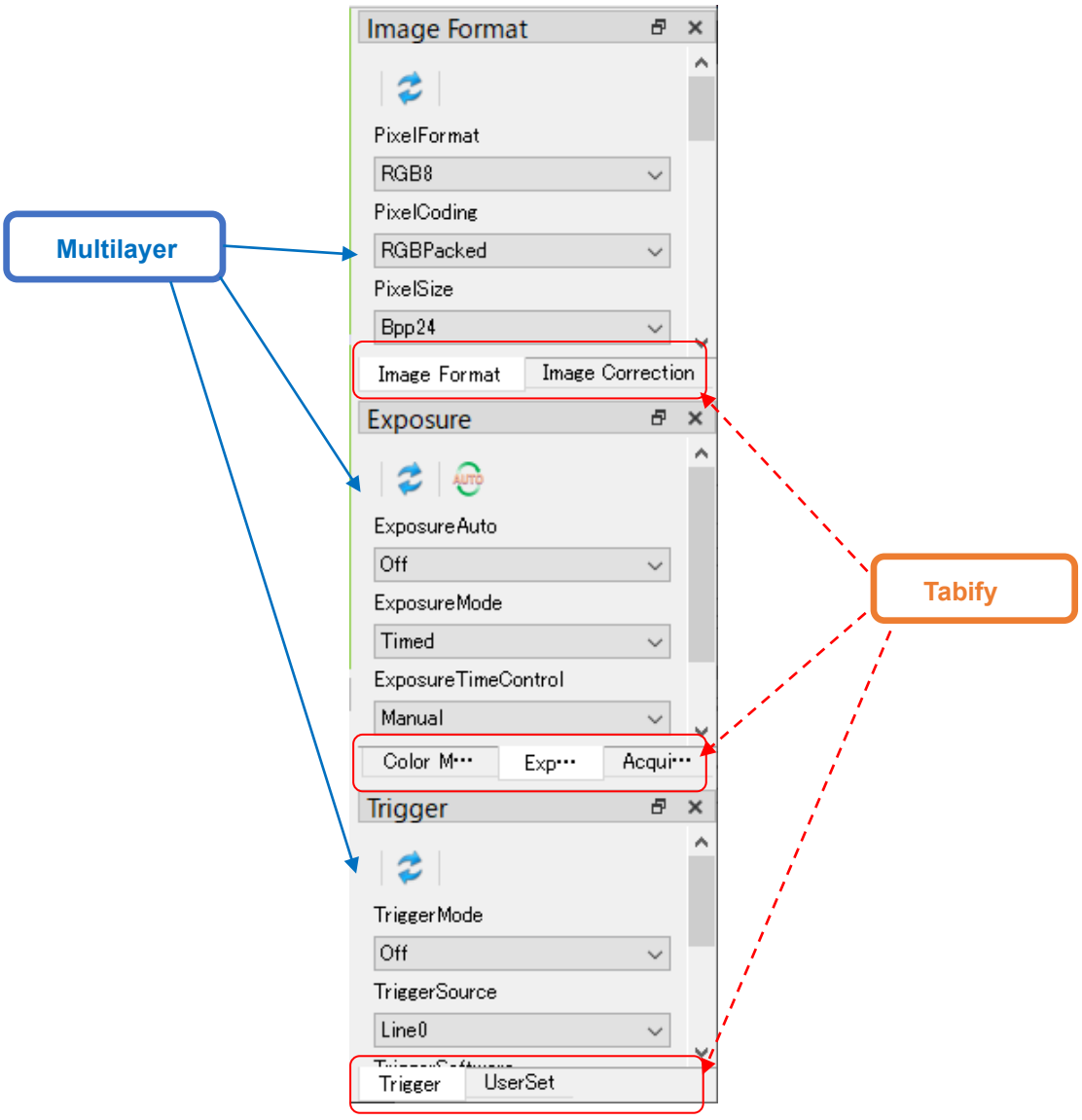
  If the feature is not supported in current camera, it is grayed out and N/A.

Hint

In case the detailed information for features supported in current camera is required	If it is required to know the more detailed information for each feature supported in current camera, users can confirm it with user manual. It can be downloaded from our website.

7.6.6. Recommended usage

The panes implemented within TeliViewer can be used with tabified or multilayered into dock as following. By the operation of drag and drop with mouse, users can arrange the placement of them, for easy accessing to each feature, or according to user's preferences.

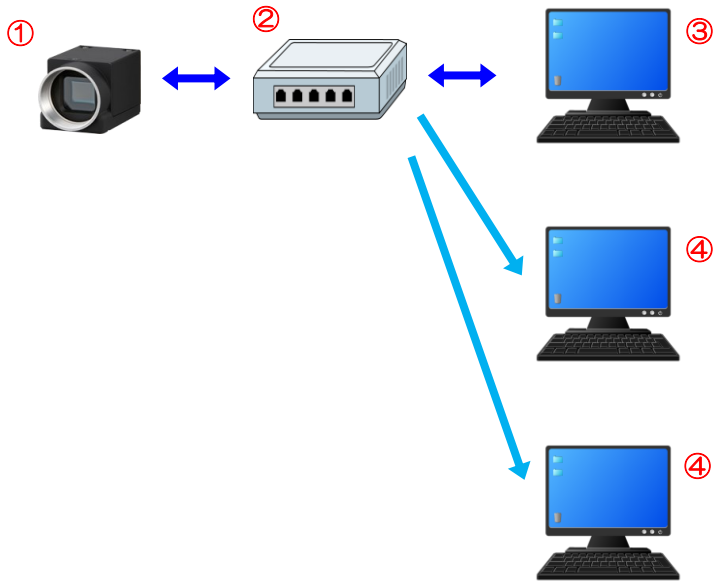


7.7. Multicast

This feature described as follows is **only available for GigE camera**.
By this feature, it is available that multiple hosts can retrieve the images from one GigE camera.

7.7.1. Overview

The following figure shows overview and typical construction of network for using the Multicast.



	Devices	Descriptions
①	GigE camera	GigE camera that will deliver the image using Multicast.
②	Distributor	Typically, it is the device called as switch or router. It must be the device such as L3/L2 switch or router that is supporting Internet Group Management Protocol (IGMP) or IGMP Querier feature, for executing Multicast transmission.
③	Controller	It is a host system accessing to camera with RW access rights. It means that such host controls the camera, retrieves the image, and is called as Controller. In a Multicast group, only one host can act the role of the Controller.
④	Listener	They are host systems accessing to camera with RO access rights and retrieving the image without controlling the camera. Such hosts are called as Listener. As above figure, multiple Listeners can exist in a Multicast group.

Attention

Regarding the IP address settings for each device	It is required to apply appropriate IP address and subnet mask to communicate between each device. Regarding IP address assignment, etc., it is recommended to confirm with the administrator of the current network, before setting up.

7.7.2. Access Mode Setting

The access mode for each host must be set up as following table. Basically, users need not to care to change it since when the camera is opened, it is automatically decided by TeliViewer.

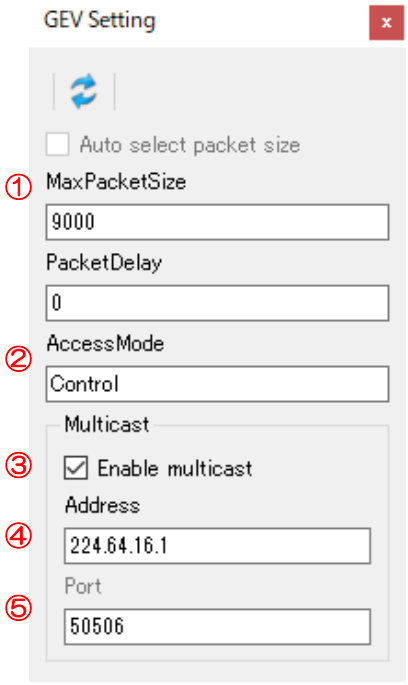
Hosts	Access Mode	Details
Controller	Control	Open the camera with RW access rights
Listener	Monitor	Open the camera with RO access rights

For instance, when the GigE camera is already opened from Controller, TeliViewer determines the 2nd or later host that try to open same GigE camera is Listener. Then, Monitor for Access mode is automatically selected for such hosts.

As the exception, in case a Listener open the camera before Controller, it is required to select Monitor for Access mode manually in Listener host. For changing the Access mode, refer to "Access mode selection".

7.7.3. Multicast Setting

By selecting the [View] → [Camera Control] → [GEV Setting] on menubar, following pane is displayed. In this pane, Multicast can be set up. The description for setting up each item is as follows.



	Items	Descriptions
①	MaxPacketSize	Packet size for streaming with Multicast is specified in this field. It must be used as the common value for all hosts and camera, in a Multicast group. For details to decide such value, refer to "Determine MaxPacketSize".
②	Access Mode	Current Access Mode is displayed in this field. In Controller, "Control" is displayed, and in Listener, "Monitor" is displayed.
③	Enable multicast	By turning "ON" this, Multicast is enabled.
④	Address	IP address for Multicast is set in this field. Default value is "224.64.16.1". It must be used as the common value for all hosts and camera, in a Multicast group. If it is needed to change, IPv4 multicast addresses defined by standards must be used. For details of standards, refer to RFC documents or else.
⑤	Port	Port number for Multicast is set in this field. Default value is "50506". It must be used as the common value for all hosts and camera, in a Multicast group. If it is needed to change, note that port numbers reserved as System Ports (or Well-Known Ports) are not available. For details of available port numbers, refer to the IANA website or other sources.

7.7.4. Details for Setup

This section describes the specific setup procedures for Multicast.

7.7.4.1. Determine MaxPacketSize

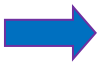
First, the available MaxPacketSize for all hosts must be determined. Such value depends on the construction of a Multicast group. To determine it, the JumboPacket or Maximum Transmission Unit (MTU) size of all hosts in a Multicast group must be researched as follows.

Hint

How to check/set JumboPacket or MTU size	In Windows, the JumboPacket can be set by opening the properties of the network adapter from the Device Manager. In Linux based OS, the MTU can be set using ifconfig, etc. For details, refer to the OS manual or ask administrator of current network.

As a result of research, if a Multicast group is constructed with following table:

Host	JumboPacket / MTU size
Controller	9014
Listener (A)	8192
Listener (B)	4096



Appropriate MaxPacketSize
4096

For MaxPacketSize, select the "maximum size that all hosts can receive".

So, in above example, appropriate MaxPacketSize is 4096. This value should be used in following steps for setup.

7.7.4.2. Setup for Controller

It is recommended that the Controller is configured first, and next the Listener.
The steps for setting up the Controller is as follows.

[Steps]
1) Launch TeliViewer in Controller
2) Open GigE camera with steps in “Camera Open/Close”
3) Open “GEV Setting”. Then, confirm Access Mode is “Control”
4) Check the check box of Enable multicast
5) If it is needed to change the Address and Port, set them appropriately. If it is not needed to make any changes, users can use with default settings.
6) Set “Determined value” to MaxPacketSize
7) Start streaming with steps in “Control for stream”
8) Confirm the image from camera is displayed correctly

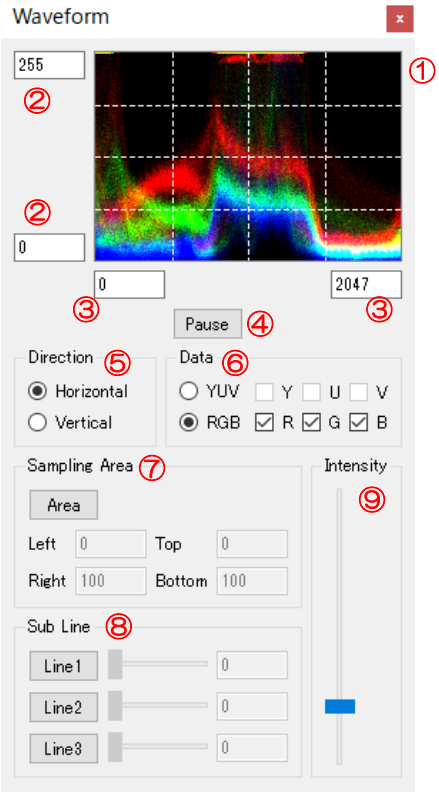
7.7.4.3. Setup for Listener

It is recommended that the Controller is configured before the Listener.
The steps for setting up the Listener is as follows.

[Steps]
1) Launch TeliViewer in Listener
2) Open GigE camera with steps in “Camera Open/Close”
3) Open “GEV Setting”. Then, confirm Access Mode is “Monitor”
4) Check the check box of Enable multicast
5) Set the same values as the Controller for Address and Port
6) Set the same values as the Controller for MaxPacketSize
7) Start streaming with steps in “Control for stream”
8) Confirm the image from camera is displayed correctly

7.8. Waveform

This chart displays the luminance characteristics in current image.



The details for each item in this monitor are following.

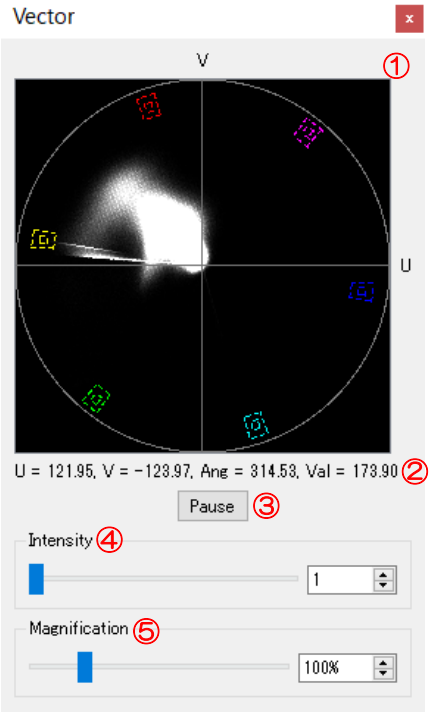
	Items	Details
①	Monitor	Luminance characteristics in current image is displayed.
②	Color assortment	Specify the color assortment for monitoring. It can be specified the range from 0 to 255.
③	Monitoring range	Specify the monitoring range. The range that can be specified depends on setting of ⑤ in this table and width or height in current image.
④	Pause button	When this button is pressed, update of monitor is paused.
⑤	Direction setting	Specify the horizontal or vertical for monitoring direction.
⑥	Data type	Specify the YUV or RGB for monitoring. By checking each check box, each component in current image can be selected for monitoring.
⑦	Sampling Area	By pressing the Area button, it becomes into area-specified mode. Under this mode, it is enabled to specify the limit of area for sampling.
⑧	Sub line	Three lines can be drawn on monitor by this.
⑨	Intensity	Intensity setting of each component can be changed on the monitor.

Hint

Changing the update interval of monitor	If it is needed to change the update interval of monitor, it can be changed with “Updating interval of charts” in options dialog.

7.9. Vectorscope

This chart displays the characteristics of chrominance components of U and V in current image.



The details for each item in this monitor are following.

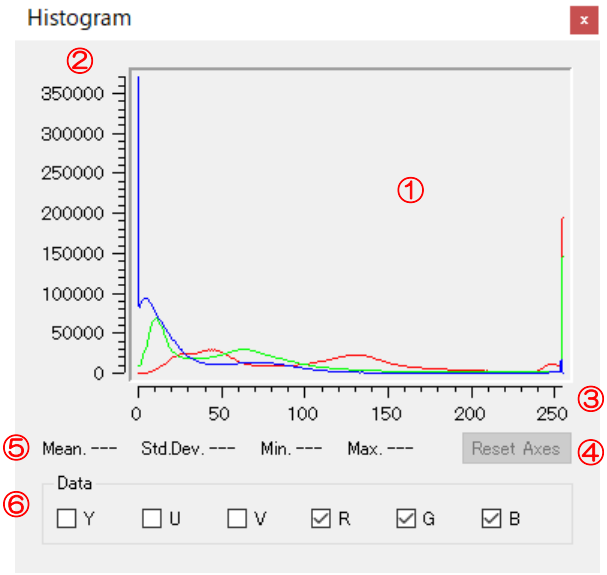
	Items	Details
①	Scope	Displays the current characteristics in current image.
②	Current value	Displays the value of the mouse cursor position on the scope.
③	Pause button	By pressing this button, the update of the scope can be paused.
④	Intensity	Intensity setting of each component can be changed on the display.
⑤	Magnification	Magnification can be changed on the display.

Hint

Changing the update interval of monitor	If it is needed to change the update interval of monitor, it can be changed with “Updating interval of charts” in options dialog.

7.10. Histogram

This chart displays the distribution of pixel value in current image.



The details for each item in this monitor are following.

	Items	Details
①	Histogram	Current distribution of pixel values is shown as a chart. When the mouse cursor is moved over ①, the frequency of each data component selected in ⑥ is displayed as a tool tip.
②	Frequency (Y axis)	For each data component selected in ⑥, the frequency of appearance of each pixel value is shown. Maximum value of the Y axis changes dynamically according to the current image.
③	Pixel value (X axis)	It indicates the pixel value. The Maximum or Minimum pixel value depend on the current image format. The above figure shows an example, when RGB format is selected, displaying values from 0 to 255. When the mouse cursor is on the X-axis, the partial magnification is available by holding down the Ctrl key and moving the mouse wheel up/down.
④	Reset axes	It is available when the X axis is in the magnified state at ③. Pressing this button resets the magnification and returns to the normal scale state.
⑤	Statistics	It is available only when a single component is selected in ⑥. It displays the Mean, Standard Deviation, Minimum and Maximum values for the currently selected data component.
⑥	Component selection	It allows users to select the data component to be shown as a histogram. If the current image is mono format, only Y can be selected. If the image is in color format, all data components are available for selection. The above figure shows an example of selecting R, G, and B on a color image.

Hint

Changing the update interval of monitor	If it is needed to change the update interval of monitor, it can be changed with "Updating interval of charts" in options dialog.

7.11. Save/Load camera features

By using the following buttons on the toolbar, it is available to save or load the camera features.

They are shortcuts to the feature implemented in FeatureView. For details on how to operate them, refer to the descriptions in "Save/Load camera features" section of FeatureView.

7.12. Video recording

This feature enables users to record the streaming images as the video into AVI or MP4 file format.

Attention

Regarding the available platforms	This feature is not available on platforms that use the ARM architecture, such as the Raspberry Pi.

7.12.1. Precautions for using this feature

Please use this feature if you fully understand and agree with the following precautions.

1) Regarding the video recording feature

TeliViewer uses GStreamer for the video recording feature. Users can use such feature by installing GStreamer into user's environment.

2) Regarding the recording videos to file

Users can choose either uncompressed (default) or compressed when recording the videos to file on TeliViewer. If users require the video to be compressed, it is possible by using the encoder.

3) Installation of encoders

By installing the GStreamer Plugin, users can use the encoder to record the videos on TeliViewer.

4) Regarding the selection of encoder

Each encoder has an individual license, and there is the case it contains patented technology. Users should select the encoder under user's responsibility and then must agree to follow the terms and conditions of the selected encoder.

5) In case of selecting any H.264 encoder

If users use a technology equivalent to the H.264 standard for video compression, users must agree to the following terms and conditions:

https://www.mpegla.com/wp-content/uploads/avcweb.pdf

[Note]

For further details, such as the "Where End User pays for AVC Video" clause, users should refer to the applicable terms and conditions in above documentation.

6) Regarding the workings of encoder

This document describes reference procedures for using the encoder on TeliViewer. However, please note that it does not guarantee that the encoder will work correctly on demand of users.

7) Regarding the following usage procedures

The following contents are reference procedures when this document was prepared, and information regarding the URLs and installation procedures are subject to change depending on the circumstances of the module distributor. Even if there are any points in the following procedures that do not correspond to the current situation, users have to solve them by themselves by using internet searches, etc.

8) Disclaimer

- Our company is not responsible for any problems that users meet as a result of using the encoder. Please contact the encoder distributor for any problems when using the encoder.
- Our company is not concerned with any licensing or patent issues arising from the choice by users made in 4) above.
- Our company is unable to answer to any questions from users about the encoder.

7.12.2. Installation of GStreamer

To use this feature, users need to install GStreamer into user's environment according to the following procedure.

7.12.2.1. Windows

To use the GStreamer package on the Windows environment, users need to follow the instructions below to download, install and properly configure the path to the GStreamer package.

If users are unclear about anything in the explanations in this manual, please also check the links below for further information.

[GStreamer: Installing on Windows]
https://gstreamer.freedesktop.org/documentation/installing/on-windows.html?gi-language=c

7.12.2.1.1. Download of GStreamer package

Download the "runtime installer" that matches user's environment from the link below.
https://gstreamer.freedesktop.org/download/

7.12.2.1.2. Installation of GStreamer package

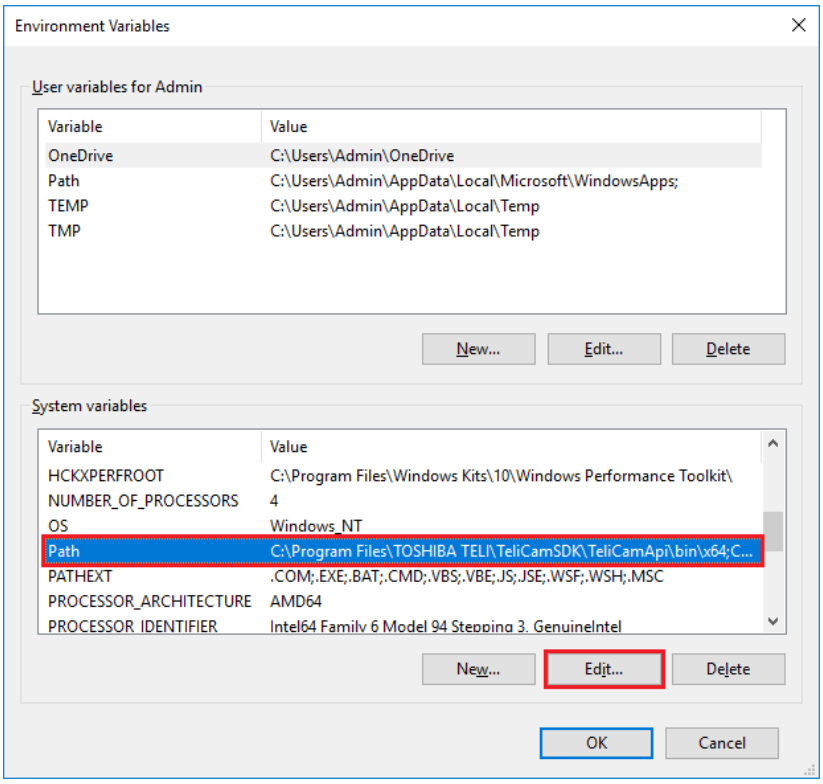
Launch the downloaded installer and install GStreamer. Depending on the installation option that the user selected, the configuration of the installed Plugin will differ. For more information, please refer to the GStreamer user manual.

7.12.2.1.3. Configuration of path

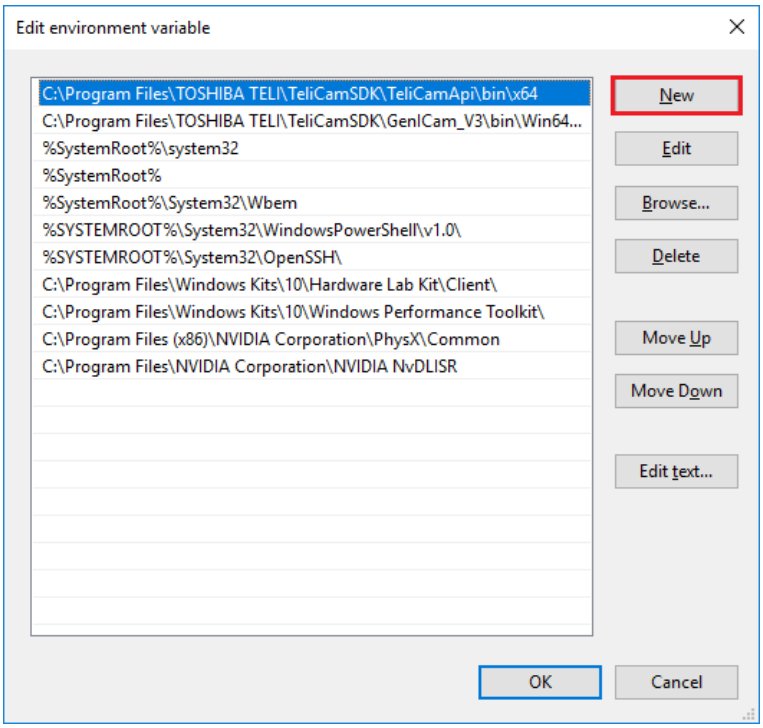
After installing GStreamer, users need to configure the path settings to make it available from TeliViewer. Please refer to the following instructions to set up the path.

The following procedure describes the case of installation to the default installation folder "C:¥gstreamer" as an example. Please note that if user install to a location other than the default, user need to set a different folder path to the one described in the following procedure.

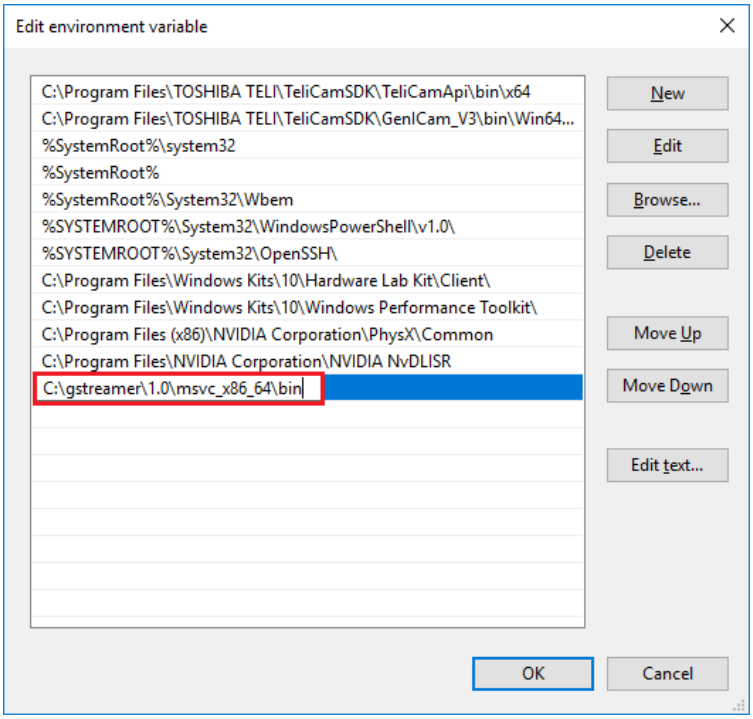
[Steps]
1) Right-click the Windows Start button
2) Select [System] from the menu that appears
3) Scroll downwards in the opened window and select [Advanced system settings]
4) Select the [Advanced] tab and press the [Environment Variables] button
5) The dialog box shown below is displayed, select the [Path] row and press the [Edit] button



6) The dialog box shown below is displayed and press the [New] button



7) When the path input mode will be entered, set “C:¥gstreamer¥1.0¥msvc_x86_64¥bin” as shown below, then press the OK button and save. If the installation destination is changed to another folder different from the default in the installation procedure, set “%Destination folder%¥1.0¥msvc_x86_64¥bin”



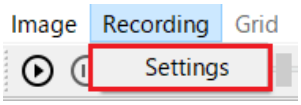
8) Press the OK button to close [Edit environment variable] dialog box
9) Restart Windows to reflect the changes to the entire system

7.12.2.2. Linux based OS

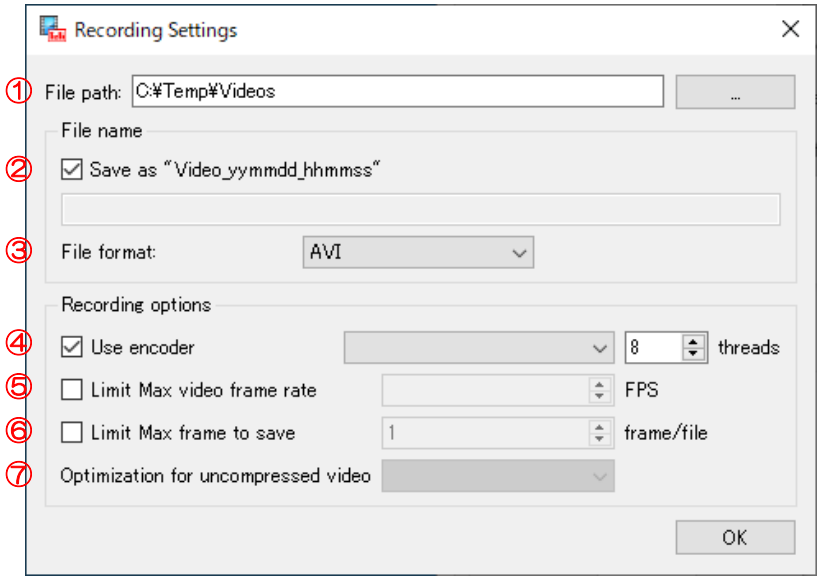
Please refer to the links below for further information.
[GStreamer: Installing on Linux]
https://gstreamer.freedesktop.org/documentation/installing/on-linux.html?gi-language=c

7.12.3. Video recording settings

1) Open the camera to which user want to record the video
2) Select [Recording] → [Settings] from the menubar as shown below



3) As the result, the dialogue box shown below will open. Users can configure the settings for the video file to be saved



7.12.3.1. File path

By setting the ① in above figure, users can select the destination folder for the video file. Default folder is as follows:

OS	Folder
Windows	%HOMEPATH%Videos
Linux based OS	$HOME/Videos

Hint

Selection of the storage medium on which to save the video	The video recording feature is affected by the write speed supported by the storage medium selected as the storage destination. If the write speed to the storage medium is slow, this can cause problems such as dropped frames when writing. If the user wishes to save videos with higher quality and reproducibility, it is recommended to select a storage medium that supports high-speed writing, such as M.2 or SSD, as the video storage destination.

7.12.3.2. File name

By setting the ② in above figure, Users can specify the name of the file in which the video is to be saved. Initially, the filename is shown in "Video_yymmdd_hhmmss" style.

(yymmdd: Date when video record start was pressed; hhmmss: Time when video record start was pressed)

If the user wants to specify a file name other than this, uncheck the ② and enter the name of the file to be saved in the edit box.

7.12.3.3. File format

Users can select the format of the file to be saved from any of the following. Select the most suitable format according to the playback method to be used.

In addition, if users choose to save videos in uncompressed format, AVI will be automatically selected.

Format	Description
AVI	Save videos in AVI format.
MP4	Save videos in MP4 format.

7.12.3.4. Use encoder

By checking ④ in above figure, the list of available encoders in the current environment will be displayed. Users can use several encoders on TeliViewer, that are installed with GStreamer installation. By selecting an encoder from the drop-down list, users can save the compressed video to a file.

If ④ is not checked, the video is saved in uncompressed format. Default is uncompressed.

Hint

Regarding the encoders that appear in the drop-down list	The encoders that can be selected is depending on the operating system and distribution currently in use, or on the installation options specified when GStreamer was installed. If it is necessary to find out information on each of the available encoders, please use an internet search or something similar to confirm the information. Additionally, in some environments, the hardware encoder is available. In this case, selecting a hardware encoder is likely to result in low-load video recording.

7.12.3.4.1. Threads setting

As a result of checking ④ and selecting an encoder, if the number of threads used for compression can be changed by the currently selected encoder, this menu is enabled. Increasing the number of threads used will reduce the time taken for compression but will increase CPU utilization. Decreasing the number of threads used increases the time taken for compression but decreases CPU utilization.

7.12.3.5. Limit Max video frame rate

By checking ⑤ in above figure, it is possible to limit the maximum frame rate saved in a video file. This can work as effective workaround when users want to avoid video files becoming bloated.

The range of available values depends on the current "AcquisitionFrameRate" setting of the camera.

7.12.3.6. Limit Max frame to save

By checking ⑥ in above figure, it is possible to limit the maximum number of frames that can be saved to a video file. Users can use this function if it is necessary to end video recording when a specific number of frames have been saved, without unlimitedly continuing to save the video.

7.12.3.7. Optimization for uncompressed video

If ④ is unchecked, the video is recorded in uncompressed format. Then, the menu item ⑦ is activated and users can select a setting from one of the following options.

Setting	Description
Scale down FPS	Optimizes the frame rate (automatic frame decimation) when writing images to video files and saving them.
Scale down image size	Optimizes the image size (automatic size shrinking) when writing images to video files and saving them.

Hint

Regarding the video recording in uncompressed format	When recording image data received from the camera as video in uncompressed format, the capacity is generally larger than for encoded video. Although it depends on the write speed of the destination media, in many cases it can lead to problems such as dropped frames due to overcapacity, users may have the likelihood of not achieving the desired video recording deliverables as the result. As the workaround, TeliViewer uses whichever option is selected here to optimize the writing speed to the media to around 150 MB/sec when recording the videos in uncompressed format. Such procedure brings the result in smooth playback of the recorded video.

7.12.4. Recording the video

It can be operated from the toolbar on the TeliViewer to start/stop video recording.

7.12.4.1. Start recording

1) Start streaming from camera.
2) Press the button shown below, located on the toolbar. Then, video recording will be started.

3) Please wait until the required recording time.

7.12.4.2. Stop recording

1) Press the button shown below, located on the toolbar. Then, video recording will be stopped.

2) The recorded video is saved to file specified with “File name” into the location specified with “File path”.

Attention

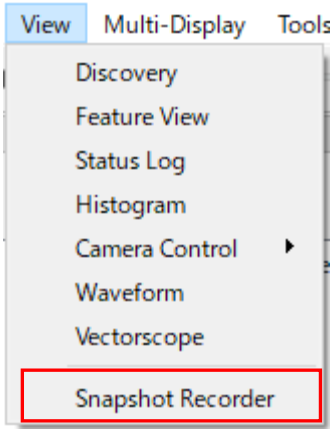
Regarding the behavior when disk full occurred	During the video recording, if disk full occurred within storage, it will be automatically stopped with displaying the message "No space left on the resource". Before starting the recording, it is recommended to confirm there is enough free space in storage in advance.

7.13. Snapshot Recorder

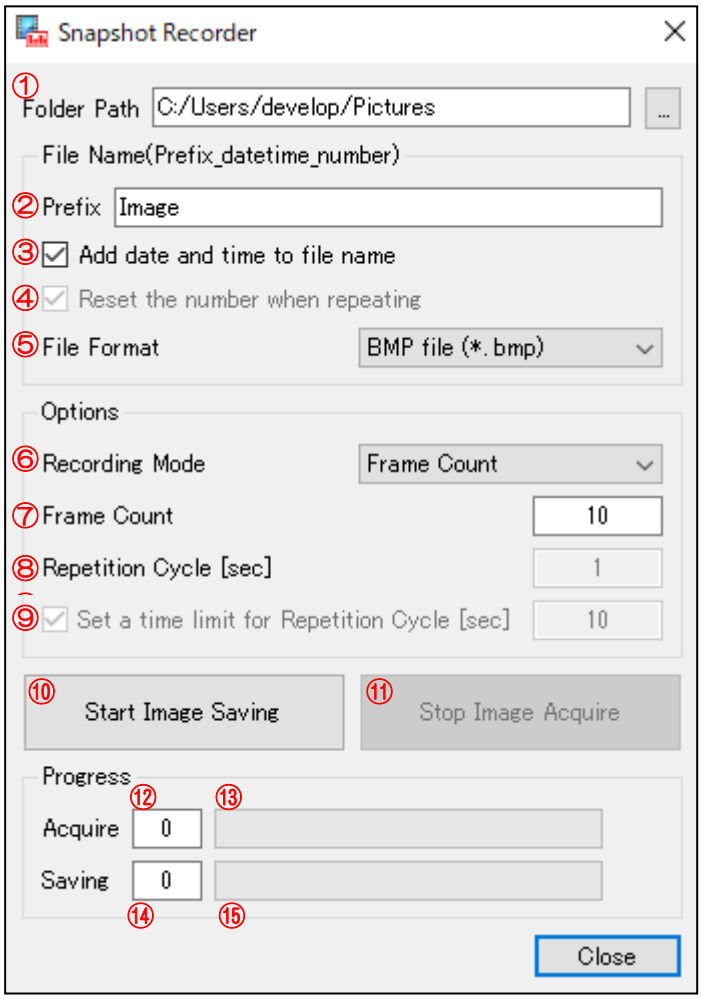
This feature enables users to continuously save streaming images as still images. It is available exclusively on Windows. Furthermore, this feature cannot be used in Random Trigger Shutter mode."

7.13.1. Snapshot Recorder Settings

1) Open the camera to which user want to save the still image
2) Start the stream.
3) Select [View] → [Snapshot Recorder] from the menubar as shown below



4) As the result, the dialogue box shown below will open. Users can configure the settings for the still image file to be saved.



7.13.1.1. Folder Path

By setting the ① in above figure, users can select the destination folder for the still image file. Default folder is as follows:

OS	Folder
Windows	%HOMEPATH%Pictures

Hint

Selection of the storage medium on which to save the still image	The Snapshot Recorder feature is affected by the write speed supported by the storage medium selected as the storage destination. If the user wishes to save still image at a higher speed, it is recommended to select a storage medium that supports high-speed writing, such as M.2 or SSD, as the still image storage destination.

7.13.1.2. File Name

By setting the ② in above figure, Users can specify the name of the file in which the still image is to be saved. Initially, the filename is shown in "Image_yymmdd_hhmmss_number" style. (The "number" part is a sequential number.)

(yymmdd : Year, month, and day when the still image was acquired; hhmmss : Hour, minute, and second when the still image was acquired.)

If the user wants to specify a file name other than this, enter the desired filename in the edit box labeled "Prefix". Also, if the user does not need _yymmdd_hhmmss in the file name, uncheck ③.

If the user unchecks ③, the name of the saved file will be "Image_number". (The “number” part is a sequential number.)

When Recording Mode is set to “Frame Count Repeat”, ④ is available.

If the user unchecks ④, the value of 'number' will not be reset.

If the user checks ④, the value of 'number' will be reset.

Please refer to Recording Mode for information on Recording Mode.

7.13.1.3. File Format

By setting the ⑤ in the above figure, users specify the file format to save as a still image.

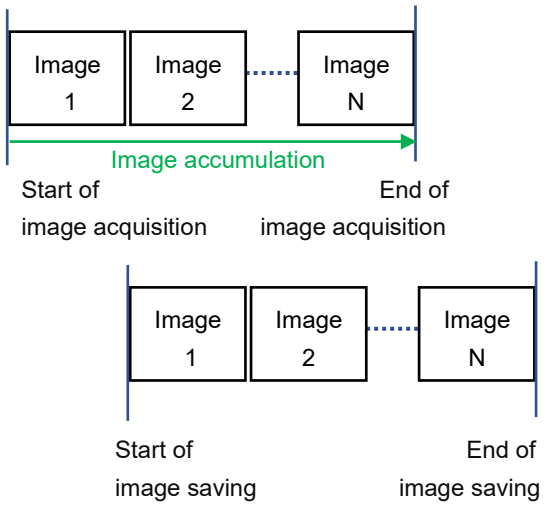
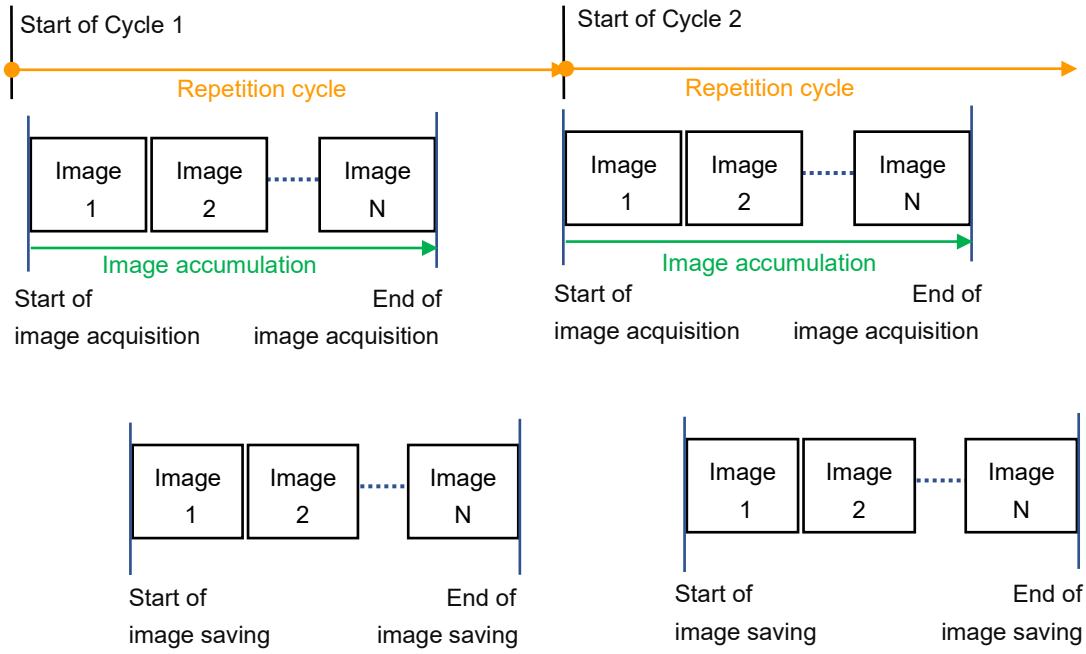
Setting	Description
BMP	Save the image as a Bitmap file.
JPG	Save the image as a JPEG file.

7.13.1.4. Recording Mode

By setting the ⑥ in the above figure, users can select the mode. There are two types of modes available.

Setting	Description
Frame Count	Save images of a specified number of still frames. Once the first image is acquired from the camera, the process of saving the image to the storage medium is initiated. Additionally, when the specified number of frames is reached, the process of acquiring images from the camera and saving them to the storage medium will cease. Please refer to Frame Count for setting the specified number of frames.
Frame Count Repeat	Execute the operation of the “Frame Count” mode repeatedly. Once the first image is acquired from the camera, the process of saving the image to the storage medium is initiated. Additionally, the Frame Count operation is executed at specified time intervals. Please refer to Frame Count for setting the specified number of frames. Please refer to Repetition Cycle for setting the repetition interval.

The operation of each mode is as follows.

Setting	Description
Frame Count	
Frame Count Repeat	

7.13.1.5. Frame Count

By setting the ⑦ in the above figure, users can specify the number of still images to save. This value is used in “Frame Count” and “Frame Count Repeat” modes.

7.13.1.6. Repetition Cycle

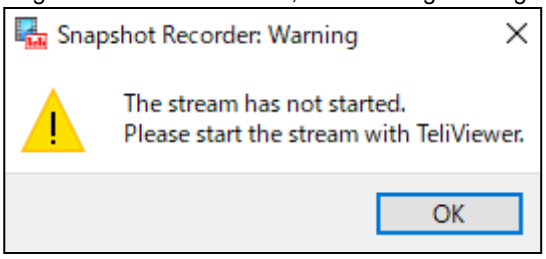
By setting the ⑧ in the above figure, you specify the time interval for obtaining images from the camera. This becomes available in “Frame Count Repeat” mode, and this value is utilized.

By checking the ⑨, users can stop the operation of acquiring images from the camera and saving images to the storage medium at the specified interval. If users uncheck ⑨, please use Stop Image Acquire (Stop Image Saving) to halt the operation.

7.13.1.7. Start Image Saving

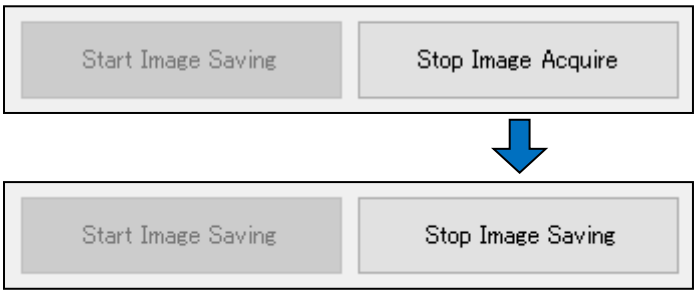
By pressing button ⑩, the system initiates the process of acquiring images from the camera and saving them to the storage medium.

Attention

Automatic cessation of image acquisition from the camera and saving images to the storage medium	This function stops acquiring images from the camera and saves the accumulated images in the buffer to the storage medium when the available memory falls below 500MB. Additionally, if the capacity of the selected storage medium falls below 100MB, the operation of acquiring images from the camera and saving them to the storage medium will be halted.
When the user has not started the TeliViewer stream.	If the TeliViewer stream is not started, images will not be saved to the storage medium. If the user is using a USB3 Vision camera, the following warning will be displayed.  If the user is using a GigE Vision camera, please note that no warning will be displayed.

7.13.1.8. Stop Image Acquire (Stop Image Saving)

Pressing button ⑪ will stop the operation of acquiring images from the camera and saving images to the storage media. Additionally, pressing the “Stop Image Acquire” button will change to the “Stop Image Saving” button. When the "Stop Image Acquire" button is pressed, acquisition from the camera will cease, but saving to the storage medium will continue.



Button	Description
Stop Image Acquire	Stop acquiring images from the camera.
Stop Image Saving	Stop saving images to the storage medium.

7.13.1.9. Progress (Acquire, Saving)

⑫ counts and displays the number of times the progress bar of “Acquire” reaches 100%.
By checking ⑬, users can confirm the progress of retrieving images from the camera.

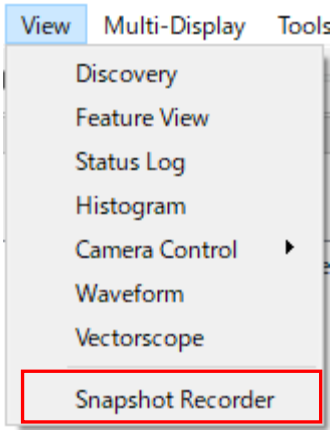
⑭ counts and displays the number of times the progress bar of “Saving” reaches 100%.
By checking ⑮, users can confirm the progress of saving images to the storage medium.

7.13.2.Saving still images.

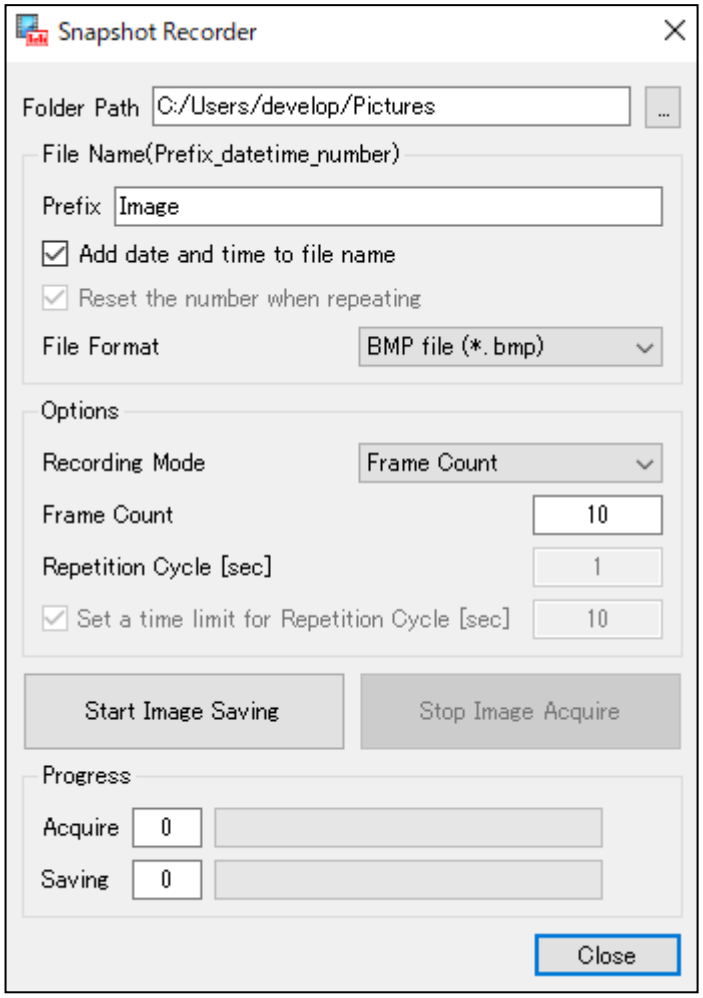
Use the "Stop Image Acquire" button ("Stop Image Saving" button) displayed on the dialog box to control the start and stop of continuous saving of still frame images.

7.13.2.1. Start saving still images.

1) Open the camera to which user want to save the still image
2) Start the stream.
3) Select [View] → [Snapshot Recorder] from the menubar as shown below

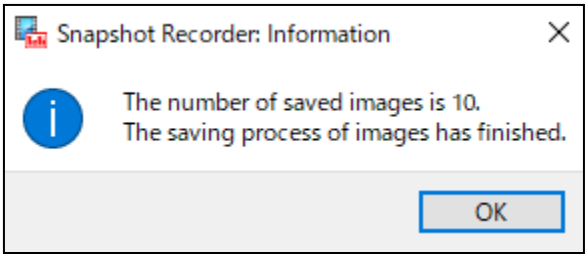


4) As the result, the dialogue box shown below will open.



5) Press the “Start Image Saving” button.

6) Continuous image saving of still images will begin, so please wait until the image saving is complete.
7) When all saving is completed, the following image will be displayed, and the images will be saved to the specified folder.



(Example setting: Recording Mode: Frame Count, Frame Count: 10)

7.13.2.2. Stop saving still images.

If the user wishes to manually stop saving still images, follow the steps below:

1) Press the “Stop Image Acquire” button.
(Stop acquiring images from the camera.)

2) Press the “Stop Image Saving” button.
(Stop saving images to the storage medium.)

7.14. Tools

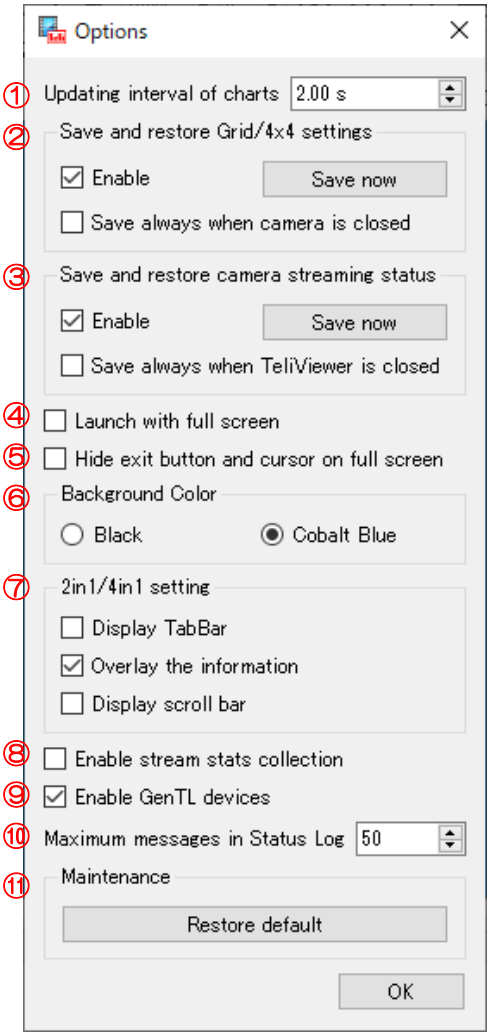
By selecting [Tools] from the menubar, the following features are available. These allow users to change various settings for using TeliViewer.

7.14.1. Launch “IP Configuration tool”

By selecting [Tools] → [IP Configuration Tool] from the menubar, it is possible to launch an external tool "IP Configuration tool". This allows users to change the IP address settings for any GigE camera of products of Toshiba Teli on current network.

7.14.2. Options

By selecting [Tools] → [Options] from the menubar, dialog for setting the options is opened as following figure. This allows users to change various settings for TeliViewer.



7.14.2.1. Updating interval of charts

By using ① in above figure, users can change the settings for the update interval of the charts implemented in TeliViewer, such as Waveform、Vectorscope、Histogram. Default setting is 2.00 sec.

7.14.2.2. Save and restore Grid/4x4 settings

By turning ON the “Enable” checkbox ② in above figure, the state of the lines drawn in the current image can be saved/restored. Refer to the following process steps to save/restore it. Default setting is OFF.

[Steps]
1) Draw the “Grid” or “4x4” on current image
2) Turn ON the ②
3) When “Save now” button is pressed, TeliViewer saves the state of lines to “line configuration file”. At the same time, TeliViewer saves “ModelName/SerialNumber/DeviceUserID” as the identification ID
4) Open the camera that was closed in above step 3). Then, if there is a “line configuration file” with an identification ID that matches the “ModelName/SerialNumber/DeviceUserID”, it is read out
5) When streaming is started, the state of the lines that was drawn in above step 1) is restored

7.14.2.2.1. Save always when camera is closed

This feature is available when the “Enable” checkbox of ② is set to ON. If this is also set to ON, the current line drawing status is automatically saved or updated each time when camera is closed. If user want to use the data saved with the “Save now” button always and repeatedly when camera is opened, set this check box to OFF.

7.14.2.3. Save and restore camera streaming status

By turning ON the “Enable” checkbox ③ in above figure, the current streaming status of the camera can be saved/restored. Refer to the following process steps to save/restore it. Default setting is OFF.

[Steps]
1) Start streaming with currently opened camera
2) Turn ON the ③
3) When “Save now” button is pressed, TeliViewer saves the state of streaming to “streaming status configuration file”. At the same time, TeliViewer saves “ModelName/SerialNumber/DeviceUserID” as the identification ID
4) Close TeliViewer
5) When TeliViewer is launched in next time, if there is a camera that has “ModelName/SerialNumber/DeviceUserID” matching to identification ID within “streaming status configuration file”, the camera is automatically opened and the stored data in file is read out, and set to the camera
6) As the result, streaming status is restored

7.14.2.3.1. Save always when TeliViewer is closed

This feature is available when the “Enable” checkbox of ③ is set to ON. If this is also set to ON, the current streaming status is automatically saved or updated every time when TeliViewer is closed.

It means that if user want to restore the last working state of the TeliViewer every time when user launch it again, then set this checkbox to ON.

If user want to restore the streaming status saved with “Save now” button, and launch the TeliViewer with it every time, this checkbox should be set to OFF. By setting this to OFF, the "streaming status configuration file" will not be overwritten.

7.14.2.4. Launch with full screen

This feature is available when the “Enable” checkbox of ③ is set to ON. By setting ④ to ON, the next time TeliViewer starts up, it will launch in full screen mode.

7.14.2.5. Hide exit button and cursor on full screen

By turning ON the checkbox ⑤ in above figure, it is possible to hide the “Exit button” that appears in the bottom right corner on the full screen. Also, mouse cursor on the full screen is hidden.

In this state, to exit the full screen, press the ESC key.

7.14.2.6. Background Color

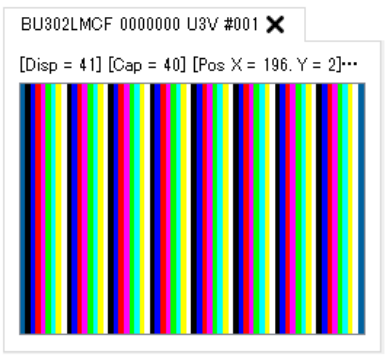
This allows users to set the background color of the image. It is available in either Black or Cobalt Blue. Default is Black.

7.14.2.7. 2in1/4in1 setting

By setting up ⑦ in above figure, the layout of the 2in1/4in1 screen can be changed. Details of each setting are as follows.

7.14.2.7.1. Display TabBar

It displays the camera identification and the current drawing information in tabbar. An example of the display is shown in the following figure. Note that this mode and “Overlay the information” cannot be selected at the same time.



7.14.2.7.2. Overlay the information

It displays the camera identification and the current drawing information as the overlay on the image. An example of the display is shown in the following figure. Note that this mode and “Display TabBar” cannot be selected at the same time.

Attention

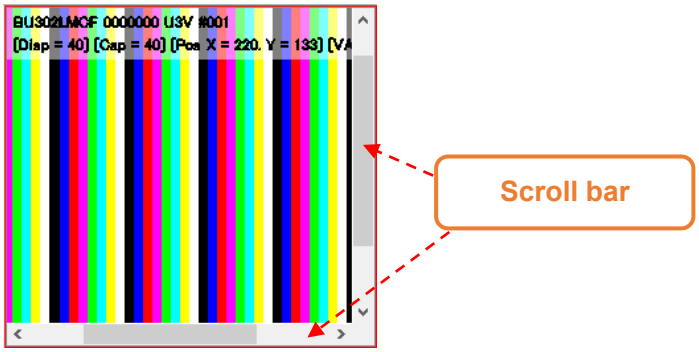
Regarding the impact on Overlay	This feature affects the performance of rendering. If enabled, note that the Display Rate may be slightly lower than when using the “Display TabBar”.

7.14.2.7.3. Display Scrollbar

When the image extends beyond the display area, this option allows users to select whether scroll bars are displayed. When the setting is turned “ON”, scroll bars will appear as shown in the following figure, and the scroll bars is available to scroll the image.

If the setting is “OFF”, the scroll bar will not appear even if the image extends beyond the display area, so the display area will not be made narrower by the scroll bar. In addition, even when the scroll bar is not displayed, the image can be scrolled by using the “Scroll feature”.

Users can select the most appropriate setting according to their preferences.



Attention

Regarding the scroll bars in Fit mode	Note that scroll bars are not displayed when images are displayed in Fit mode.

7.14.2.8. Enable stream stats collection

By turning ON the checkbox ⑧ in above figure, it is possible to collect and display stream stats. This feature is available for U3V and GEV cameras. The each information for U3V/GEV can be displayed by following procedure.

Attention

Regarding the collection and display stream stats	Since this feature spends CPU resources, it is recommended to turn OFF when it is not required.

7.14.2.8.1. For U3V

By selecting [View] → [Camera control] → [U3V Info] from the menubar, users can display the “Stream stats” in U3V Info pane.

7.14.2.8.2. For GEV

By selecting [View] → [Camera control] → [GEV setting] from the menubar, users can display the “Stream stats” in GEV setting pane.

7.14.2.9. Enable GenTL devices

Since this feature is existing for the purpose of user support, basically use it with ON.
By turning OFF the checkbox ⑨ in above figure, GenTL devices are disabled in TeliViewer. Default setting is ON.

Attention

If it is set to OFF	Note that users cannot use the CoaXPress camera under it is OFF.

7.14.2.10. Maximum messages in Status Log

By setting the value of ⑩ in above figure, it is possible to change the number of messages displayed in the “Status Log”. Default is 50.

7.14.2.11. RestoreDefault

By pressing ⑪ in above figure, it is possible to restore the TeliViewer screen configuration, such as placement of panes or button state, to the recommended default.

7.15. Help

By selecting [Help] from the menubar, the following features are available. It will help the users according to their necessary.

7.15.1. Open user manual

By selecting [Help] → [Open user manual] from the menubar, users can open this document "TeliViewer User manual".

7.15.2. About

By selecting [Help] → [About] from the menubar, users can confirm the information related to TeliViewer, such as version number, etc.

8. Appendix

This section describes general supplementary information for using TeliViewer.

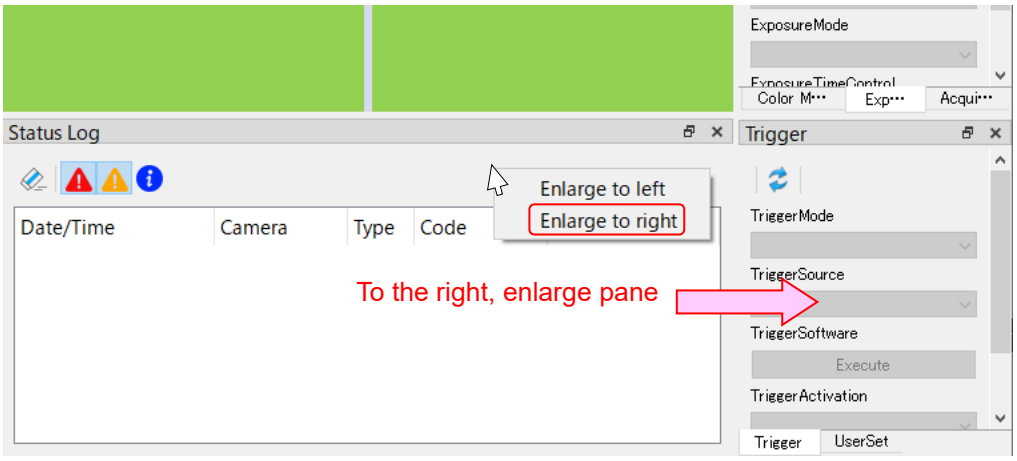
8.1. Enlargement of the pane to the four corners

When right-clicking on the area of a pane that has no buttons, lists, or other controls, a context menu is displayed to enlarge the pane. The following four types of items are displayed. These will only be displayed when available.

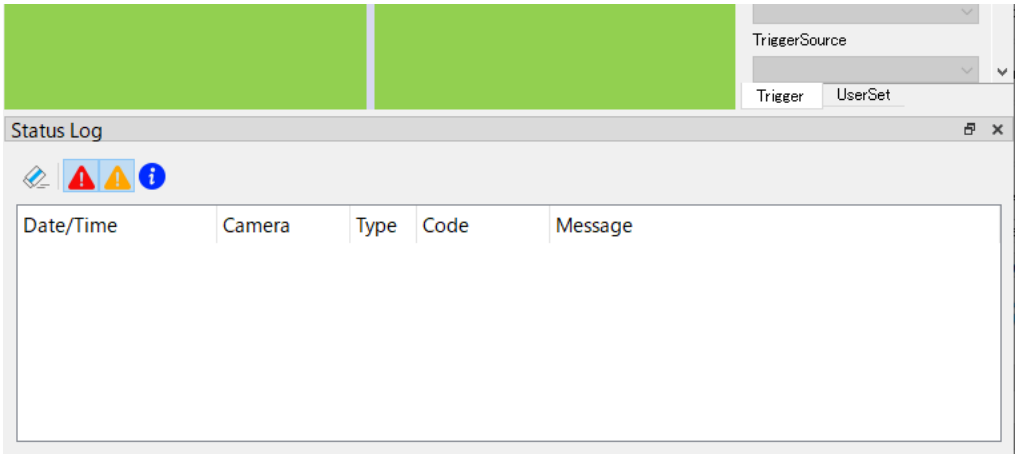
- Enlarge to left
- Enlarge to right
- Enlarge to top
- Enlarge to bottom

The following is an example of "Enlarge to right" operation.

1) As following figure, “Status Log” pane does not occupy the lower right corner of the window. In this case, right-clicking on the area of a pane without any controls will display "Enlarge to right". When it is selected, the “Status Log” pane is enlarged to the right.



2) As a result, the “Status Log” pane occupies the lower right corner of the windows as following figure.



Regarding the “Enlarge to left”, “Enlarge to top” or “Enlarge to bottom”, almost same effect is available. It is recommended that users utilize the above procedure to obtain the most suitable placement and size of pane.

8.2. About Save/Restore settings for TeliViewer

TeliViewer automatically saves the current application state to a configuration file on the file system, when it is terminated by user operation, or when it receives the application termination signal from OS. Also, the saved state will be restored at the next launch.

The target of save/restore here is the settings for the application, such as the screen configuration of TeliViewer, or the button state of FeatureView, StatusLog, or else. Note that settings for each camera are not saved automatically. Refer to the following hints for saving/restoring settings for each camera.

Hint

To save/restore camera settings	Refer to "Save/Load camera features".
To save/restore Grid/4x4 settings	Refer to "Save and restore Grid/4x4 settings".
To restore the default state of TeliViewer	Refer to "RestoreDefault". If this is executed, it is possible to restore TeliViewer to the default state of the initial installation.
Regarding the directory where the TeliViewer settings are saved	[Windows] It will be saved to the TeliViewer.ini file under the "%APPDATA%¥TOSHIBA TELI¥TeliCamSDK" directory. [Linux based OS] It will be saved to the TeliViewer.ini file under the "$HOME/.teliviewer" directory.

Attention

For Raspberry Pi OS users	Under the Raspberry Pi OS, if the OS shutdown process is executed while TeliViewer is running, the application state will not be saved. It is caused by the reason why such OS never notifies the termination signal to application at shutdown. To save the TeliViewer state under such OS, close TeliViewer by user operation, and after confirming that it is closed completely, then execute OS shutdown. [Note] This problem does not occur under the Windows or ubuntu OS. Even if the OS is shut down while TeliViewer is running, the state will be saved correctly.

8.3. U3V Camera Specific Information

This section describes the U3V camera specific information.

8.3.1. BERT feature

BERT (Bit Error Rate Test) is a feature that evaluates the quality of transaction between U3V camera and host. By using this feature, it is available to check the quality of signals including USB cable. Especially, when users construct the new system or update the construction of current system, it will help to check whether new system constructed by several peripherals is appropriate to work with U3V camera correctly.

The detailed technical information is opened in our web site as following:

[TECHNICAL INFORMATION: BU Series - Bit Error Rate Test]

https://www.toshiba-teli.co.jp/pdf/technology/technical/t0002_BERT.pdf

8.3.1.1. Usage of BERT feature

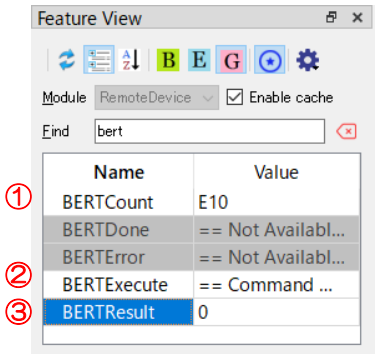
By following procedure, it is available to utilize BERT feature.

Attention

Regarding the OS to be used	Please use Windows OS. Under the Linux based OS, there is the case BERT cannot work correctly.

[Procedure]

1) By steps in "Camera Open/Close" of Discovery, open U3V camera.
2) By steps in "Filter Selection" in FeatureView, select the "G" (Guru mode).
3) By using "String search" in FeatureView, input "bert" and press Enter key to search the corresponding nodes.
4) As the result, FeatureView will display the following figure.



5) By ① in above figure, select the BERTCount within the range from E9 to E12. It specifies the number of bits to be sent in a test. Please refer the technical information in the document linked above on demand.
6) By ② in above figure, select the BERTExecute and press the displayed "Execute" button.
7) When test is started, U3V camera will be closed automatically.
8) By steps in "Updating Camera List" of Discovery, check the recovery of U3V camera form testing.
9) Re-open the U3V camera with same steps in above 1).
10) As the result, count of Bit Error(s) is displayed within ③ in above figure. If it displays '0', it means test has finished without any error. If it displays other than '0', it means there is the possibility any peripheral that cause the transaction error is existing in current system,.

Hint

Regarding BERTCount	If larger value such as E12 is selected, it will spend much time to finish the test (In the case of E12, it will take 200sec around). During the test, please wait for finishing current test without plug out the camera.
Camera cannot recover from test after waiting much time	Under some USB controllers, in above step 8), there is the case that camera cannot recover and be re-discovered after waiting much time. In this case, please reboot the host. In most cases, by this operation, the USB controller has been reset, as the result, camera will recover to normal state. However, since BERTResult is also reset and cleared, the result of test cannot be confirmed. Furthermore, if you meet such situation continuously, there is the possibility that current USB controller potentially has problem regarding the connectivity with U3V camera. In such situation, it is recommended to use another USB Controller to narrow down the problem.

9. FAQ

Question	Answer
Tearing occurs in image	If the appropriate driver for graphics card is not installed into system, optimal performance may not be achieved. In addition, there is the case that problems such as tearing appear. For information on how to get the appropriate driver, refer to the website of the vendor of the graphics card. Note that tearing cannot be avoided on the Raspberry Pi due to graphics card performance limitations.
System freezes while streaming on Raspberry Pi	On the Raspberry Pi, there is the case that freeze phenomenon occurs while streaming from the camera. If this happens frequently, it is recommended to consider using “ubuntu MATE” instead of "Raspberry Pi OS". To use "ubuntu MATE", users need to utilize “Raspberry Pi Imager” to install the most appropriate ubuntu for the Raspberry Pi on a bootable SD card (note that this operation will erase all the data on the SD card). Next, boot ubuntu using the SD card image that was created by user, and then run "sudo apt install ubuntu-mate-desktop" from the terminal. After rebooting, the lightweight desktop "ubuntu MATE" will be available and may work as the workaround for the freezing phenomenon. [Note] For more information regarding the “Raspberry Pi Imager” and creating the OS image, refer to the Raspberry Pi OS website.
After upgrading the TeliCamSDK package, the TeliViewer screen configuration became unexpected.	Currently saved application settings may not match the new version. In that case, it is recommended to execute “RestoreDefault”. After that, it will be launched with the configuration most appropriate for the current version.
Under the virtual environment, streaming of multiple cameras does not work correctly	Under such environment, even if user environment meets the hardware and software requirements, there is a possibility sufficient performance will not be achieved (It is based on the results of some our evaluation). For inquiries regarding virtual environments, such as performance issue, please contact the provider of it.
When streaming multiple cameras simultaneously, frame rate does not achieve the max performance of camera	Due to bottlenecks dependent on the OS or display adapter driver, there is the case that the display rate does not achieve sufficient performance in 2in1/4in1 mode. For streaming in 2in1/4in1 mode with high performance display rate, it is recommended to select the Linux based OS (e.g., ubuntu) on the environment that meets hardware requirements. As a result of our evaluation, there is the tendency that, on the same hardware, better performance streaming is achieved under the Linux based OS, than other OS.
Packet Lost error appears in StatusLog when streaming multiple cameras simultaneously	When the amount of data transferred from the camera exceeds the transfer capacity of the data bus on the system, there is a possibility that packet loss may occur. Even if CPU capability is sufficient, packet loss may occur if the data bus does not have sufficient bandwidth. If it is intended to stream multiple cameras at the same time, make sure that there is enough bandwidth on the data bus.

When ubuntu 22.04LTS is used with Full Wide XGA (1366 x 768) monitor, there is a case unexpected vertical line is displayed in right edge of the full screen mode	In the default window system adopted by ubuntu 22.04LTS, GNOME Desktop is selected along with Wayland. When using TeliViewer in full screen mode in this environment, there is the case that this problem will occur. Also, it has been confirmed that this problem can be solved with the workaround by selecting the Xorg or MATE Desktop for the window system. In the case when user faces this problem and has operational inconvenience, it is recommended to consider using either Xorg or MATE Desktop. The window system can be switched by selecting "Ubuntu on Xorg" or "MATE" from the session list at graphical login. In addition, it is available to select MATE Desktop by installing it with following the procedure. “sudo apt install ubuntu-mate-desktop” [Note] For detailed information regarding window systems, etc., refer to the user manual of ubuntu.

10. Miscellaneous topics

10.1. Revision History

Date	Version	Description
2021/10/01	1.0.0	Initial release
2022/07/25	1.0.1	The following features are appended: ➢ Histogram ➢ Move 4x4 by mouse drag ➢ Multicast ➢ Save/Load XML file ➢ Add format for Save image as follows: BMP(8/24/32bpp)、PNG(8/16/24/32/48bpp) ➢ Launch IP Configuration tool ➢ Open user manual Also, some other modifications such as minor changes, correction of descriptions, etc. were applied.
2023/02/28	1.0.2	Some minor changes are applied regarding the description.
2023/05/12	1.0.3	The following features are appended: ➢ StatusLog - Save events ➢ Retrieving and displaying Camera event ➢ Video recording ➢ Options - Enhancement for Save and restore Grid/4x4 settings - Save and restore camera streaming status - Launch with full screen - Hide exit button and cursor on full screen - Enable stream stats collection - Enable GenTL devices
2024/06/20	1.0.4	The following feature is appended: ➢ Image Settings - Image display mode: Legacy is appended ➢ Snapshot Recorder ➢ FeatureView - Save XML to file: Support GenTL device - Update usability of some of input operation ➢ LUT Control - Upload/Download CSV file: Support newline code(CRLF) as separator ➢ Descriptions and usage for BERT Also, some other modifications such as minor changes, correction of descriptions, etc. were applied.

10.2. Disclaimer

The disclaimer for the Logging Tool follows the disclaimer for the TeliCamSDK.
The disclaimer of TeliCamSDK is described in another “License Agreement TeliCamSDK Eng.pdf”.
Make sure to read this Agreement carefully before using it.
Refer to the following folder.

Windows version : [TeliCamSDK installation folder]/Licenses
Linux version : /opt/TeliCamSDK/licenses

10.3. License

TeliCamSDK consists of multiple, independent software components. Each software component is copyrighted by a third party. TeliCamSDK uses software components that are distributed as freeware under a third-party end-user license agreement or copyright notice (hereinafter referred to as a “EULA”).

Some EULAs require that the source code of the applicable component be disclosed as the condition for distributing the software component in executable format. You can check the software components subject to such EULA requirements. For more information, please contact our inquiries described in section 7.4.

Toshiba Teli corporation provides a warranty for TeliCamSDK under conditions set forth by Toshiba Teli corporation. (See the following documents.
“License Agreement TeliCamSDK Eng.pdf”,
“License Agreement TeliCamSDK Sample Eng.pdf”)
However, some of the software components distributed under an EULA are made available for use by the user on the assumption that they are not copyrighted or warranted by a third party. These software components are licensed to the user free of charge and therefore not covered by any warranty within the scope of the applicable laws. These software components are not subject to any copyrights or other third-party rights and are provided in “as is” condition without any warranty, whether express or implied. “Warranty” here includes, but not limited to, an implied warranty for marketability
or fitness for specific uses. All risks associated with the quality or performance of these software components are assumed by the user.

EULAs are included in the following directory:

Windows version : [TeliCamSDK installation folder]/Licenses
Linux version : /opt/TeliCamSDK/licenses

Toshiba Teli corporation shall not be liable whatsoever for any cost of repair or correction or other incidental expense incurred in connection with a defect found in any of these software components. Unless specified under the applicable laws or in a written agreement, a party who changes or redistributes the software with consent from the copyright holders or based on the aforementioned licenses shall not be held liable whatsoever for any loss arising from the use of or inability to use such software components. The same applies even when the copyright holders or relevant third parties have been informed of the possibility of such loss. “Loss” here includes normal, special, incidental and indirect loss (including, but not limited to, the loss of data or its accuracy; loss incurred by the user or any third party; and interface incompatibility with other software). Please read each EULA for details on the use conditions and items that must be observed regarding these software components.

The table below lists the software components using in TeliCamSDK, which are subject to EULAs.
The user should read the applicable EULAs carefully before using these software components.

Windows version

Project name	Project license
GenICam GenApi	GenICam License

Linux version

Project name	Project license
libteliusb (libusb)	LGPLv2.1
GenICam GenApi	GenICam License
Qt	LGPLv3

GenICam GenApi uses the following third party software.

Project name	Project license
MathParser	LGPLv2.1
Log4Cpp	LGPLv2.1
CppUnit	LGPLv2.1
CLSerAll	NI license
xs3p	DSTC license
xxhash	xxhash license
XSLTProc	MIT license
XSDe	Proprietary

TeliViewer uses the following third party software.

Windows version

Project name	Project license
Qt	LGPLv3
Qwt	Qwt License
OpenGL	MIT license
GStreamer	LGPLv2

Linux version

Project name	Project license
libjpeg-turbo	IJG (Independent JPEG Group) License * 1 Clause 2 of the Modified BSD License * 2 zlib license
libdouble-conversion1	BSD-3-clause
Qt	LGPLv3
Qwt	Qwt License
OpenGL	MIT license
GStreamer	LGPLv2

* 1 This software is based in part on the work of the Independent JPEG Group.

* 2 Refer to “The Modified (3-clause) BSD License” in the libjpeg-turbo/LICENSE.md file in the licenses folder listed in section 10.3.

TeliCamSDK redistributes the binaries of LGPL-applied software, and for these source code only, you have the right to obtain, modify and redistribute it in accordance with the LGPL provisions.
To the customer who wants the source code, we write to the media (CD - ROM etc.) and send it by post.
Customers must pay for actual expenses such as shipping fee. If you want, please contact our inquiries described in section 7.4. We distribute source code only for open source software that you have right to obtain. (Source code of TeliCamSDK is not included.) Please understand beforehand that we cannot answer questions about the content of the source code etc.

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CoaXPress is registered trademark of JIIA (Japan Industrial Imaging Association).
GenICam is trademark of EMVA (European Machine Vision Association).
Furthermore, company name or product name might be trademark or registered trademark of each company.

10.4. Inquiry

For frequently asked questions (FAQ) and answers about TeliCamSDK, GigE cameras, USB3 cameras, and CoaXPress cameras, please visit the "Support" - "Industrial Cameras FAQ" site on our website.

If you still cannot solve the problem, please contact us using the phone number or Inquiries form from "Contact Us" site on our website.