



EAN-Ground Control Stations

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Web: sightlineapplications.com

Sales: sales@sightlineapplications.com

Support: support@sightlineapplications.com

Phone: +1 (541) 716-5137

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 **CAUTION:** Alerts to a potential hazard that may result in personal injury, or an unsafe practice that causes damage to the equipment if not avoided

 **IMPORTANT:** Identifies crucial information that is important to setup and configuration procedures.

 *Used to emphasize points or reminds the user of something. Supplementary information that aids in the use or understanding of the equipment or subject that is not critical to system use.*



1 Overview

This document describes how to configure SightLine OEM hardware for encoding and streaming a viewable RTP-H264 video stream for common Ground Control Stations (GCS).

1.1 Additional Support Documentation

Additional Engineering Application Notes (EANs) can be found on the [Documentation](#) page of the SightLine Applications website.

The [Panel Plus User Guide](#) provides a complete overview of settings and dialog windows located in the Help menu of the Panel Plus application.

The Interface Command and Control (IDD) describes the native communications protocol used by the SightLine Applications product line. The IDD is also available as a PDF download on the [Documentation](#) page under Software Support Documentation.

1.2 SightLine Software Requirements

ⓘ IMPORTANT: The Panel Plus software version should match the firmware version running on the board. Firmware and Panel Plus software versions are available on the [Software Download](#) page.

- Panel Plus software 2.23.xx or higher.

1.3 Third Party Ground Control Software for Video Clients

Mission Planner and QGroundControl (QGC) are mutually exclusive in their use. They both provide flight control and mission planning capabilities. It is assumed these software packages are installed on a PC separate from Panel Plus software, which is used to configure the SightLine OEM products.

- [QGroundControl](#) - QGroundControl has implemented its own GStreamer build for displaying video within the application. It is not required to download and install GStreamer separately. Tested using v3.4.4.
- [Mission Planner](#) - Mission Planner requires a separate installation of the GStreamer software. The supported version is the 1.5.2 release 32-bit build (do not install the 64-bit).
- [GStreamer](#) 32-bit Encoder/Decoder version 1.5.2. The recommended version for GStreamer is 1.5.2 release 32-bit build. Other versions may support these configurations and examples. Consult the software documentation for more information on supported GStreamer versions.
- [VLC Player](#) - Optional software used for testing of video streams.



2 Panel Plus Configuration

This section covers the how to configure the video processing board in Panel Plus. All SightLine OEM configuration Panel Plus procedures are similar.

1. Connect to the OEM using the Panel Plus application. After connecting, video should display in Panel Plus. See the one of the corresponding OEM [startup guides](#) for connection and video streaming instructions.
2. From the *Compress* tab in Panel Plus, in the RTP section, select *RTP H.264*.
3. Enter the destination IP address of the PC running Mission Planner or QGroundControl software.
4. Enter the destination port of 5600. This is the default listen port for both Ground Control Station (GCS) applications.
5. Click the *Send* button, and then click the *Start Streaming* button to begin sending the RTP stream to the destination host system.
6. Connect to the OEM board using the Panel Plus application.

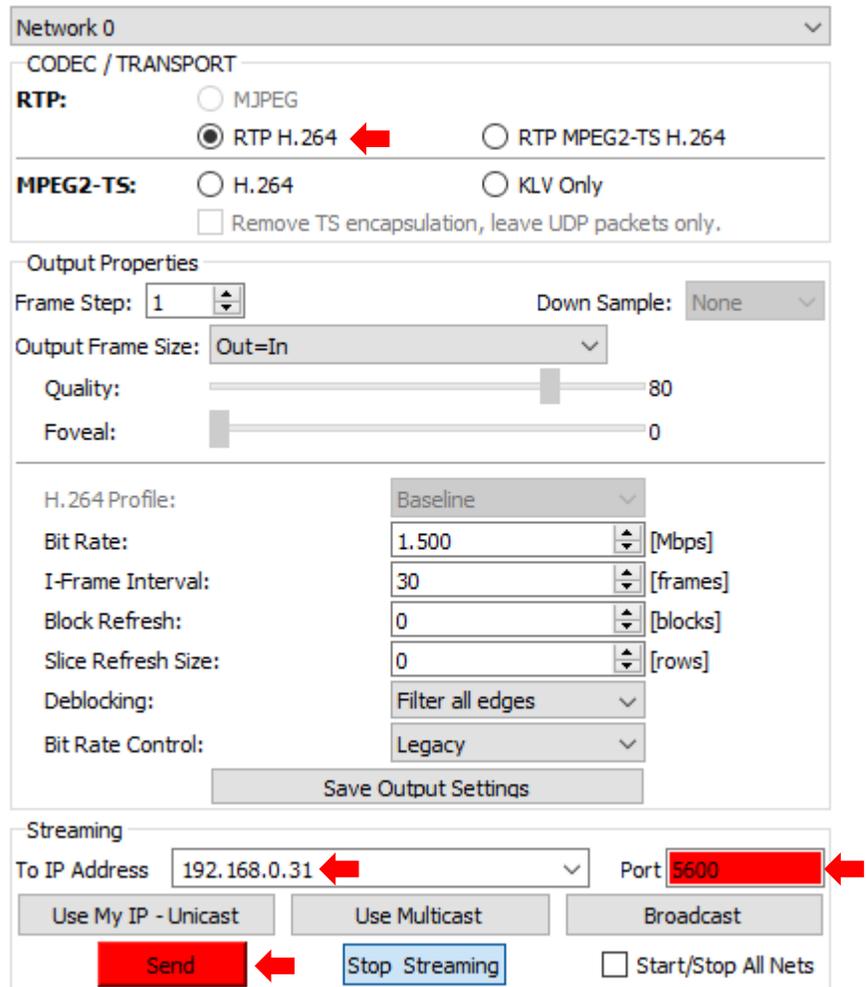
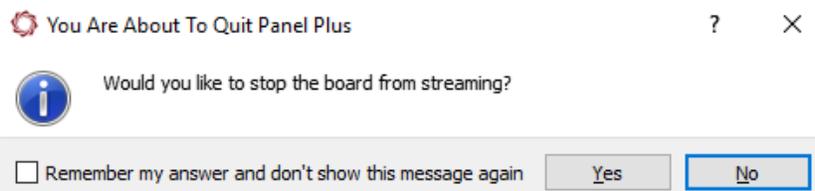


Figure 1: Configure Streaming - Mission Planner / QGC

7. Close Panel Plus and click the *No* button to stop streaming. The board will continue to send the RTP stream to the destination IP address.





3 Configuring QGroundControl Software

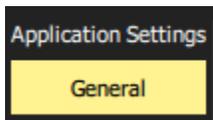
This software will be the easiest to setup given an internal implementation of the GStreamer software. After installing the QGroundControl software, the default configuration attempts to open a video stream (using their embedded GStreamer) on a designated network port (5600). Video streaming configuration can be done with no autopilot hardware connected.

3.1 Setup and Configuration

1. Start an RTP stream from the OEM video processing board using the steps above.
2. Start the QGroundControl.
3. Configure QGroundControl from the toolbar by clicking on the configure icon.



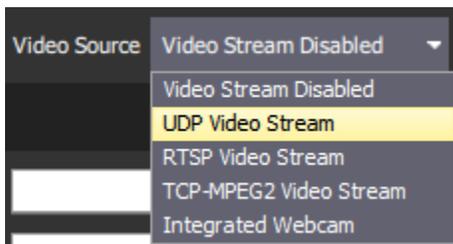
4. Under *Application Settings*, select *General* (default).



5. In the configuration window, scroll down to the *Video* section.

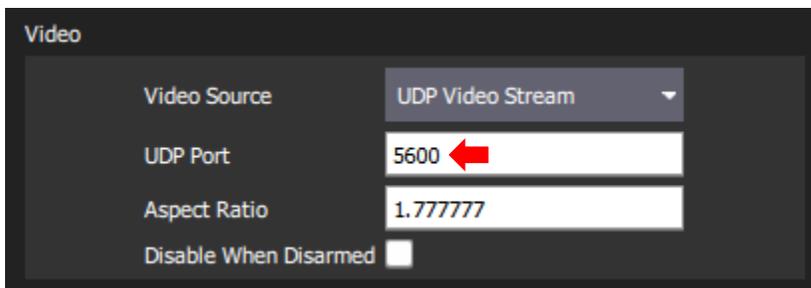
The scroll bar may not be obvious by default.

6. Use the pulldown menu to select *UDP Video Stream*.



7. Update the *UDP Port* to match the UDP port specified in Panel Plus above.

ⓘ IMPORTANT: The UDP Port must match the streaming port in Panel Plus.





- Select the return icon in the menu bar to return to main QGC window.



- By default, the OEM board video stream will be displayed in a small window located at the bottom left of the main application screen.*
- Click on the small video window to switch it with the main map viewing window. Click it again to switch it back to the left corner.
- If the video stream is not visible see the [Troubleshooting](#) section.*

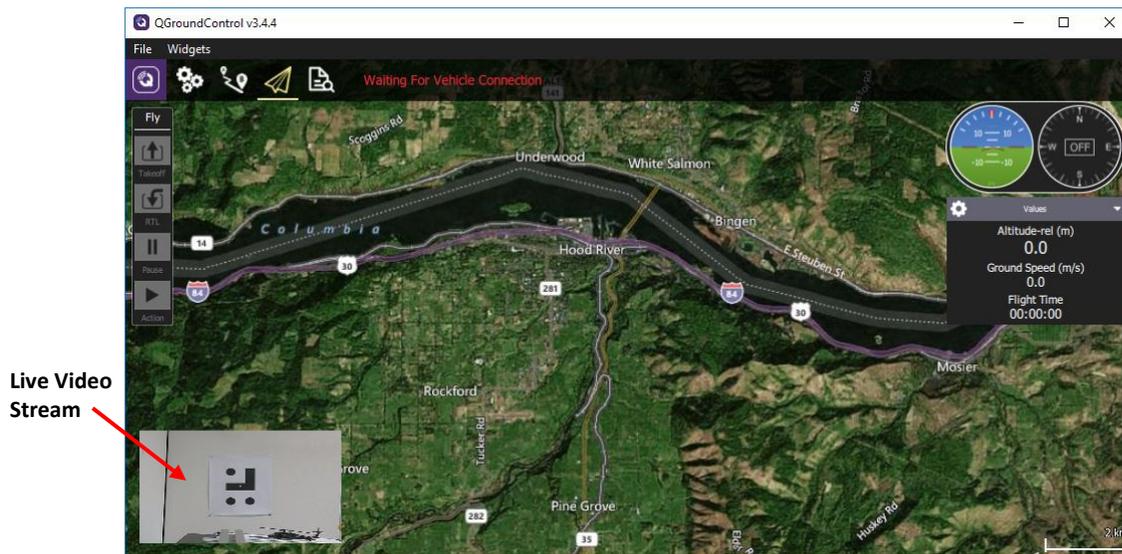


Figure 2: Live Video Stream

4 Configuring Mission Planner Software

Mission Planner requires GStreamer software to decode/display video streamed from the OEM board. Follow the steps below for installing both applications.

- Install the 32-bit version of the GStreamer application. See [EAN-GStreamer-Decoder](#) for detailed instructions for installing and validating GStreamer.

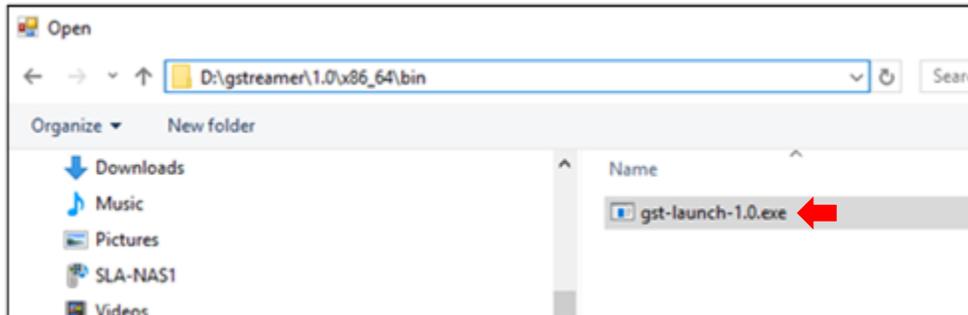
Note the path to the installed binaries - C:\gstreamer\1.0\x86\bin.

- Install the Mission Planner software.
- After the installation is complete load the Mission Planner software.
- Start the RTP video stream.
- After the application loads use the keyboard command CTRL-F to bring up the advanced configuration screen.
- Click the *gstream* button (midway on the right column).



- Using the supplied file open selection, browse to the GStreamer executable (*gst-launch-1.0.exe*) and click *Open*.

Depending on Mission planner version, step 7 may not be necessary.



After the GStreamer application loads the video should be displayed in the top left navigation window. If the video is not displayed, try restarting Mission Planner. If the video does not display, see the [Troubleshooting](#) section for testing the video streaming with both GStreamer and VLC independently from Mission Planner or the QGroundControl software packages. This will confirm that the OEM board is properly configured and working.

5 Troubleshooting

The following sections cover troubleshooting issues related to streaming video to the GCS software packages in the previous sections. The VLC media player and GStreamer will be used to set up test cases to help determine where the issues are.

Since there are many pieces to any streaming configuration, the scenarios below attempt to find issues by establishing connections, opening streams, and testing delivery of IP and RTP/UDP ports with the above applications.

5.1 Waiting for Video Error

Possible causes:

- The OEM may be offline.
- The OEM may be streaming to a different IP address than the GCS.
- The OEM may be streaming to a different port.
- Check the encoding and protocol (RTP H.264) are correct on the OEM.

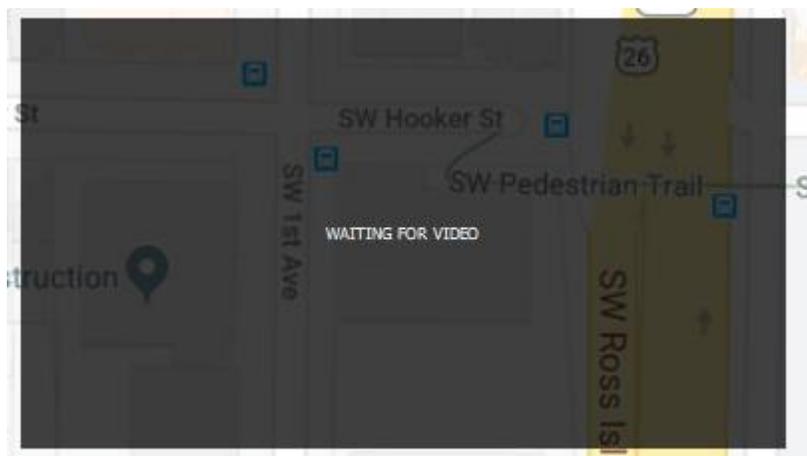


Figure 3: Waiting for Video Error



5.2 Testing Using GStreamer and Mission Planner

In the below examples, GStreamer is used to create an RTP stream for Mission Planner. This test ensures that Mission Planner and GStreamer are working correctly before introducing the OEM board into the system.

1. Open a command window and navigate to the GStreamer bin directory (by default `C:\gstreamer\1.0\x86\bin`).
2. At the command prompt window paste in the following GStreamer pipeline command:

```
gst-launch-1.0 videotestsrc pattern=ball ! video/x-raw,width=640,height=480 ! clockoverlay ! x264enc ! rtph264pay ! udpsink host=127.0.0.1 port=5600
```

- If GStreamer has been installed correctly the output in the command window should match [Figure 4](#).

```
C:\gstreamer\1.0\x86\bin>gst-launch-1.0 videotestsrc pattern=ball ! video/x-raw,width=640,height=480 ! clockoverlay ! x264enc ! rtph264pay ! udpsink host=127.0.0.1 port=5600
Setting pipeline to PAUSED ...
Pipeline is PREROLLING ...
Redistribute latency...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
```

Figure 4: GStreamer Pipeline Command

3. Once this pipeline is running, start Mission Planner and follow the steps outlined in [Configuring Mission Planner Software](#). If everything is working the HUD should match [Figure 5](#).



Figure 5: Mission Planner HUD



4. If Mission Planner does not show video in the HUD, enable the console output in Mission Planner using the following steps:
 - a. Open the help window and check the box *Show Console Window (restart)*.
 - b. Restart Mission Planner. The console window will stay open. This should show any issues with the GStreamer pipeline. An incorrect installation example of GStreamer is shown in [Figure 6](#).

```

HUD 5 hz drawtime 44 gl True
INFO MissionPlanner.Utilities.GStreamer - Found gstreamer C:\gstreamer\1.0\x86\bin\gst-launch-1.0.exe
INFO MissionPlanner.Utilities.GStreamer - Starting C:\gstreamer\1.0\x86\bin\gst-launch-1.0.exe -v udpsrc port=5600 buffer-size=3000000 ! application/x-rtp ! rtph264depay ! avdec_h264 ! queue leaky=2 ! avenc_mjpeg ! queue leaky=2 ! tcpserversink host=127.0.0.1 port=1235 sync=false
INFO MissionPlanner.Utilities.GStreamer - _Start
WARNING: erroneous pipeline: no element "avdec_h264"
INFO MissionPlanner.Utilities.GStreamer -
INFO MissionPlanner.Utilities.GStreamer - Stop

```

Figure 6: Incorrect Installation of GStreamer

5.3 Testing Using GStreamer

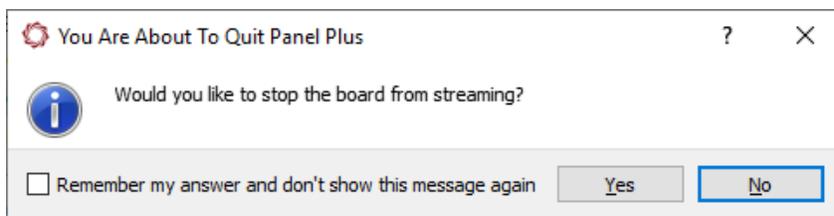
In the example below GStreamer is used to open an RTP stream sent for the OEM board and has been tested with the 1.5.2 version. Other versions of the GStreamer application may require different settings.

Testing can also be done with the VLC media player using the SDP File. See the [VLC Media Player with SDP File](#) section in the [EAN-RTSP](#) document.

5.3.1 GStreamer Pipeline Test

The following steps cover how to open the OEM board video stream using a GStreamer pipeline in a command window.

1. Using Panel Plus software, create a standard RTP output stream and set the outbound port to 5600. (The below pipeline uses this port number in the test string.)
2. Close Panel Plus. At the prompt click the *No* button.



3. Open a command shell window.
4. At the command prompt window paste in the following GStreamer pipeline command:


```

gst-launch-1.0 udpsrc port=5600 ! application/x-rtp,media=video,clock-rate=90000,encoding-name=H264 ! rtph264depay ! avdec_h264 ! autovideosink fps-update-interval=1000 sync=false

```
5. Video will be displayed in a GStreamer D3D video sink internal display window.



5.4 Questions and Additional Support

For questions and additional support, please contact [Support](#). Additional support documentation and Engineering Application Notes (EANs) can be found on the [Documentation](#) page of the SightLine Applications website.