



SightLine

APPLICATIONS

EAN-RTSP

PN: EAN-RTSP

9/4/2020

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 *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.*



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1 Overview

This document describes how to use various commercial off-the-shelf media players to stream video from the RTSP server running on SightLine OEM hardware. Most video client examples use VLC. For more complex tasks, FFmpeg/FFplay or GStreamer can be used.

1.1 Associated Documents

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.

1.3 Application Bit Requirements

The functions described in this EAN require Application Bits (app bits) purchased from SightLine. App bits are enabled with a license file provided by SightLine at initial unit purchase or during a license upgrade process. License files use a hardware ID that is applicable to a specific hardware serial number. For questions and upgrade support contact [Sales](#).

Table 1: Application Bits Requirement Table

RTSP Support	Initial Software Release	Required Application Bit(s) v7 License
1500-OEM	2.22.xx	IP Encoding (H.264) 0x0000 0004 Optional: IP Encoding (H.265) 0x0001 0000
3000-OEM	2.24.xx	
4000-OEM	3.00.xx	

1.4 Third Party Software

[VLC media player](#): Used to display video.

FFplay Media Client: Included in the Panel Plus application folder.

The RTSP server from SightLine Applications is compatible with other RTSP clients including VMS (Video Management Systems) compliant with [RFC 2326](#).



1.5 Feature Overview

RTSP <ul style="list-style-type: none"> • RTP MJPEG • RTP H.264 • RTP MPEG2-TS H.264 + Metadata • RTP MPEG2-TS MPEG-4 + Metadata 	IP Network Protocols <ul style="list-style-type: none"> • UDP and TCP Packets • Unicast Streaming • Multicast Streaming • Multiple Unicast Streaming • TCP Tunneling • RTCP
Streaming <ul style="list-style-type: none"> • 1 camera stream (1500-OEM) • 2 camera streams (3000-OEM) 	Clients <ul style="list-style-type: none"> • 8 simultaneous connections (1500-OEM) • 16 simultaneous connections (3000-OEM) <ul style="list-style-type: none"> ○ 8 sessions for Net0, 8 sessions for Net1
Multiple Display Options <ul style="list-style-type: none"> • Picture-In-Picture • Side-By-Side • Zoom to Track • False Color • Digital Pan, Tilt, Zoom, and Rotation 	On Screen Display (OSD) <ul style="list-style-type: none"> • Text • Shapes • Customer Logo / Watermark
Authentication <ul style="list-style-type: none"> • Digest Authentication 	Keep Alive <ul style="list-style-type: none"> • RTSP Keep alive timeout is set to 120 seconds

1.6 Definitions

SightLine hardware:	OEM hardware products available from SightLine Applications - 1500-OEM, 3000-OEM, 4000-OEM.
RTSP server:	SightLine hardware will host an RTSP server that will handle client connections and translate RTSP requests into actionable video streaming by VideoTrack.
RTSP client:	Remote software which communicates with the RTSP Server to negotiate the streaming video session.
VideoTrack:	The video processing software from SightLine Applications that runs on SightLine hardware.
Panel Plus:	The PC user interface from SightLine used for configuring and testing SightLine hardware. Its intent is to introduce SightLine Command and Control Protocol that can be implemented in the client's software. Panel Plus is a stand-in for any other client such as an autopilot or ground control station that can be used to control the SightLine hardware.
VMS:	Video Management System

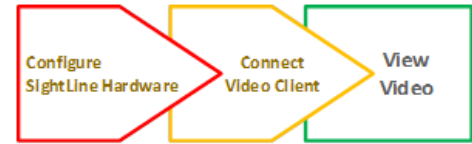
1.7 RTSP Overview

RTSP (Real Time Streaming Protocol) allows a media client such as VLC to request streaming video in a variety of formats from a server such as the 1500-OEM. The RTSP client and RTSP server negotiate the destination port and video format, but actual streaming of video is done by another service (VideoTrack on the 1500-OEM and 3000-OEM), typically using the RTP streaming protocol over UDP. An introduction to the RTSP protocol can be found on [Wikipedia](#). Detailed and authoritative information is available from [RFC 2326](#).



1.7.1 How it Works

The SightLine RTSP Server will startup automatically on power up of the hardware and will listen for inbound connections on port 554. Before clients can connect, system administrators use Panel Plus to configure the video encoding parameters, such as codec (MJPEG, H.264) and other parameters such as quality, frame rates, and image size.



To view the video, operators will use a simple standard URL: `rtsp://<<ip address>>`, where the IP address is the unique address for the SightLine hardware. The video client will then handle all the connection details behind the scenes communicating with the SightLine RTSP server.

ⓘ IMPORTANT: RTSP sessions are not recommended for applications where there is active gimbal control because of the additional latency introduced by the RTSP session.

1.7.2 RTSP Requests and Features

The RTSP server running on SightLine OEM hardware supports sending the video stream in different formats. Consult the client software documentation for specific formatting requirements for the video payload. SightLine hardware can be configured to stream RTSP video in the following formats shown in [Table 2](#).

Table 2: RTSP Video Formats

Hardware*	Format	Description
All	RTP-H.264	H.264/AVC encoded video stream
All	RTP-MPEG2-TS H.264	H.264 encoded video stream within an MPEG2 transport stream
1500-OEM	RTP-MJPEG	MJPEG (Motion JPEG) video stream
1500-OEM	RTP-MPEG2-TS MPEG-4 / RTP-MPEG-4	MPEG4 encoded video stream within an MPEG2 transport stream
4000-OEM	RTP-H.264 & RTP-H.265	H.264 & H.265 encoded video stream
4000-OEM	RTP-MPEG2-TS H.264 & RTP-MPEG2-TS H.265	H.264 & H.265 encoded video stream within an MPEG2 transport stream

*SightLine hardware is designed as a live streaming encoder. The RTSP server does not currently support a pause option.

These types of encoded payloads should be selected prior to establishing RTSP sessions with the OEM board. Use Panel Plus to select the desired encoded video payload format.

By default, OEM boards will send out video encoded as H.264 in an elementary stream inside an MPEG2 Transport Stream. The client software may already support this format. This is a [MISB](#) (Motion Industry Standards Board) requirement for UAV video streams. For more information refer to the [EAN-Encoding](#) document or go to the MISB website.

1.8 Before Starting

Use the [EAN-Startup Guide 1500-OEM](#) or the [EAN-Startup Guide 3000-OEM](#) to setup the SightLine hardware and confirm that video and Ethernet communications are functioning. For the purposes of examples shown in this EAN, the following IP addresses are used:

PC: 192.168.0.23 **1500-OEM:** 192.168.0.115 **3000-OEM:** 192.168.0.24 **4000-OEM:** 192.168.1.230



2 Configuring 1500-OEM for RTSP Sessions

This section describes how to set up the 1500-OEM to send the selected RTP payload for a RTSP session through VLC media player client. The following steps will reference the Panel Plus software.

1. Connect to the board using the Panel Plus application.
2. Go to the *Compression* tab.
3. In the RTP section select one of the four encoded payload options. In this example, *RTP H264* is selected.

CODEC / TRANSPORT			
RTP:	<input type="radio"/> MJPEG	<input type="radio"/> RTP MPEG2-TS MPEG4	
	<input checked="" type="radio"/> RTP H.264	<input type="radio"/> RTP MPEG2-TS H.264	
MPEG2-TS:	<input type="radio"/> H.264	<input type="radio"/> MPEG4	

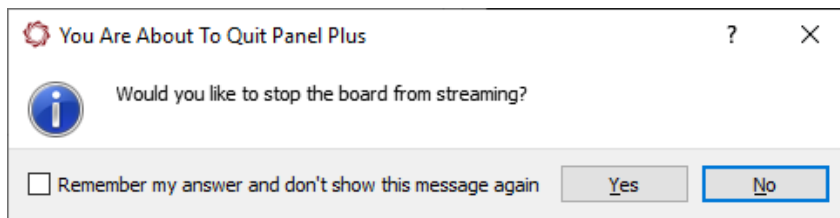
It is not required to set an IP address or Port for a remote client. They are set when the RTSP client connects.

4. Click *Send*. If streaming to Panel Plus, encoding, transport and general performance can be verified using the onscreen statistics.

Statistics			
Frames	30.38	[1/sec]	Video 1287.43 [Kb/sec]
Profile:	Baseline		KLV 0.00 [Kb/sec]
Encapsulation:	rtp		Codec: h264

To save the settings to the parameter file, from the main menu » Parameters » Save to Board.

5. Close the Panel Plus application. Click *No* in the dialog window.



6. Start the RTSP client and enter the IP address of the SightLine hardware.



2.1 Using VLC as RTSP Client

In this example the VLC media player is the RTSP client requesting a session.

1. Open the VLC media player. From the main menu, go to *Media » Open Network Stream (CTRL+N)*.
2. In the URL field use the following syntax:

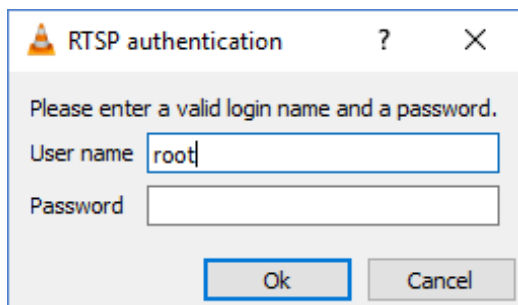
rtsp://<ip-address-of-SLA-Hardware>



3. Click *Play* to begin the connection. The VLC media client will negotiate with the SightLine hardware RTSP server to establish a session.

2.2 Connecting with Authentication

1. If authentication is enabled, VLC will display the authentication dialog box (see [RTSP Authentication - Advanced Use](#)). Enter the login and password in the prompt as configured in the RTSP server.



2. To avoid the login prompt, bypass the username and password directly in the URL by using the following syntax:

rtsp://<login>:<password>@<ip-address>

Example: The username is *admin*. The password is *bls_345*. The following URL can be used with the username and password to avoid the login prompt:

rtsp://admin:bls_345@192.168.1.15

3. If authentication is successful or authentication is disabled, the video will start streaming from the RTSP server. If video is not streaming, refer to the [Troubleshooting](#) section.



3 Configuring 3000-OEM for RTSP Sessions

This section describes how to set up the 3000-OEM to send the selected RTP payload for a RTSP session through VLC media player client.

The 3000-OEM board can output two network streams. These streams are assigned to logical networks: *Network 0* and *Network 1*. RTSP clients can establish sessions on either of these network channels.

1. Open the Panel Plus application and connect to the 3000-OEM.
2. Go to the *Compression* tab.
3. In the top *Output* section, select the *Output Frame Size* for the session.
4. In the *RTP* section select one of the two available encoded payload options, and then click *Apply*. The alternate options will be grayed out. In this example, *RTP H264* is selected.

Network 0 ▼

CODEC / TRANSPORT

RTP: MJPEG

RTP H.264 RTP MPEG2-TS H.264

Do not set an IP address or Port for a remote client. Only set these to the host PC if the video stream is viewed in Panel Plus

5. Go to the *Multi Camera* tab. Using the radio buttons to assign the preferred camera to either *Network 0* or *Network 1*. In this example, *Camera 2* is assigned to *Network 0*. Click *Send* to send changes to the board.

When making changes save the parameter file to the board as needed. Main menu » Parameters » Save to Board.

Index	Video Source	Network Display		Physical Display			Decode @ P+	
		Enable	Resolution	Ana	HDMI	HDSDI		Resolution
0	Cam 2 ▼	<input checked="" type="radio"/>	Out=In	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	720p60 ▼	<input checked="" type="radio"/>
1	None ▼	<input type="radio"/>	N/A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	720p60 ▼	<input type="radio"/>

Send



3.1 Using VLC as RTSP Client

Load the RTSP client and enter the IP address of the 3000-OEM board. In this example, the board has been assigned IP the address of 192.168.0.24. The VLC media player is the RTSP client requesting a session.

1. Open the VLC media player. From the main menu, go to *Media » Open Network Stream (CTRL+N)*.
2. In the dialog box provided use the following syntax: `rtsp://<ip-address-of-SLA-board>/<Network>`

The network designation is either *net0* or *net1*. For example:

Network Protocol

Please enter a network URL:

rtsp://192.168.0.24/net0

Network designations allow choosing either of the logical outbound networks support by 3000-OEM.

3. Another client can stream simultaneously from *Network 1* by using the *net1* designation. For example:

Network Protocol

Please enter a network URL:

rtsp://192.168.0.24/net1

4. Click *Play* to begin the connection.
5. The VLC media client will negotiate with the 3000-OEM RTSP server to establish a RTSP session.
6. If authentication is enabled, see [Connecting with Authentication](#).

4 Configuring 4000-OEM for RTSP Sessions

This section describes how to set up the 4000-OEM to send the selected RTP payload for a RTSP session through VLC media player client.

The 4000-OEM board can output one network stream and RTSP clients can establish a session with this network stream.

1. Open the Panel Plus application and connect to the 4000-OEM.
2. Go to the *Compression* tab.
3. In the top *Output* section, select the *Output Frame Size* for the session.
4. In the *RTP* section select one of the four available encoded payload options, and then click *Apply*. The alternate options will be grayed out.

CODEC / TRANSPORT

RTP:

MJPEG

RTP H.264

RTP H.265

RTP MPEG2-TS H.264

RTP MPEG2-TS H.265



Do not set an IP address or Port for a remote client. Set them to the host PC if the video stream is viewed in Panel Plus.

- Go to the *Multi Camera* tab. Select the *Enable* radio button under *Network Display*. Under *Physical Display* select display type and resolution. Click *Send* to send changes to the board.

Index	Video Source	Network Display		Physical Display		Decode @ P+
		Enable	Resolution	Ana HDMI	HDSDI	
0	Cam 2 ▾	<input checked="" type="radio"/>	1920x1080	<input type="radio"/>	<input checked="" type="radio"/>	1080p30 ▾

When making changes save the parameter file to the board as needed. Main menu » Parameters » Save to Board.

4.1 Using VLC as RTSP Client for 4000-OEM

Load the RTSP client and enter the IP address of the 4000-OEM board. In this example, the board has been assigned IP the address of 192.168.1.230. The VLC media player is the RTSP client requesting a session.

- Open the VLC media player. From the main menu, go to *Media » Open Network Stream (CTRL+N)*.
- In the dialog box provided use the following syntax: `rtsp://<ip-address-of-SLA-board>/<Network>`
- The network designation is `net0` for the 4000-OEM. For example:

Network Protocol

Please enter a network URL:

- Click *Play* to begin the connection.
- The VLC media client will negotiate with the 4000-OEM RTSP server to establish a RTSP session.
- If authentication is enabled, see [Connecting with Authentication](#).

5 Joining Multicast Sessions Through RTSP

RTSP can join to an existing multicast session if the multicast session is configured through Panel Plus for a network.

To join a multicast session through RTSP:

- Open the Panel Plus application and connect to the SightLine hardware.
- Follow the steps in the previous sections to configure the network and camera.
- Go to the *Compression* tab and click *Use Multicast*.

In the IP Address window enter the multicast address and port if it is different than the default multicast address and port shown.



- Click *Send* to begin streaming. The video should start rendering in the Panel Plus display window.

- Open the VLC media player. From the main menu, go to *Media » Open Network Stream (CTRL+N)*. In the URL field use the following syntax:

rtsp://<ip-address-of-SLA-board>/<Network>

- The network designation is either *net0* or *net1*, for example:

The Video should start streaming in the VLC media player.

Starting a unicast session (RTSP URL) or joining a multicast session are the same. RTSP URL should always use the IP Address of the board and not the multicast address given in Panel Plus. Terminating RTSP multicast session will only terminate the RTSP session. The SightLine hardware will continue to stream to the multicast address. Panel Plus should be used to terminate the multicast streaming by either clicking the Stop Streaming button or switching to Unicast session in the Compression tab.

5.1 Issues with Multiple Network Adapters

Windows default routing behavior assigns equal priority for multicast traffic to network interfaces of the same type. On systems with multiple network adapters, this can result in applications listening for multicast traffic on interfaces that are not connected to the SightLine hardware. Try disconnecting or disabling other network adapters if VLC fails to decode the multicast stream.

6 RTSP Commands

The RTSP server in the SightLine hardware supports the following RTSP methods (commands): OPTIONS, DESCRIBE, SETUP, PLAY, GET_PARAMETER, SET_PARAMETER, and TEARDOWN.

7 RTSP Authentication - Advanced Use

RTSP authentication is currently not available on the 4000-OEM.

The RTSP server supports the [digest authentication](#) mechanism based on [RFC 2069](#). Currently, the RTSP server does not support basic authentication. Digest authentication applies an MD5 hash function to the username and password before sending them over the network.

RTSP authentication is disabled by default. It can be enabled through a command line argument while starting RTSP Server.



7.1 Procedure Overview

- Create / modify password file.
- Enable RTSP authentication.
- Copy files to target SightLine hardware.
- Reboot SightLine hardware.

7.2 Create and Modify Authentication File

The authentication file should be named `.htpasswd`. It can have multiple entries corresponding to different users. Each entry in the authentication file should use the following syntax:

`<username>:<realm>:<MD5>`


Username: A unique identifier for each individual using the system.

Realm: This string should contain the name of the host performing the authentication and indicate the collection of users that have access.

Example: `registered_users@gotham.news.com` or `sla_rtspserver`.

Realm should be specific to the customer or product. Digest authentication uses *Realm* to group usernames and passwords.

MD5: A checksum calculated over the string comprised of the (username:realm:password)

 *The authentication file can reside anywhere on the target filesystem, but we recommended that it is placed at the same location as the RTSP server executable.*

7.2.1 Create Password File - SightLine Hardware

An authentication file can be created directly on the target SightLine hardware.

1. Open SSH connected to target:

 *Make the file system writable on the 3000-OEM.*

```
root@sla:~# mount -w -o remount /
```

2. Create an empty password file:

```
root@sla:~# touch .htpasswd
```

3. Use `md5sum` to generate a password for a given username:

```
root@sla:~# echo -n "root:sla_rtspserver:root" | md5sum | cut -d ' ' -f 1
54a6205c85e92a26699dc2c1184e887d
```

4. Add the username, realm and MD5 to the password file. Check the contents using `cat`:

```
root@sla:~# echo
"root:sla_rtspserver:54a6205c85e92a26699dc2c1184e887d" >> .htpasswd
root@sla:~# cat .htpasswd
root:sla_rtspserver:54a6205c85e92a26699dc2c1184e887d
```



5. Add other users as needed:

```
root@sla3000:~# echo -n "admin:sla_rtspserver:bls_345" | md5sum | cut -d ' ' -f 1
66b7f77eb8d65ece28a3a36ad2ba8736
root@sla3000:~# echo
"admin:sla_rtspserver:66b7f77eb8d65ece28a3a36ad2ba8736" >> .htpasswd
```

6. Check the contents of the newly created file:

```
root@sla3000:~# cat .htpasswd
root:sla_rtspserver:54a6205c85e92a26699dc2c1184e887d
admin:sla_rtspserver:66b7f77eb8d65ece28a3a36ad2ba8736
```

7.2.2 Testing Authentication

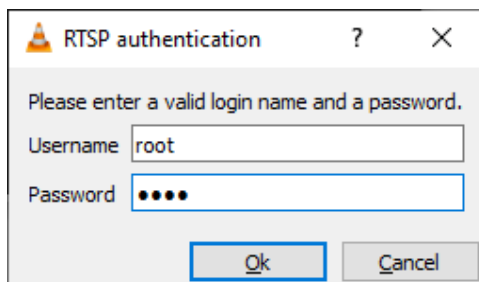
1. Stop the RTSP server:

```
root@sla3000:~# killall rtspMain
```

2. Restart the service with command line parameters:

```
root@sla3000:~# ./rtspMain -a . sla_rtspserver
Enabling authentication in rtsp with password file path .
Passed realm to rtspserver is sla_rtspserver
103078396: RTSP Server: Waiting for client connection
```

3. Connect with an RTSP client.



4. Verify a successful connection on the client. Video should be displayed as expected. The server will output the following verbose diagnostics from RTSP server when authenticating:

```
110116325: Got Authorization header Digest username="", realm="sla_rtspserver",
nonce="11660150213401011283", uri="rtsp://169.254.1.181:554/net0", response="ad
6b6ba3d6a71730fa312b86451e6c8f"
110116326: RTSP Server: RTSP_METHOD_DESCRIBE : 0x6f280
110116326: Did not find authentication header
110116326: Calling handle request without auth header
110116326: Returning null in get_header
110116326: returning 0 in parse_auth_header
```



7.2.3 Creating Password File on the PC

1. Create a new password file (*.htpasswd*) in the *Upgrade Utility* folder using Notepad++ or similar application.

classifier_params.cls	1500	C:\Program Files (x86)\SightLine Applications\SLA-1500 Upgrade Utility 3.02.01\firmware\release\root\root.
dm814x_hdvcip.xem3		
dm814xbm_m3vpss_whole_program_de...		
.htpasswd	3000	C:\Program Files (x86)\SightLine Applications\SLA-3000 Upgrade Utility 3.02.01\firmware\release\root\home\root.
rtspMain	4000	(Not available)

2. Create MD5 hashes for each username, realm and password.
3. Add username, realm and MD5 hash to the *.htpasswd* file.

The md5 hash can be generated online using [OnlineMD5](#). However, OnlineMD5 generates the hash in upper case. Convert into lower case before writing into the *.htpasswd* file.

Example 1: Adding a single user to the authentication file. Assume the following information for username, realm, and password:

Username: *root*

Realm: *sla_rtspserver*

Password: *root*

Figure 1: MD5 Online Hash Generator

In this example (Figure 1) the *.htpasswd* entry is:

```
root:sla_rtspserver:54a6205c85e92a26699dc2c1184e887d
```

Example 2: Adding more users.

Username: *admin*

Realm: *sla_rtspserver*

Password: *Bls_345*

The modified *.htpasswd* file is:

```
root:sla_rtspserver:54a6205c85e92a26699dc2c1184e887d
admin:sla_rtspserver:66b7f77eb8d65ece28a3a36ad2ba8736
```




Step 1: Enable RTSP authentication. Format to enable authentication:

`<path to rtsp executable>/<rtspMain> -a <path to password file> <realm to use>`

Example:

```
./rtspMain -a . sla_rtspserver
```

In the above example:

<code>rtspMain</code>	RTSP server executable.
<code>-a</code>	Command line switch to enable authentication.
<code>.</code>	Path where <code>.htpasswd</code> is in the file system.
<code>sla_rtspserver</code>	Realm to be used.

Step 2: Modify the scripts that launch the RTSP server. The following startup scripts can be modified to add the arguments shown above:

1500-OEM: `/etc/rc.d/rc.local`

3000-OEM: `/home/root/sla3000_init.sh`

4000-OEM: *(Not available)*

Example:

The default startup script that launches the RTSP server without authentication is shown in [Figure 2](#).

```
78  if [ -f rtspMain ]; then
79      sleep 5
80      ./rtspMain &
81  else
82      echo -e "\e[31mrtspMain not found - RTSP support disabled\e[0m"
83  fi
```

Figure 2: Default Startup Script

The modified startup script to launch the RTSP server with authentication is shown in [Figure 3](#).

```
78  if [ -f rtspMain ]; then
79      sleep 5
80      ./rtspMain -a . sla_rtspserver &
81  else
82      echo -e "\e[31mrtspMain not found - RTSP support disabled\e[0m"
83  fi
```

Figure 3: Modified Startup Script

Step 3: Copy files to target SightLine hardware or edit them on the OEM. Use the SightLine Upgrade Utility tool or FTP client to move the files to the target hardware.

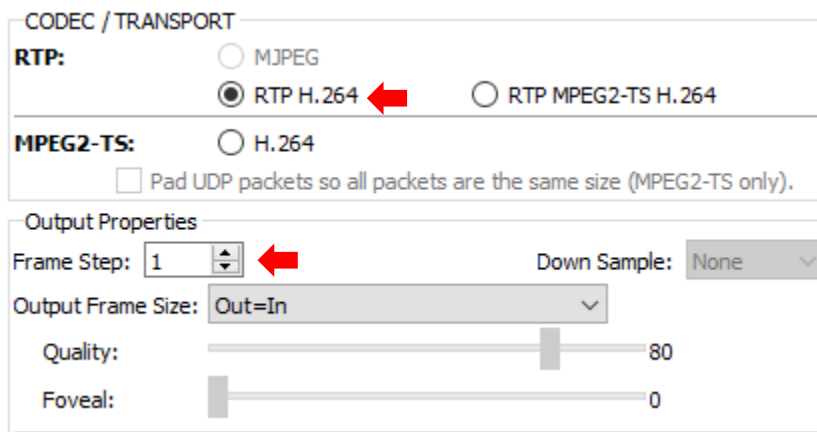
Step 4: Reboot the SightLine hardware. RTSP authentication is now enabled.



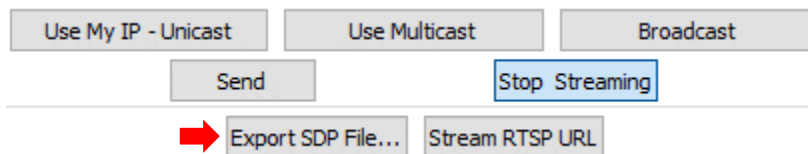
8 Generating SDP File Using Panel Plus

1. Open the Panel Plus application and connect to the SightLine hardware.
2. Go to the *Compression* tab.
3. In the *CODEC / TRANSPORT* section, select one of the four encoded payload options. In this example, *RTP H264* is selected.
4. In the *Output Properties* section, select the *Output Frame Size* for the session.

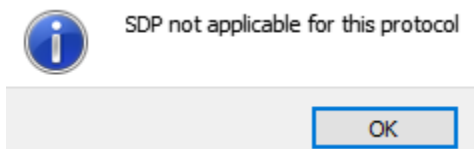
When input field changes have been detected in the *Compression* tab the *Send* button will turn red. Click the *Send* button to send the changes to the board.



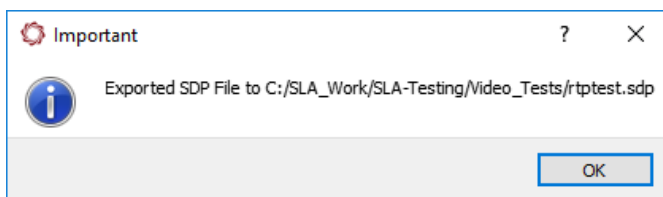
5. Click *Export SDP File*. This will generate an SDP file and will save it to a user designated folder.



If the configuration is not valid, the following error window opens.



If the configuration is valid, the following message will appear.



6. Use the generated SDP file in VLC or other players to stream the video.



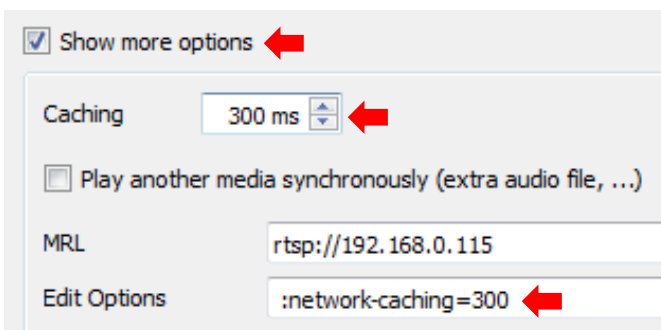
9 Additional Configurations for VLC

9.1 Improving Latency

The VLC Media player can cause a lag in the video frames being displayed due to internal buffering. See [EAN-Using-VLC](#) for additional details.

To reduce the latency in VLC:

1. Open the VLC application. From the main menu, go to *Tools » Preferences » Input / Codecs*.
2. Set *Default Caching policy* to *Lowest latency*.
3. To reduce the latency further, from the main menu » *Open Network Stream* and check *Show more options*. Change the caching amount in the drop down or edit the network caching option.



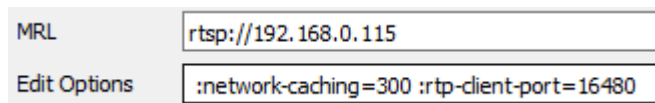
9.2 Bypass RTP Client Port

VLC may use the same control port for all the instances of the application. This will allow only one VLC instance to receive the RTP stream. This behavior can be overridden by bypassing the RTP client port as an optional parameter in network streaming.

To set the RTP client port for network streaming in VLC:

1. From the main menu, *Media » Open Network Stream* and check *Show more options*.
2. In *Edit options*, enter client port using the following syntax:

```
rtp-client-port=<client_port to be used>
```



Per [RFC 3550](#) SightLine recommends that port numbers be even.

9.3 VLC Media Player with SDP File

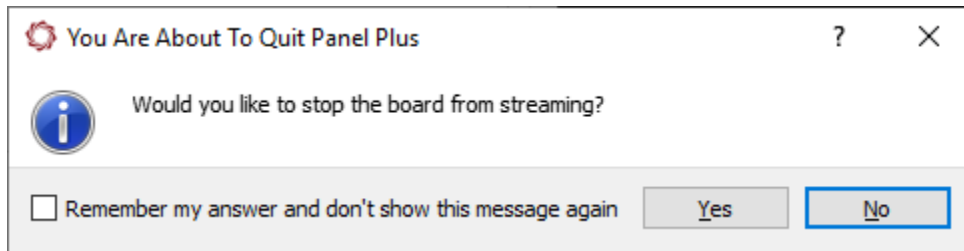
In this method, VLC is a passive receiver of video being streamed by UDP. The SDP file sends the properties of the stream to the VLC so it can be properly interpreted.

This only works if the video is already streaming, no other process (like Panel Plus) is reading the video, and the SDP file accurately describes the stream.



This section describes how to open the SightLine video stream using an SDP (Session Description Protocol) file with the VLC media player.

1. Using Panel Plus software, create a standard RTP output stream. Set the outbound UDP Port to 5400. Verify that the video can be seen in the Panel Plus display window.
2. Follow the steps in [Generating SDP File Using Panel Plus](#) to generate an SDP file.
3. Close the Panel Plus application, and then click *No* in the prompt about stopping video streaming.



4. Open the VLC media player.
5. From the main menu, go to *Media » Open File* to open the file that was saved at `C:\SLA_Work\SLA-Testing\Video_Tests\rtptest.sdp`.

The VLC will then display the video stream in the display window.

10 Enabling TCP Transport Mode

RTSP server supports TCP transport mode for streaming. RTP packets will be sent in the same RTSP connection instead of a separate UDP connection.

ⓘ IMPORTANT: Multicast support through RTSP is not available in TCP mode.

10.1 Enable TCP mode in VLC

1. From the main menu, go to *Tools » Preferences » Input / Codecs*.
2. Enable *RTP over RTSP (TCP)*.

Follow the configuration steps mentioned in previous sections to begin streaming to VLC.

To switch back to UDP mode:

1. From the main menu, go to *Tools » Preferences » Input / Codecs*.
2. Enable *HTTP (default)* to switch to UDP streaming.





11 Configuring RTSP Streaming in Other Media Players

SightLine supports many of the media players available that utilize RTSP streaming and RTP protocols. Procedures to configure RTSP/RTP streaming on other media players and VMS software are similar to VLC.

For all SightLine hardware, follow the same steps for setting the network configuration for testing the RTP output stream (see [EAN-Video-Management-Software](#)).

12 Using FFplay with RTSP

This section describes how to open the SightLine video stream via RTSP and using FFplay media player. The FFplay executable is included in the Panel Plus installation folder.

1. Navigate to the SightLine Applications folder on the host PC hard drive.
2. Open the Panel Plus folder.
3. In the window address bar type CMD, and then press the Enter key to open a command prompt window.

```
Microsoft Windows [Version 10.0.17134.165]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Program Files (x86)\SightLine Applications\SLA-PANEL-PLUS 2.25.01>
```

4. In the command window, type the following command:

```
FFPLAY rtsp://<enter-ip-address-here>:<port number>
```

Example: `FFPLAY rtsp://192.168.0.24:554`

The video will be displayed in the FFplay media presentation window.

12.1 Using FFplay with SDP File

See also [Generating SDP File Using Panel Plus](#) and [VLC Media Player with SDP File](#).

1. Select video format.
2. Create an SDP file.
3. Start streaming.
4. Exit Panel Plus.
5. Assuming the SDP file is named *rtptest.sdp*, launch FFplay by using the command:

```
<ffplay rtptest.sdp>
```

Some versions of ffplay require additional arguments:

```
<ffplay -protocol whitelist file,udp,rtp rtp.sdp>
```

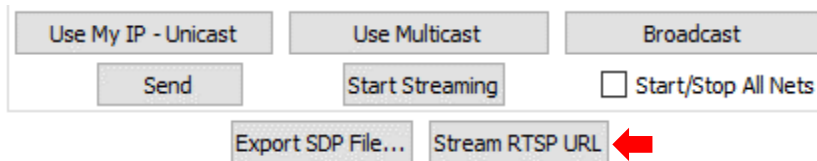
FFplay should launch a display window with the RTP video stream.



13 Streaming RTSP to Panel Plus

Panel Plus can be configured as an RTSP Client to receive RTP video from SightLine hardware using RTSP protocol. The following procedure outlines connecting to SightLine RTSP streams in Panel Plus.

1. Connect Panel Plus to the SightLine hardware.
2. Configure the board for IP video output and select an RTP payload/transport type as described in [section 2](#) (1500-OEM), [section 3](#) (3000-OEM), or [section 4](#) (4000-OEM).
3. In the *Streaming* section under the *Compression* tab, click *Stream RTSP URL*:



4. Panel Plus will open a window with the available streaming URL(s) based on the configuration in the *Compression* tab.

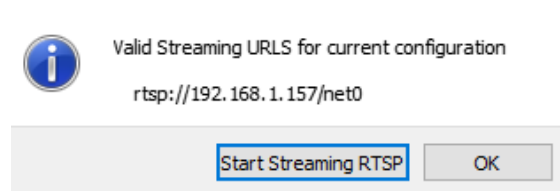
Example 1:

RTP setting: RTP H.264

Chosen network: Net0

IP of board: 192.168.1.157

Displayed dialog window:



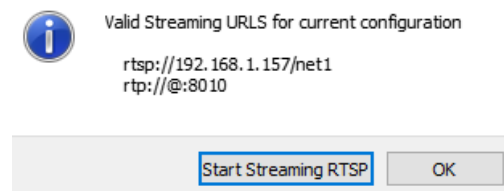
Example 2:

RTP setting: RTP TS-H.264

Network: Net1

IP of board: 192.168.1.157

Displayed dialog window:



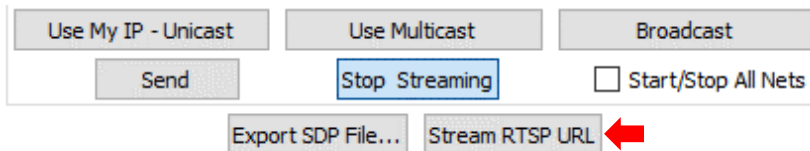
The dialog window also shows a sample RTP URL that can be used with other players like VLC, which support RTP streaming with an SDP file.

5. Click *Start Streaming RTSP*.

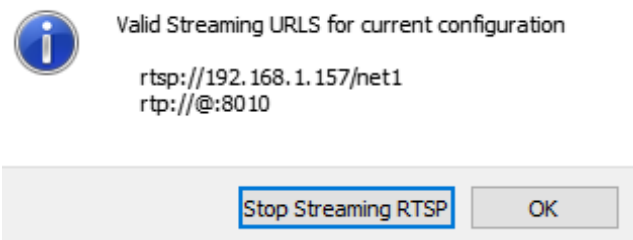
Panel Plus will establish an RTSP session and begin decoding RTP video from the board. When the RTSP session is initiated, the destination IP under the *Compression* tab will be set to the localhost address (127.0.0.1) on port 8008 (network 0) or 8010 (network 1).



6. To end the RTSP session:
 - a. Click *Stream RTSP URL* under the *Streaming* section.



- b. Click *Stop Streaming RTSP*.



To switch to standard UDP streaming, enter the destination IP and port under the compression tab, click *Send*, and click *Start Streaming* if necessary. This will bypass the RTSP server on the SightLine hardware.

ⓘ IMPORTANT: When Panel Plus is configured as an RTSP client, the *Decode @ P+* stream selection setting under the *Multi Camera* tab is ignored.

📄 *Panel Plus does not support TCP transport mode for RTSP video streams.*

📄 *It is possible to connect multiple RTSP clients running on the PC to the same SightLine RTSP stream.*

14 Streaming Video Over the Internet

With 2.23 support of RTSP, video can be streamed over the internet. A simple network topology is shown in [Figure 4](#).

Basic setup steps:

1. Configure the SightLine hardware for RTP streaming.
2. Configure the router to allow port 554 forwarding to the SightLine hardware.
3. Connect to the video client.

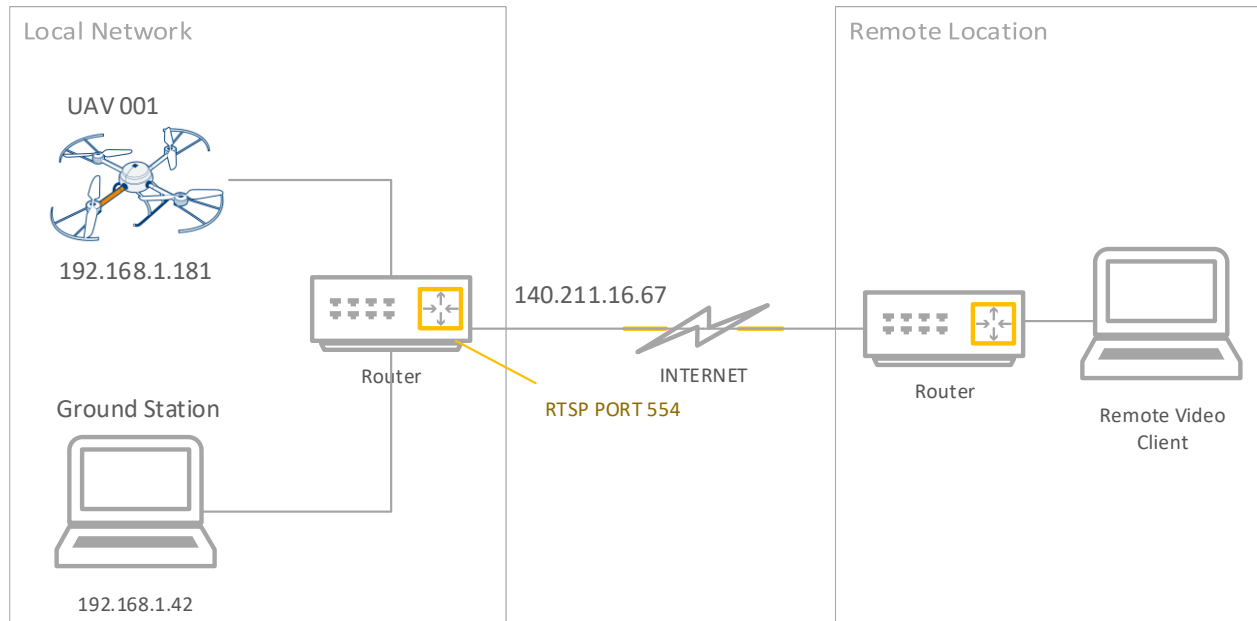


Figure 4: Simple Network Topology

Additional configuration steps may be necessary depending on how the network is setup.

14.1 Configure the SightLine Hardware

Detailed configuration information is covered in the previous sections.

1. In the *Compression* tab of Panel Plus, select one of the RTP streaming modes.
2. Save the parameters to the board, *main menu » Parameters » Save to Board*.
3. In the bottom status bar of Panel Plus, note the IP address of the system. This will be used to configure the router in the next section.

```
Board: SLA3000_44bad4, 192.168.1.181 Firmware Ver: 2.24.1.20, temp: 123°F
SVN Revision: 35035, Build Date: 4/18/2017, Build Time: 10:21:23 This PC: 192.168.1.91
```

14.2 Configure the Router

Configure the router to forward port 554 of your external IP address to port 554 of the SightLine hardware. The example shown uses a COTS D-Link DIR-601 router.

Consult the router documentation on how to configure the port forwarding function.

1. Use a web browser to log on to the router, e.g., *http://192.168.1.1*
2. In the top navigation bar, click *Advanced*.





3. Configure the port forwarding table.

Name	<< Application Name ▾	Public Port	Protocol
UAV_001		554	Both ▾
IP Address	<< Computer Name ▾	Private Port	
192.168.1.181		554	256

4. Save the settings. The router should now be configured to forward any inbound requests to the correct SightLine hardware.

14.3 Connect Video Client

To connect the video client, you will need the public IP address of your router. In the example below, the publicly accessible IP address for this router is 140.211.16.67 (Figure 4). Optionally, use Google to find the public IP address of your router as shown in Figure 5.

WAN

Connection Type : fixed IP
Cable Status : Connected
Network Status : Connected
Connection Up Time : 0 Day, 2:36:58
MAC Address : 14:d6:4d:28:37:cb
IP Address : 140.211.16.67
Subnet Mask : 255.255.0.0
Default Gateway : 140.211.16.1
Primary DNS Server : 8.8.8.8
Secondary DNS Server : 8.8.8.4

Figure 5: Router IP Internet Address

Google my ip address

All News Shopping Videos Maps More

About 71,300,000 results (0.89 seconds)

140.211.16.67
Your public IP address

[Learn more about IP addresses](#)

Figure 6: Google IP Address Search

For this example, the above IP address is used for the URL in the video client.

1. Open VLC media player from your remote location.
2. From the menu, go to *Media » Open Network Stream* (CTRL+N).
3. Enter the network URL for your location: *rtsp://140.211.16.67*

Network Protocol

Please enter a network URL:

rtsp://140.211.16.67 ←

4. If the inbound port is changed, the port number can be added in the URL to be more specific.

Please enter a network URL:

rtsp://140.211.16.67:554 ←

5. Once the above steps are complete, video should be streaming in the VLC media player.



15 Troubleshooting Streaming Issues

Connect to the target board again using Panel Plus and check network settings and compression protocols are correctly configured.

Check whether RTP port number (e.g., 5004) configured in Panel Plus or VLC media player is being used by any other process or service in the system. If it is being used, stop the service, and try again.

Example: The Windows media network sharing service on Windows 10 seems to use port 5004 and blocks VLC Media Player from getting the video stream.

- ✓ Use the Windows command line tool [netstat](#) to see all the ports.
- ✓ Check whether RTP port configured for the stream is an even number. RTP streaming will not work with an odd port number on some media players.
- ✓ Check whether client is configured to stream RTP over TCP.
- ✓ Verify the IP address, subnet mask, and Gateway are configured correctly for the network. Subnet m-s-match and missing or incorrect Gateway IP addresses are a common problem.

15.1 Questions and Additional Support

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