FuturePlus Systems

Display Port Pixel Renderer

User Manual

Revision 3.0

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1. Introduction

This paper is a manual on the features of the Pixel Renderer Software paired with the FS4500 Probe Manager.

How they work together is that the FS4500 Probe Manager will capture a trace and store the saved data in the following area C:\Users\username\Documents\FuturePlus\FS4500\Instance1. The Pixel Renderer will be looking in that folder for the data. When data is seen, the Pixel Renderer will parse through the data looking for pixel states to recreate complete frames that were captured.

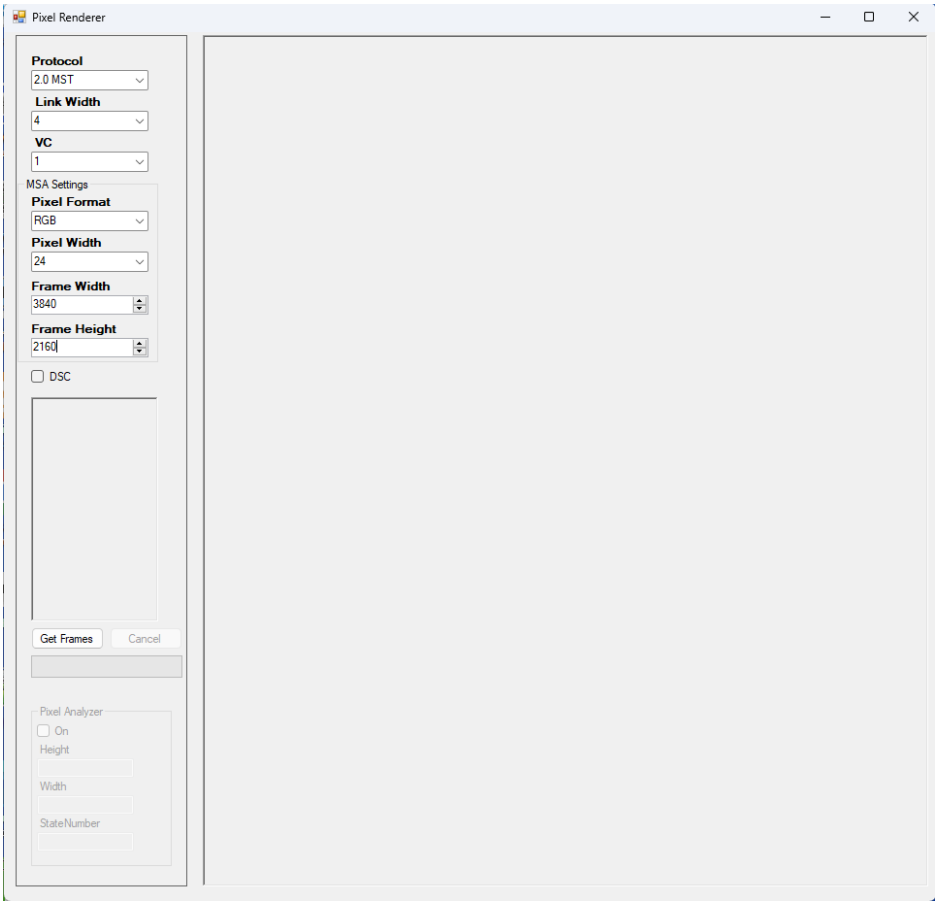
This application also works for offline data. After opening the FS4500 Probe Manager, the user can load a saved configuration file and the Pixel Renderer tool would be ready to use.

The features of the Pixel Renderer include:

- Painting frames from Probe Manager
- Analyze Pixels showing state number

2. Getting Started

The user will be presented with the following form when launching the application.



The MSA Settings can be seen by looking at the MSA Decode in the state listing of the FS4500 Probe Manager.

T	0	MSA SS	0.000 nS	1	1	MSA (5C)	01	C936C936	C936C936	C936C936	C936C936
	1	MSA SS	3.200 nS	0	1	MSA (5C)	00	F906F906	F906F906	F906F906	F906F906
	2	VFREQ[47:40] = 0x00000000 VFREQ[39:32] = 0x00000000 VFREQ[31:24] = 0x0000001F VFREQ[23:16] = 0x000000C8	6.400 nS	0	1	MSA (5C)	00	0F000000	00000000	0F000000	C81F0000
	3	Hor. Total(Pixels) = 4000 Hor. Start(Pixel) = 112 Hor. Width(Pixels) = 3840 VFREQ[15:8] = 0x000000BF VFREQ[7:0] = 0x000000D0 Ver. Total(Line Count) = 2222 Ver. Start(Line Count) = 59 Ver. Height = 2160 MISC0 = 32 Link & Stream Clks: Asynchronous Colorimetry = Legacy RGB ColorDepth = 8 bits/color MISC1 = 0 # Of Interlaced Lines: Is Odd # Stereo Video Attr: No Stereo Video	9.600 nS	0	1	MSA (5C)	00	00AE08A0	803B0070	00700800	0020D0BF
	4	Hor. Sync Polarity: Active High Pulse Hor. Sync Width(Pixels) = 32 Ver. Sync Polarity: Active Low Pulse Ver. Sync Width(Pixels) = 5	12.800 nS	0	1	MSA (5C)	01	00000020	00000005	00000000	00000000
	5	MSA SE	16.000 nS	0	1	MSA (5C)	00	1AE51AE5	1AE51AE5	1AE51AE5	1AE51AE5

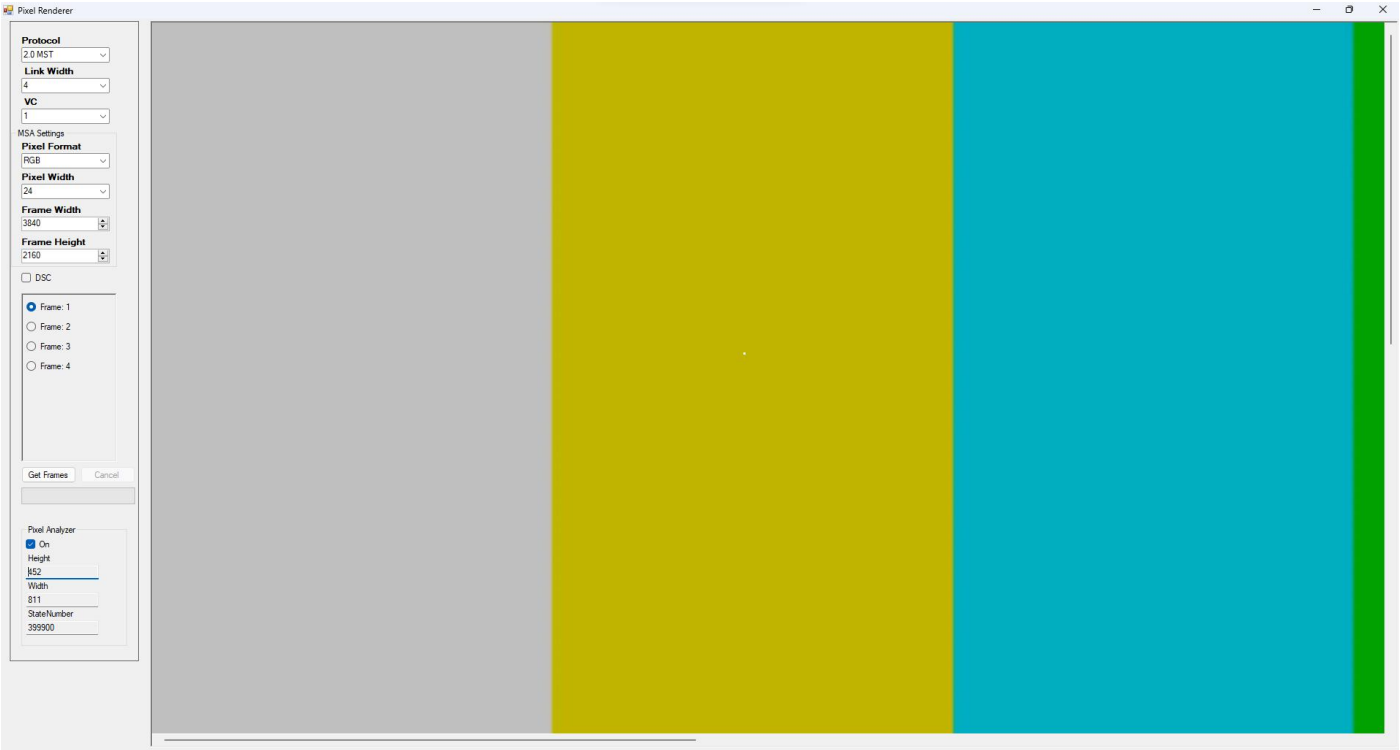
After verifying that all the settings in the Pixel Renderer match the FS4500 MSA, the user can click Get Frames. While the Pixel Renderer is parsing data, the user can select “Cancel” which will end the parsing immediately.

At the end, if frames were found, show them in the panel above the “Get Frames” button in the form of radio buttons. The user can select the radio button to show the picture.

3. Pixel Analyzer

After frames have been captured, the user can select turn on the Pixel Analyzer. The Pixel Analyzer allows the user to select a specific pixel in the picture and the Height, Width, and State Number of that pixel will be shown within the text boxes.

To select a pixel, the user can hover their mouse over the frame and click. The pixel that the cursor is over will be selected. The selected pixel will be flashing between black and white. In the picture below, notice that the Yellow Bar has an area that is no longer Yellow, that is the selected pixel.



The user can also click anywhere on the Form and user the left, right, down, and up keys on the keyboard to move the selected pixel 1 spot in the respective direction.

In the picture above, the Height is 452, the Width is 811, and the StateNumber is 399900. We can use this information to look up that pixel state in the FS4500 State Listing.

	Marker	Sample Number	Decode	Time	Trigger	VCTag	EventCode	Ln0_CDI_Pad_Dat	Ln0_Symbol_Data	Ln1_Symbol_Data	Ln2_Symbol_Data	Ln3_Symbol_Data
		399895	P784 R = 193 G= 180 B = 0 P785 R = 193 G= 180 B = 0 P786 R = 193 G= 180 B = 0 P787 R = 193 G= 180 B = 0	3.810 mS	0	1	Hor. Pixel (88)	00	C100B4C1	C100B4C1	C100B4C1	C100B4C1
		399896	P788 R = 193 G= 180 B = 0 P789 R = 193 G= 180 B = 0 P790 R = 193 G= 180 B = 0 P791 R = 193 G= 180 B = 0	3.810 mS	0	1	Hor. Pixel (88)	00	B4C100B4	B4C100B4	B4C100B4	B4C100B4
		399897	P792 R = 193 G= 180 B = 0 P793 R = 193 G= 180 B = 0 P794 R = 193 G= 180 B = 0 P795 R = 193 G= 180 B = 0 P796 R = 193 G= 180 B = 0 P797 R = 193 G= 180 B = 0 P798 R = 193 G= 180 B = 0 P799 R = 193 G= 180 B = 0	3.810 mS	0	1	Hor. Pixel (88)	00	00B4C100	00B4C100	00B4C100	00B4C100
		399898	P800 R = 193 G= 180 B = 0 P801 R = 193 G= 180 B = 0 P802 R = 193 G= 180 B = 0 P803 R = 193 G= 180 B = 0	3.810 mS	0	1	Hor. Pixel (88)	00	C100B4C1	C100B4C1	C100B4C1	C100B4C1
		399899	P804 R = 193 G= 180 B = 0 P805 R = 193 G= 180 B = 0 P806 R = 193 G= 180 B = 0 P807 R = 193 G= 180 B = 0	3.810 mS	0	1	Hor. Pixel (88)	00	B4C100B4	B4C100B4	B4C100B4	B4C100B4
▸		399900	P808 R = 193 G= 180 B = 0 P809 R = 193 G= 180 B = 0 P810 R = 193 G= 180 B = 0 P811 R = 193 G= 180 B = 0 P812 R = 193 G= 180 B = 0 P813 R = 193 G= 180 B = 0 P814 R = 193 G= 180 B = 0 P815 R = 193 G= 180 B = 0	3.810 mS	0	1	Hor. Pixel (88)	00	00B4C100	00B4C100	00B4C100	00B4C100
		399901	P816 R = 193 G= 180 B = 0 P817 R = 193 G= 180 B = 0 P818 R = 193 G= 180 B = 0 P819 R = 193 G= 180 B = 0	3.810 mS	0	1	Hor. Pixel (88)	00	C100B4C1	C100B4C1	C100B4C1	C100B4C1
		399902	P820 R = 193 G= 180 B = 0 P821 R = 193 G= 180 B = 0 P822 R = 193 G= 180 B = 0 P823 R = 193 G= 180 B = 0	3.810 mS	0	1	Hor. Pixel (88)	00	B4C100B4	B4C100B4	B4C100B4	B4C100B4

Using the Pixel Decode in the FS4500 State Listing, we can see State Number 399900 contains a Pixel ID of 811.

When the user is finished, they can uncheck the On checkbox and they will see their original picture.

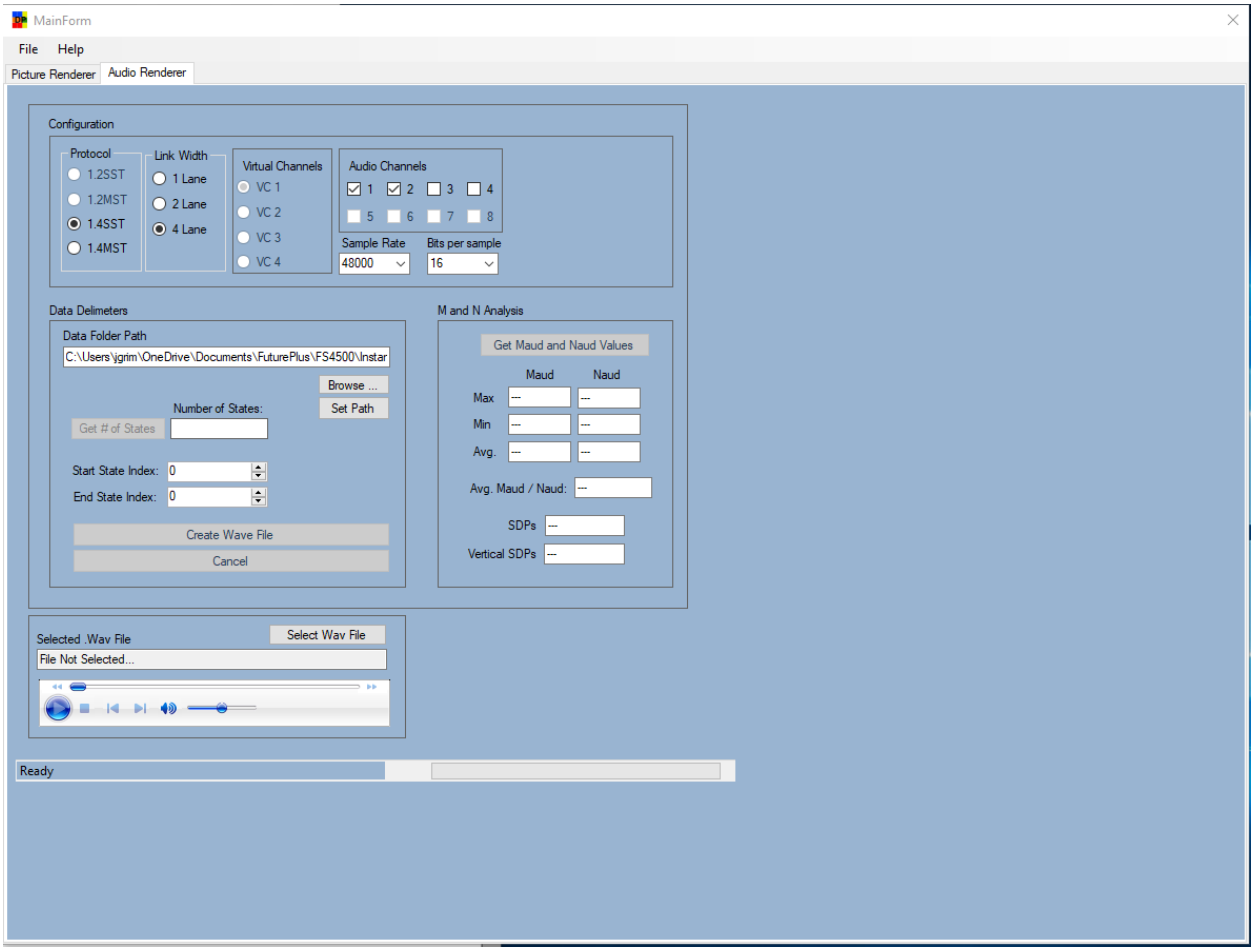
4. Audio Renderer

The features of this software are:

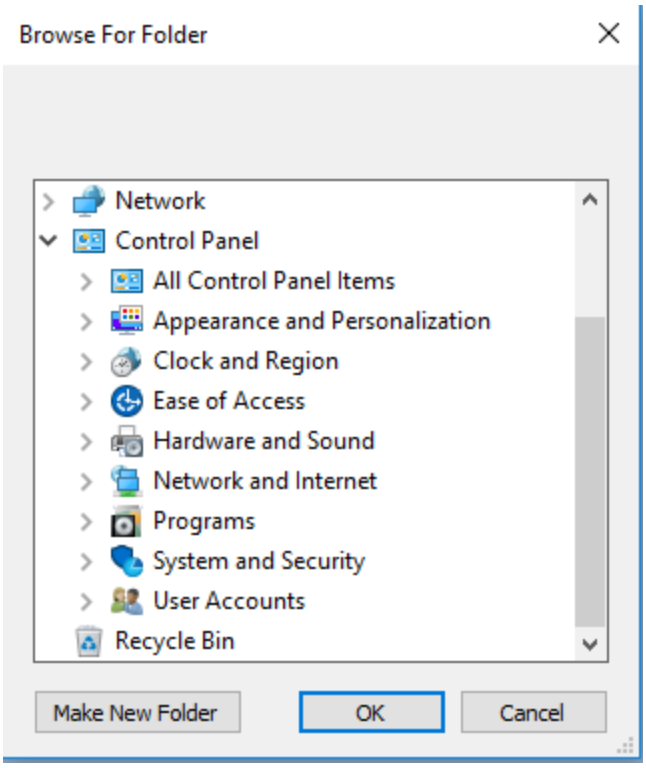
- Create Wav file from Audio Data captured by the FS4500
- Playback the created Wav files
- Outputs Max, Min, and Avg Maud and Naud Values while counting Time Stamp packets both horizontal and vertical

4.1 Getting Started

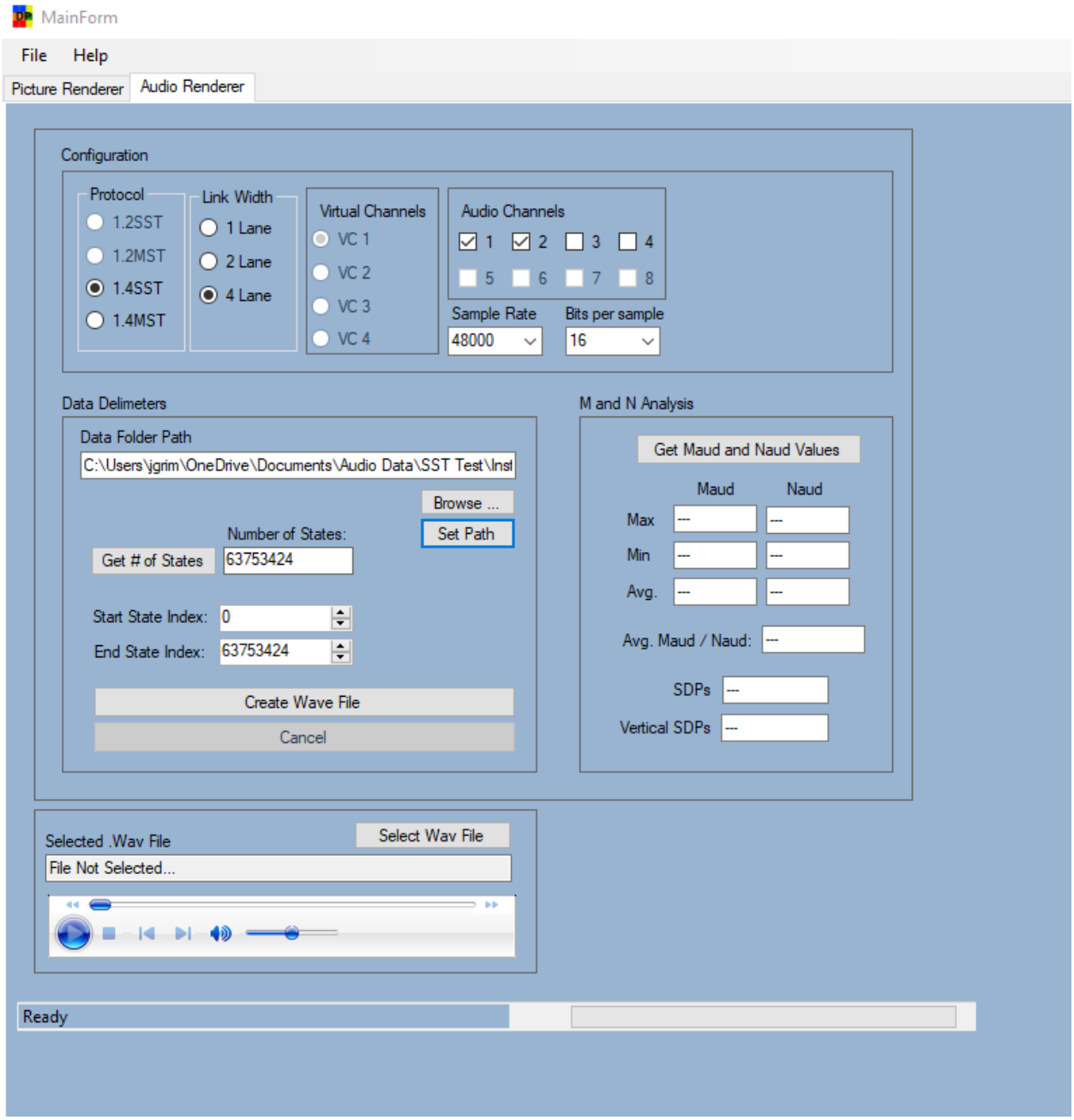
The Audio Renderer is packaged with the Pixel Renderer. On the top of the main form, there is a tab that says “Audio Renderer.” When clicked, the user will be presented with the following form.



The user may select which Audio Channels they would like, Sample Rate, and Bits per sample, although what is shown above is the most common set up for capturing audio.
The Data Folder Path text is a default path that will allow the Audio Renderer to access the configuration file with the stored data loaded in the Probe Manager, however, unlike the Pixel Renderer, the user does not need to have the Probe Manager open and the configuration file loaded. When the user clicks Browse, a popup window appears.

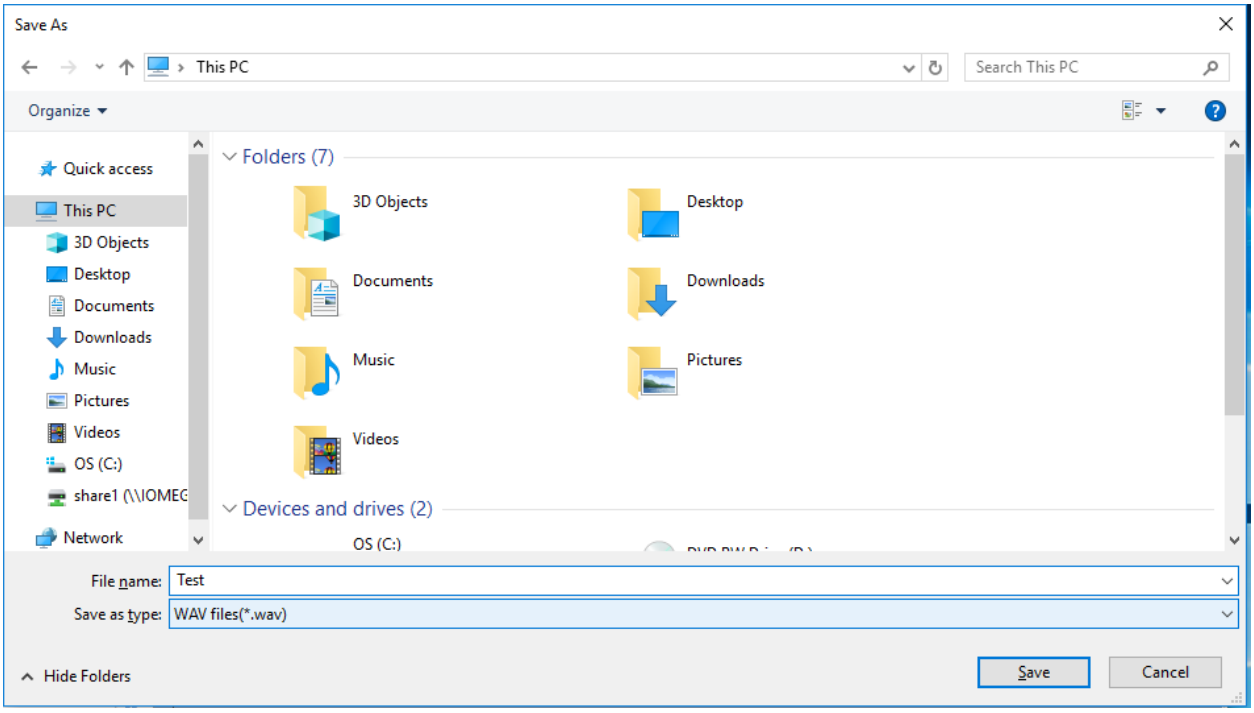


After a folder is selected, the user will click Set Path. After Set Path is clicked, the user will have the ability to create a wav file.



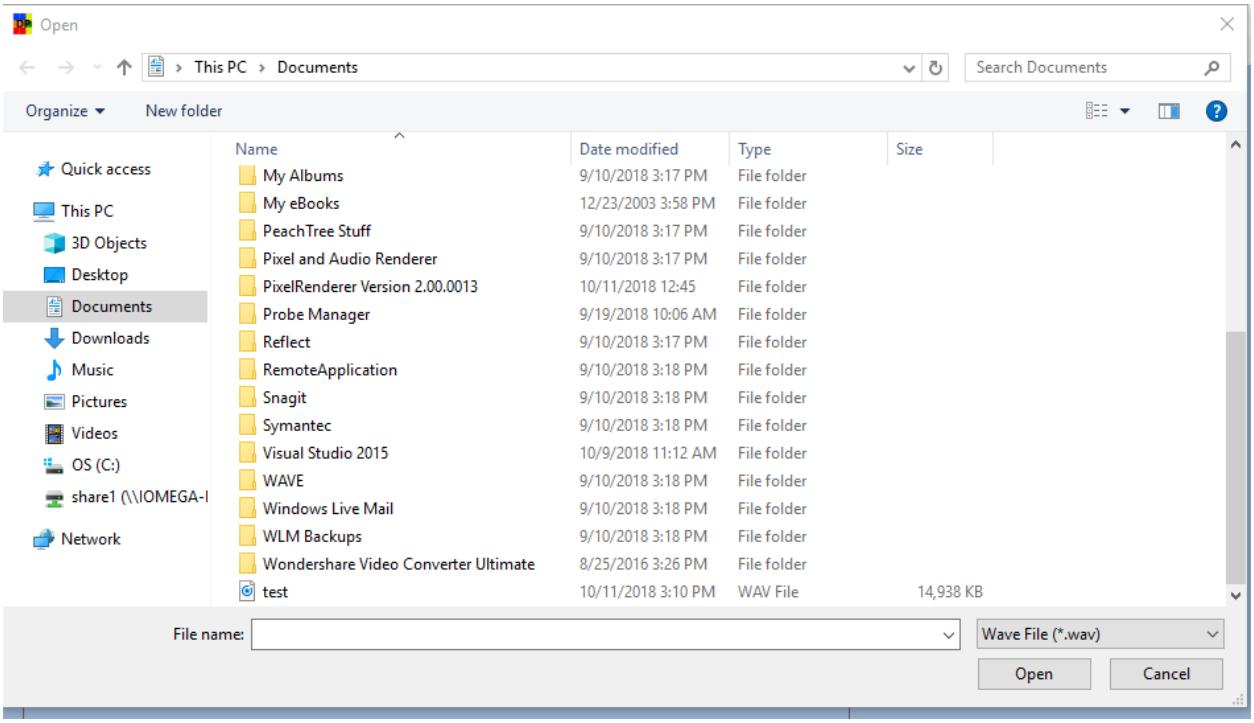
4.2 Create Wav File

After Set Path has been clicked, the user can click Create Wave File. After clicked, the Audio Renderer will rip through all the data in the stored configuration file and compile a wav file with all the audio data found. This may take a couple of minutes, the cancel button when clicked will end the process of creating a wav file. When finished, the user will be able to save the file on their local computer.

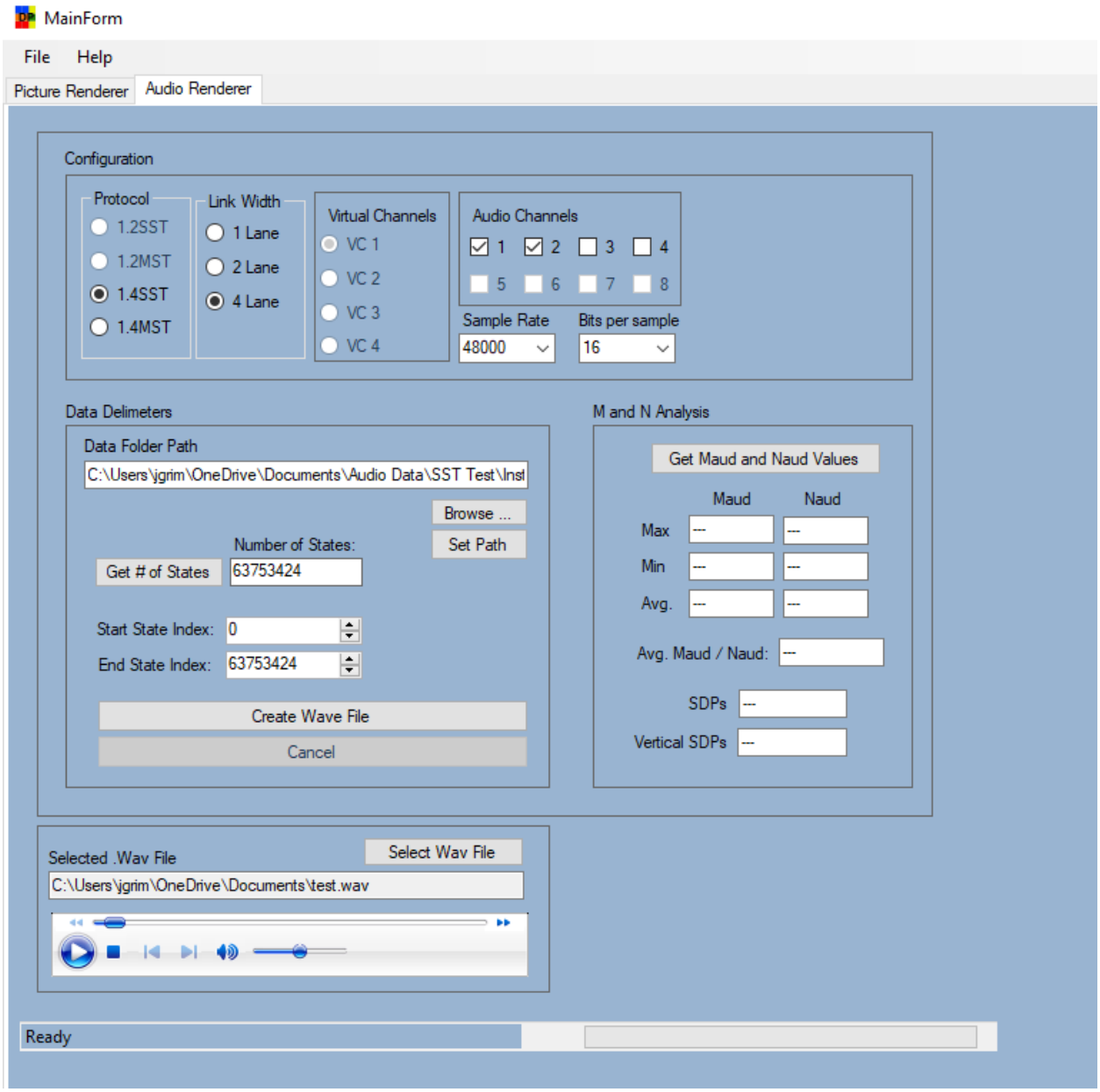


4.3 Play Wav Files

The user can click Select Wav File and another browse window will popup for the user to select a file to be played. This could either be the file that was just created, or any other wav file saved on their computer.

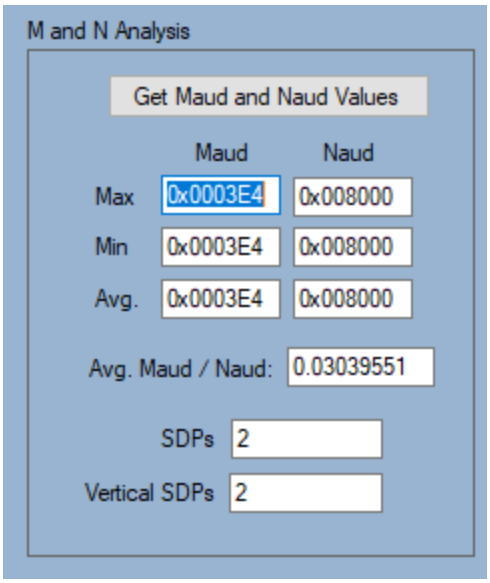


When the user selects the file, the selected wav file will be loaded into the Windows Media Player as shown below.



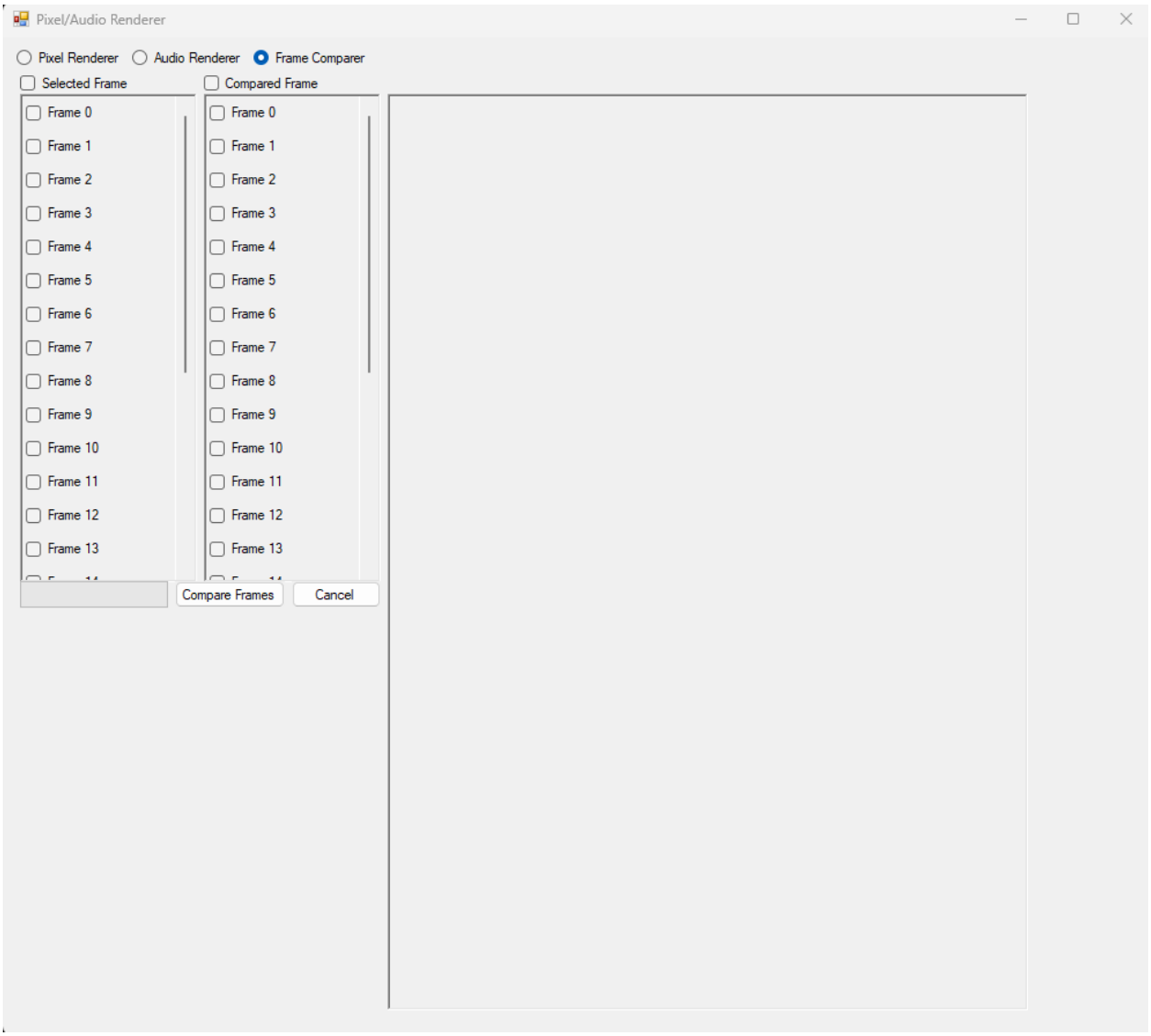
4.4 Maud and Naud

When the user clicks Set Path, the option to click Get Maud and Naud Values will be enabled. When clicked, the program will go through the state data and calculate the Maud and Naud average as well as saving the Max and Min values. The Time Stamp packets will also be counted. When the program is finished, the following will be shown.

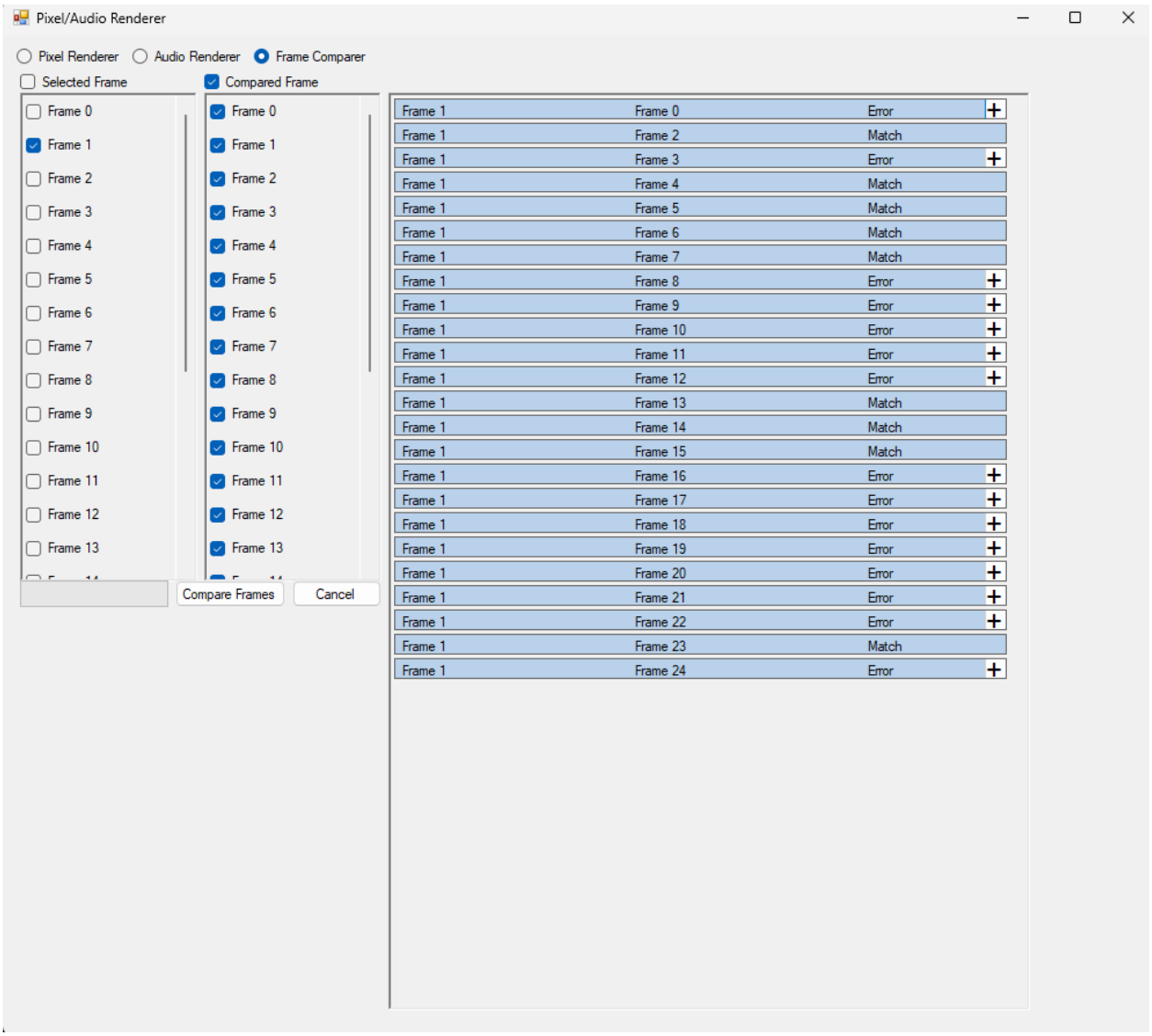


5. Frame Comparer

After frames have been acquired by the Pixel Renderer, the Frame Comparer radio button will be enabled. Clicking it will show the following form.

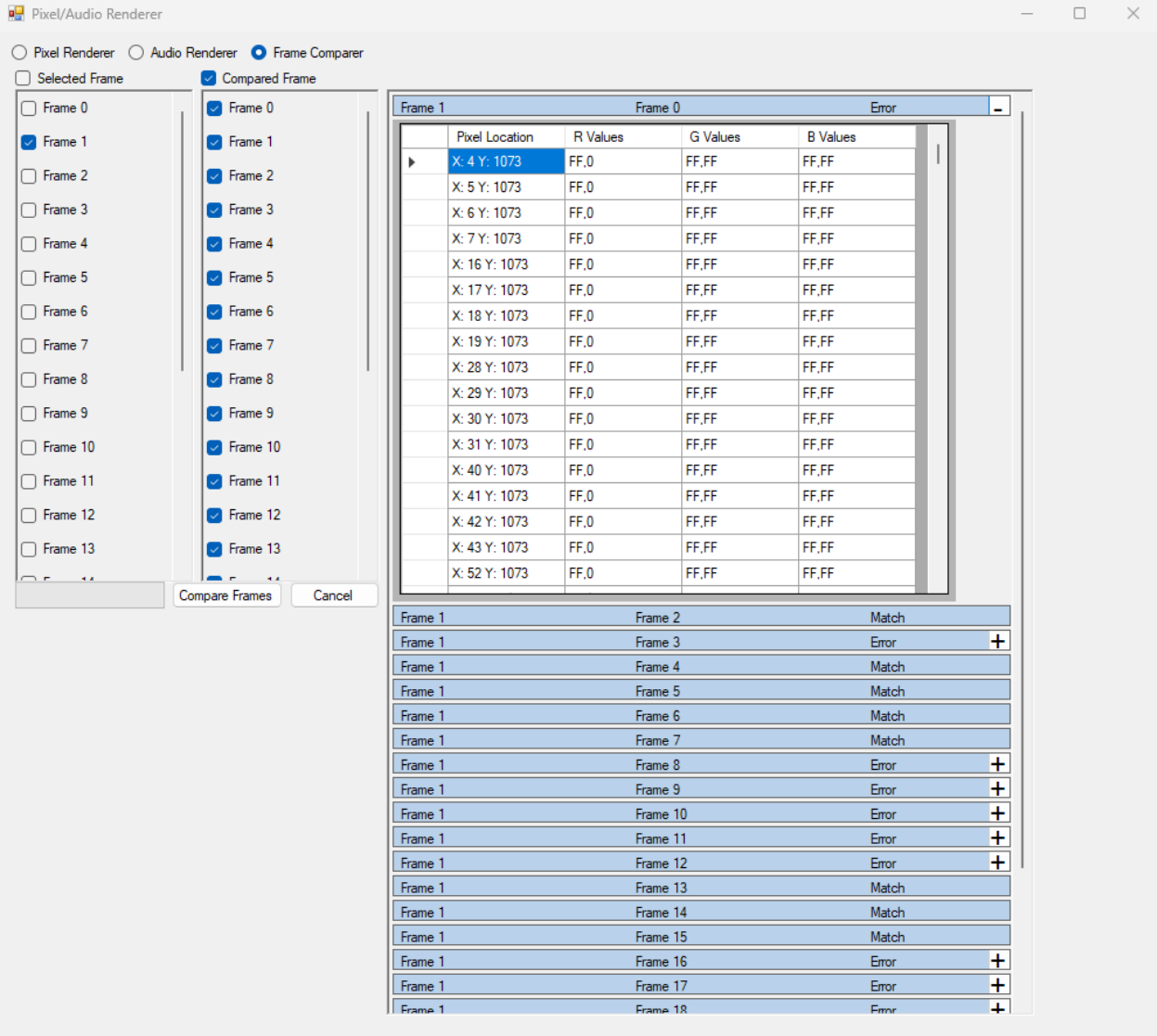


The program will compare all the selected frames from the left panel, with the selected frames on the right panel. Below is an example of all of the frames being compared to frame 1.



The program will do a pixel by pixel comparison, if the pictures are the same, they will be labeled as a match, if not, they will be labeled as an error.

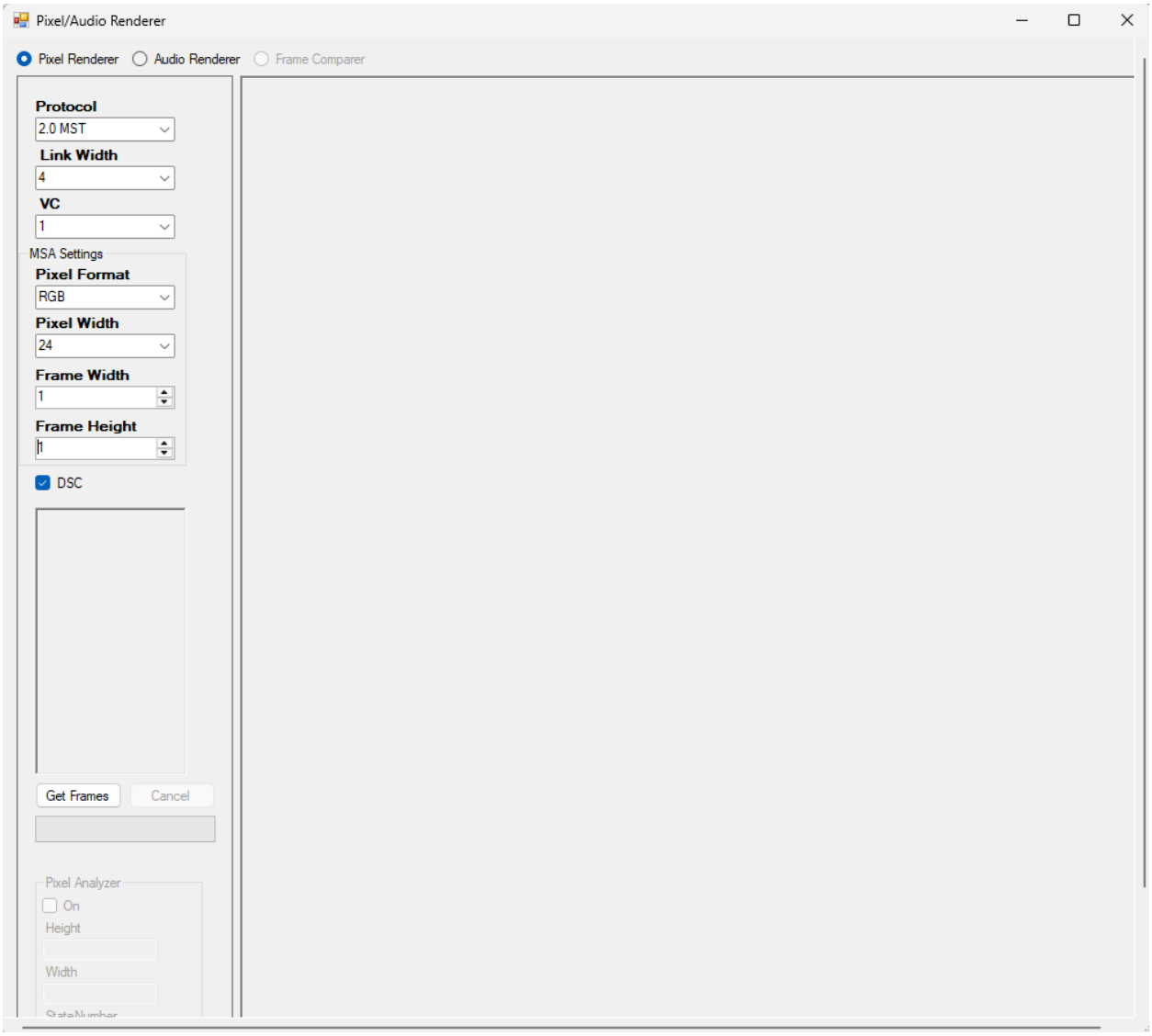
The user can then click the + button to expand the window and see which pixels did not match.



This is currently not functional if DSC frames are acquired.

6. DSC

If the user wishes to renderer a trace that is using DSC, they may do so by checking the DSC checkbox before clicking the “Get Frames” button. The User will still need to select the correctly Protocol, and the Frame Width and Height can not be equal to 0.



The Renderer will gather the PPS SDP bytes from the frame to create a .dsc file that will be fed into the .dsc decompression model. This model is included as a .exe called “DSC.exe” with the Pixel Renderer installation.

After installation, there will also be test.cfg and test_dsc_1_1.cfg in the C:\Users\username\Documents\FuturePlus\FS4500\PixelRenderer folder. These files must be slightly changed to order to work.

Below will be what both file’s contents after installation.

C:\Users\jgrim\Documents\FuturePlus\FS4500\PixelRenderer\test.cfg - Notepad++

File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?

test.cfg | test_dsc_1_1.cfg

```
1
2   // This is a config file for the Display Stream Compression model
3   // This config file may be used when running in "DSC 1.2 mode"
4   // Use test_dsc_1_1.cfg for "DSC 1.1 mode"
5   DSC_VERSION_MINOR   2       // DSC 1.2 mode
6
7   FUNCTION  2   // 0=encode/decode (no bitstream out), 1=encode only, 2=decode only
8                   // Note: FUNCTION=0 will not write a bitstream file
9
10
11  ////////////////////////////////////////////////////////////////////////////
12  // Images to process should be listed in the following text file:
13  SRC_LIST        C:\Users\jgrim\Documents\FuturePlus\FS4500\PixelRenderer\test_frame.txt
14
15  //  DPX read options (the following work well for most modes for GM/IM, some anomalies are autodetected)
16  DPXR_PAD_ENDS      1   // Pad to 32-bit boundaries
17  DPXR_DATUM_ORDER   1
18  DPXR_FORCE_BE      0
19  SWAP_R_AND_B  1
20
21  //  DPX write options (the following work well for most modes for GM/IM)
22  DPXW_PAD_ENDS      1   // Required to output RGB to XNView 1.99 (but not YUV!)
23  DPXW_DATUM_ORDER   1
24  DPXW_FORCE_PACKING 1   // Method to use for 10 & 12-bit data
25  SWAP_R_AND_B_OUT   1
26  PPM_FILE_OUTPUT 0   // Output PPM files
27
```

Normal text file | length : 1,111 lines : 27 | Ln : 1 Col : 1 Pos : 1 | Windows (CR LF) | UTF-8 | INS

C:\Users\jgrim\Documents\FuturePlus\FS4500\PixelRenderer\test_dsc_1_1.cfg - Notepad++

File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?

test.cfg | test_dsc_1_1.cfg

```
1
2   // This is a config file for the Display Stream Compression model
3   // This config file may be used when running in "DSC 1.1 mode"
4   DSC_VERSION_MINOR   1           // DSC 1.1 mode
5
6   FUNCTION  2   // 0=encode/decode (no bitstream out), 1=encode only, 2=decode only
7                   // Note: FUNCTION=0 will not write a bitstream file
8
9
10  ////////////////////////////////////////////////////////////////////////////
11  // Images to process should be listed in the following text file:
12  SRC_LIST        C:\\Users\\jgrim\\Documents\\Projects\\Latest DSC Source Model (1.1, 1.2a, 1.2b)\\Latest
13
14  //  DPX read options (the following work well for most modes for GM/IM, some anomalies are autodetected)
15  DPXR_PAD_ENDS      1   // Pad to 32-bit boundaries
16  DPXR_DATUM_ORDER   1
17  DPXR_FORCE_BE      0
18  SWAP_R_AND_B  1
19
20  //  DPX write options (the following work well for most modes for GM/IM)
21  DPXW_PAD_ENDS      1   // Required to output RGB to XNView 1.99 (but not YUV!)
22  DPXW_DATUM_ORDER   1
23  DPXW_FORCE_PACKING 1   // Method to use for 10 & 12-bit data
24  SWAP_R_AND_B_OUT   1
25  PPM_FILE_OUTPUT 0   // Output PPM files
26
27
28  ////////////////////////////////////////////////////////////////////////////
29  // DSC encode/decode parameters
30
```

Normal text file | length : 3,355 lines : 70 | Ln : 14 Col : 39 Pos : 708 | Windows (CR LF) | UTF-8 | INS

For the SRC_LIST, that path must be changed. Replace “jgrim” to whatever username that computer is operating under.