SoundWire I3S Payload Visualizer - ReadMe

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Version 1.16

Please contact rhogan@apple.com with any feedback.
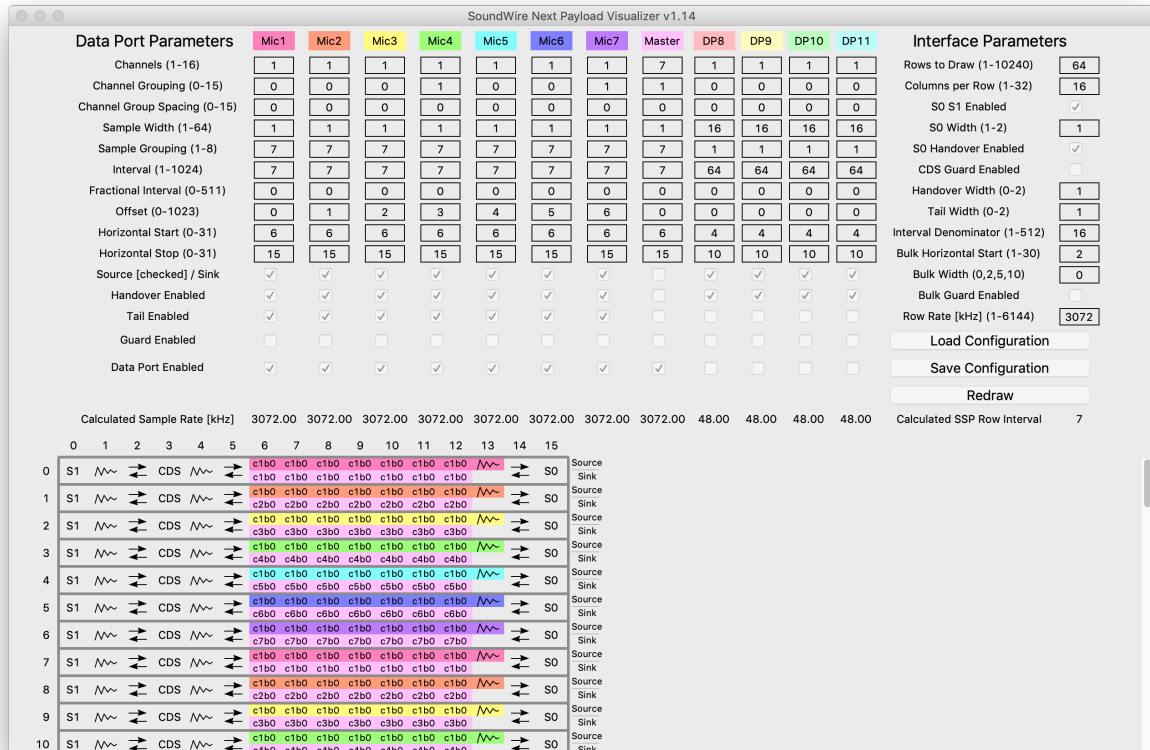

Figure - Example visualizer window

Data Port Color Key & Name Entry Fields

The visualizer features 12 data ports. Each is color coded with the following key.

Figure - Data port color key and name entry fields

The text DP0-DP11 is editable to allow more useful naming. Click on the text to edit.

Bit Slot Rendering

Each row is split into an upper and lower section. Data ports that are sourcing data are rendered in the upper section. Data ports that are sinking data are drawn in the lower portion. A key is provided at the end of each row to remind the user as to which row section is source vs. sink.

Each bit slot has text to indicate which channel and sample bit is being transported in that bit slot. For example c4b3 refers to bit 3 from channel 4.
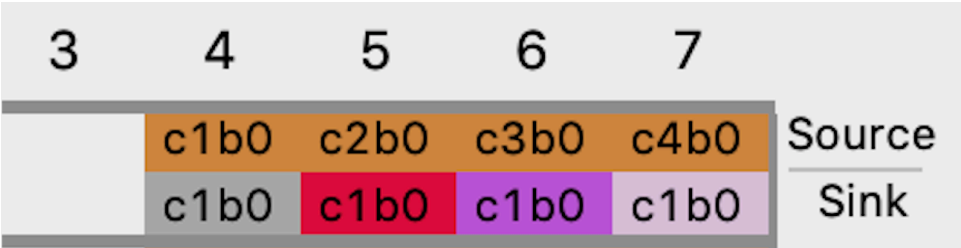

Figure - Bit slot port rendering example

Data Port Parameter Entry Fields

Figure - Data port parameter entry fields

For each data port you can edit the parameters shown above.

Channels - The number of active channels in the data port. Note that in practice each channel will have its own enable bit and active channels would be packed for transport on the bus. i.e. unused channels would not consume bus bandwidth. Valid range is 1 to 16 channels.

Channel Grouping - This parameter enables sub-groups of channels. Valid range is 0 - 15 channels. 0 indicates all active channels are treated as one group.

Channel Group Spacing - This parameter controls the spacing between channel groups. 0 indicates a new row is used for each group. 1 indicates no spacing between channel groups. 2 indicates a 1 column space between channel groups and so on. Valid range is 0 to 15 columns.

Sample Grouping - The number of samples to group together for transport.

Interval - The integer number of rows after which the data port re-arms for transport. Valid range is 1 to 1024 rows. The effective interval is the sum of the interval + (fractional interval)/(interval denominator).

Fractional Interval - The fractional portion of the effective interval. Valid range is 0 to 255. The effective interval is the sum of the interval + (fractional interval)/(interval denominator).

Offset - A row delay before the data port begins transport. Valid range is 0 to 1023 rows.

Horizontal Start - The 1st column in which a data port has an opportunity to transport data. Valid range is 0 to 31.

Horizontal Stop - The last column in which a data port has an opportunity to transport data. Horizontal Stop must be >= Horizontal Start. Valid range is 0 to 31.

Source/Sink - This sets the data port direction.

Handover Enabled - Indicates a bit slot is required for handover prior to the 1st bit slot driven in each row.

Tail Enabled - Indicates bit slot(s) are dedicated to absorbing reflections

Guard Enabled - Indicates bit slot dedicated to preventing thermal crosstalk with devices writing in an adjacent column

Data Port Enabled - Enables the data port in the visualizer.

Interface Parameter Entry Fields

Interface Parameters

Rows to Draw (1-10240)	64
Columns per Row (1-32)	32
S0 S1 Enabled	☑
S0 Width (1-2)	1
S0 Handover Enabled	☑
CDS Guard Enabled	☐
Handover Width (0-2)	1
Tail Width (0-2)	0
Interval Denominator (1-512)	16
Bulk Horizontal Start (1-30)	2
Bulk Width (0,2,5,10)	0
Bulk Guard Enabled	☐
Row Rate [kHz] (1-6144)	3072

Figure - Other parameter data port entry fields

Other parameter are required before payload may be visualized.

Row to Draw - Set the number of rows that the visualizer will render and perform bus clash checks. Valid range is 1 to 10240 rows. Note, this is not an interface parameter.

Columns per Row - Sets the columns per row. Valid range is 1 to 32 columns.

S0 S1 Enabled - Determines if the S0 & S1 columns are rendered.

S0 Width - Sets the number of bit slots used for S0

S1 Enabled - Determines if the S1 column is rendered. Valid range is 0 to 31.

S0 Handover Enabled - Set if a handover bit slot is required before the 1st S0 column in each row.

CDS Guard Enabled - Set if a zero is required after the control column. Useful for shielding devices from thermally-induced interference from the control channel.

Handover Width - Sets the number of bit slots dedicated to handovers.

Tail Width - Sets the number of bit slots dedicated to tails.

Interval Denominator - This parameter sets the interface-wide fractional interval denominator. This value is selected based on the row rate for interface and the sample rates that need to be transported.

Bulk Horizontal Start - Sets the starting channel of the bulk channel if active.

Bulk Width - Sets the width of the bulk channel, must be 0, 2, 5 or 10 bit slots.

Bulk Guard Enabled - Set if a zero is required after the last bulk channel column. Useful for shielding devices from thermally-induced interference from the control channel.

Row Rate - The row rate is used to calculate the sample rate for each data port in conjunction with each data port's effective interval and sample grouping setting.

SSP Interval - This is a calculated value showing this smallest SSP interval applicable to currently enabled data ports.

Command Buttons
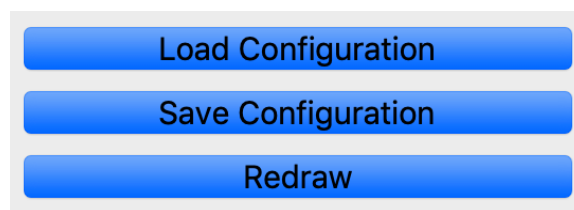
Figure - Command buttons

Redraw Data Ports

The Redraw Data Ports button renders active data ports. If configuration errors or bus clash issues are detected the user is notified by a dialog box(es). More rows may be rendered than can be displayed on screen. The mouse can be used to scroll by clicking and dragging in the payload area, or the scroll bar may be used.

Figure - Bus clash warning dialog

Figure - Data port configuration error dialog

Save Configuration

The Save Configuration button prompts the user to select a filename into which to save the configuration parameters for all data ports, their names and the other parameters needed to render payload.

The data format is an easy to read CSV export.

Load Configuration

The Load Configuration button prompts the user to select a filename from which configuration parameters for all data ports, their names and the other parameters needed to render payload are loaded.

The data format is easy to read CSV.

Hide Configuration Entry Fields

To make better use of screen real estate, the configuration entry field area may be hidden. To hide, or unhide, this area use the Control-r keyboard shortcut.

SoundWire Next Payload Visualizer v0.98

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
0	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
1	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
2	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
3	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
4	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
5	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
6	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
7	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
8	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
9	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
10	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
11	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
12	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
13	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
14	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
15	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
16	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
17	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
18	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
19	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
20	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
21	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
22	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
23	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
24	S1		CC		c1b0 c2b0 c3b0 c4b0 / c1b0 c1b0 c1b0 c1b0					c1b0 c2b0 / c1b0 c2b0			c1b0 c2b0 / c3b0 c4b0			c1b0 c2b0 / c5b0 c6b0			c1b0 c2b0 / c7b0 c8b0														SO	Source / Sink
25	S1		CC		c1b0 c2b0 c3b0 c4b0					c1b0 c2b0			c1b0 c2b0			c1b0 c2b0			c1b0 c2b0														SO	Source / Sink

Figure - Main window with configuration entry fields hidden

Graphical Export

When the user chooses to export the current configuration to a CSV file, a vector file format export of the current payload rendering is performed using an SVG file format. The same name as chosen for CSV export, minus .csv, is used with a .svg extension. A color and naming key is included at the top of the image.
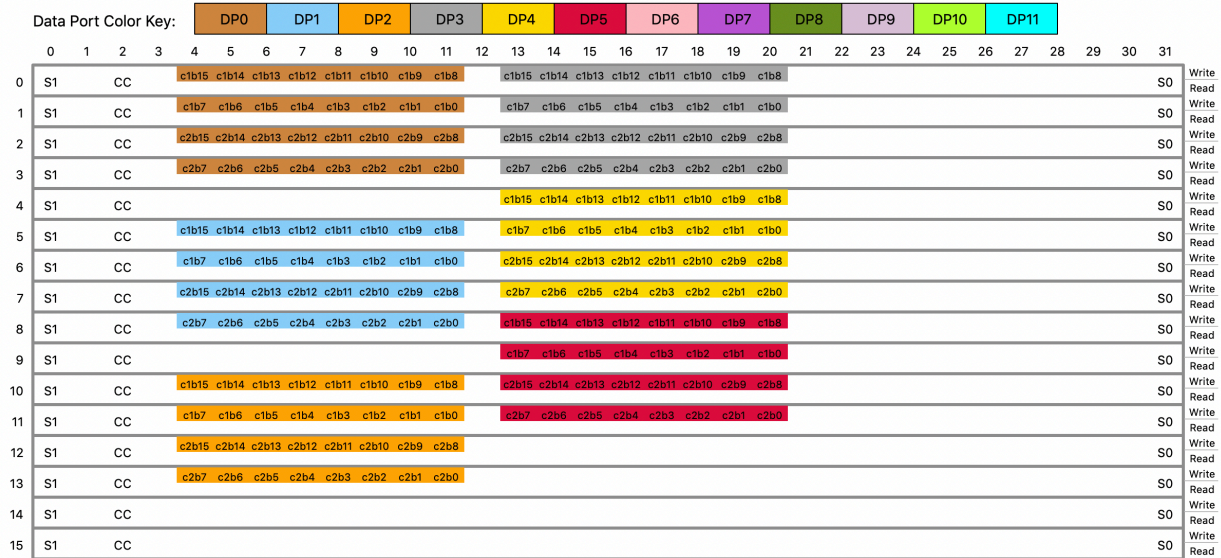

Figure - Example SVG payload rendering graphical export