

SMPTE SDI electrical specifications: equalizers, cable drivers, and retimers

TI Precision Labs – Video interface

Presented by Allison Noe

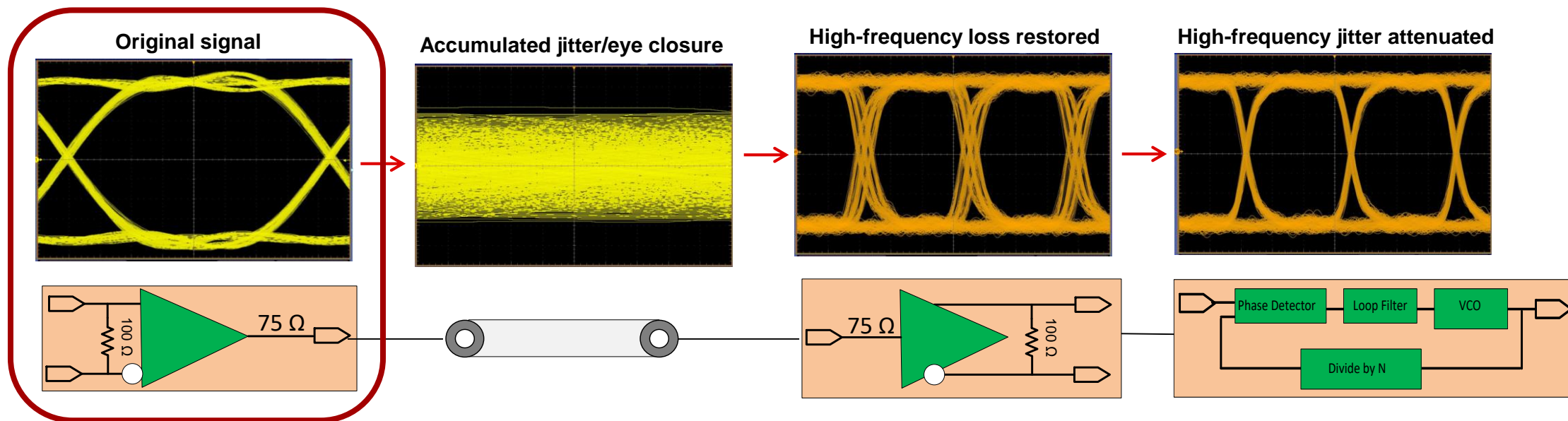
Prepared by Nasser Mohammadi and Allison Noe



SMPTE electrical specifications

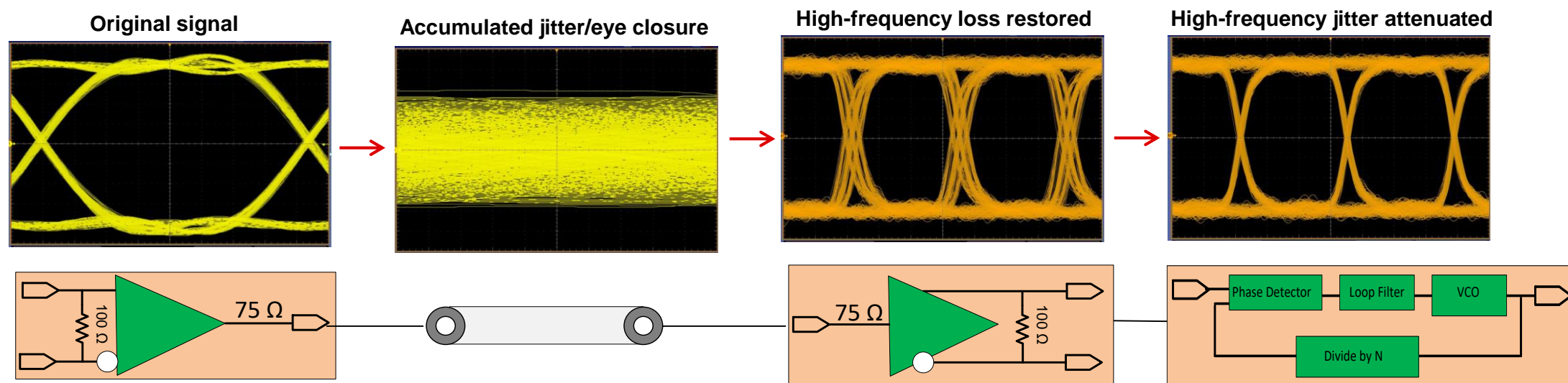
Standard	Name	Bit Rates (Mbit/s)	Example Video Formats	Year of Introduction
SMPTE 259M	SD-SDI	270, 360, 143, 177	480i, 576i	1989
SMPTE 292M	HD-SDI	1485 and 1485/1.001	720p, 1080i	1998
SMPTE 424M	3G-SDI	2970 and 2970/1.001	1080p60	2006
ST2081-1	6G-SDI	5940	2160p30	2015
ST2082-1	12G-SDI	11880	2160p60	2015

Serial digital interface (SDI) signal path



- **Cable driver:**
 - Ensures rise/fall time, overshoot/undershoot, and amplitude SMPTE specifications are met
- **Coax media:**
 - The output of the generator shall be measured across a 75-ohm resistive load connected through a 1-m coaxial cable
- **Adaptive cable equalizer:**
 - Ensures return loss SMPTE specifications are met
- **Reclocker:**
 - Ensures jitter measurement SMPTE specifications are met

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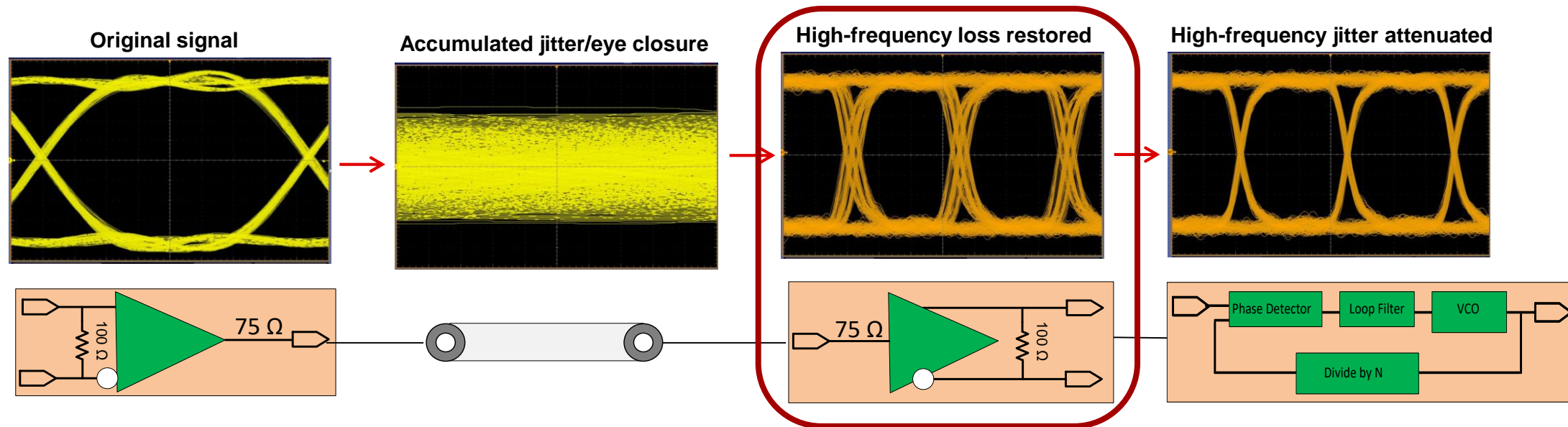
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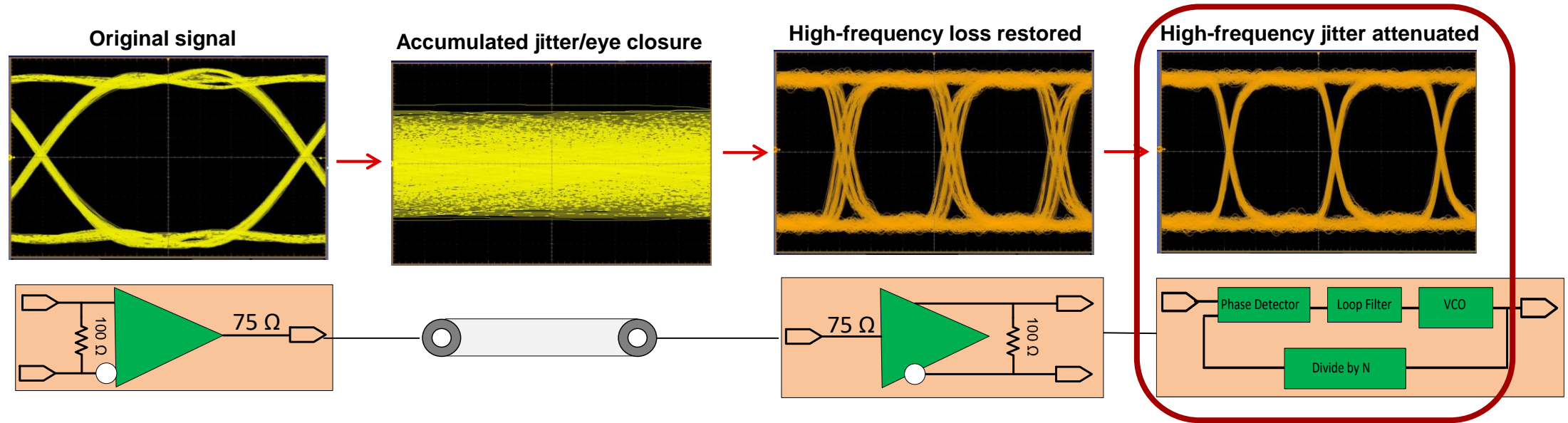
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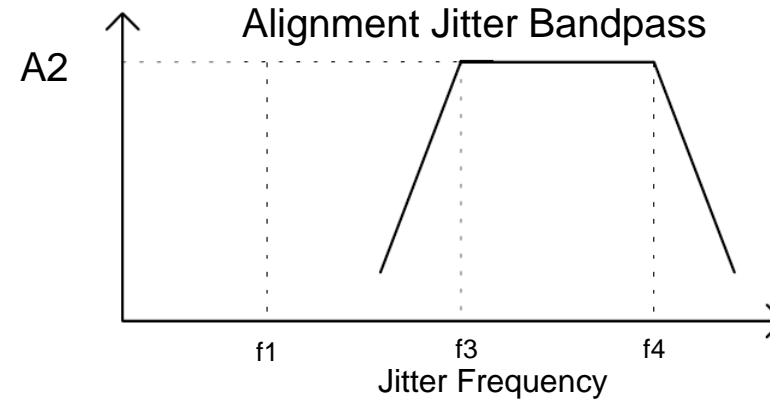
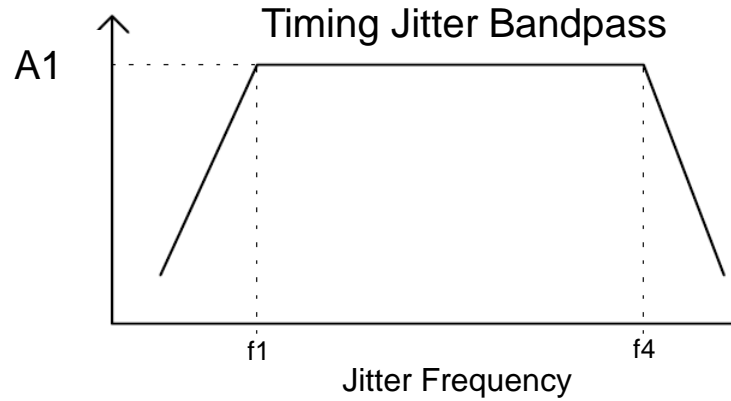
Cable driver specification definitions



SMPTE cable driver electrical requirements

Standard	Amplitude	Overshoot	DC Offset	Rise/Fall time
SMPTE 259M	800mV \pm 10%	< 10% of amplitude	0.0V \pm 0.5 V	Min: 0.4ns Max: 1.5ns Delta: 0.5ns
SMPTE 292M	800mV \pm 10%	< 10% of amplitude	0.0 V \pm 0.5 V	Max: 270ps Delta: 100ps
SMPTE 424M	800mV \pm 10%	< 10% of amplitude	0.0 V \pm 0.5 V	Max: 135ps Delta: 50ps
ST2081-1	800mV \pm 10%	< 10% of amplitude	0.0 V \pm 0.5 V	Max: 80ps
ST2082-1	800mV \pm 10%	< 10% of amplitude	0.0 V \pm 0.5 V	Max: 45ps

Timing and alignment jitter bypass filter



Parameter	Unit	Description
f1	Hz	Timing jitter lower band edge
f2	Hz	Alignment jitter lower band edge
f3	Hz	Timing jitter upper band edge
f4	Hz	Alignment jitter upper band edge
A1	UI	Timing jitter limit
A2	UI	Alignment jitter limit

SMPTE retimer jitter requirements

Standard	Timing jitter lower band edge	Alignment jitter lower band edge	Upper band edge	Timing jitter expressed in UI	Alignment jitter expressed in UI
SMPTE 259M	10 Hz	1 kHz	>1/10 of clock rate	0.2	0.2 UI
SMPTE 292M	10 Hz	100 kHz	>1/10 of clock rate	1 UI	0.2 UI
SMPTE 424M	10 Hz	100 kHz	>1/10 of clock rate	2 UI	0.3 UI
ST2081-1	10 Hz	100 kHz	>1/10 of clock rate	4 UI	0.3 UI
ST2082-1	10 Hz	100 kHz	>1/10 of clock rate	8 UI	0.3 UI

SMPTE equalizer electrical requirements

