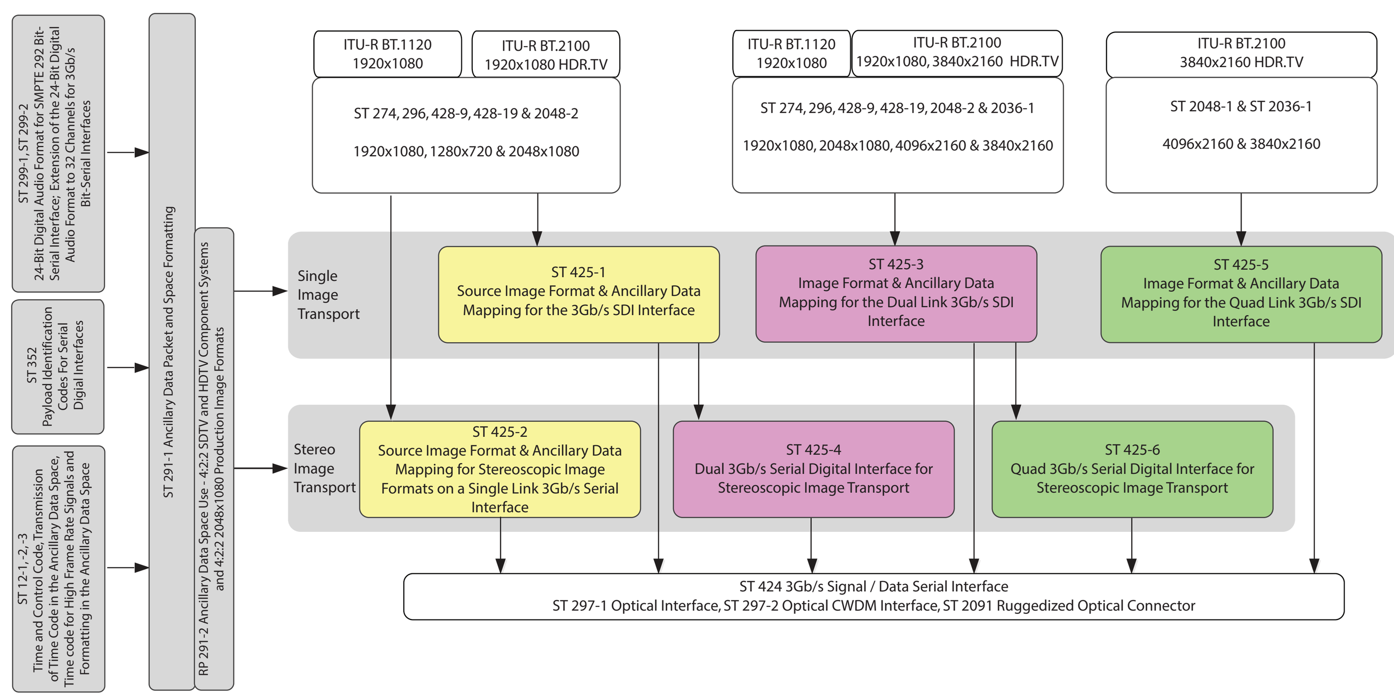
SMPTE EG 2111-2:2019 — 3/6/12 & 24 Gbit/s SDI Standards Roadmap

ST 425 3G SDI / ITU-R BT.1120



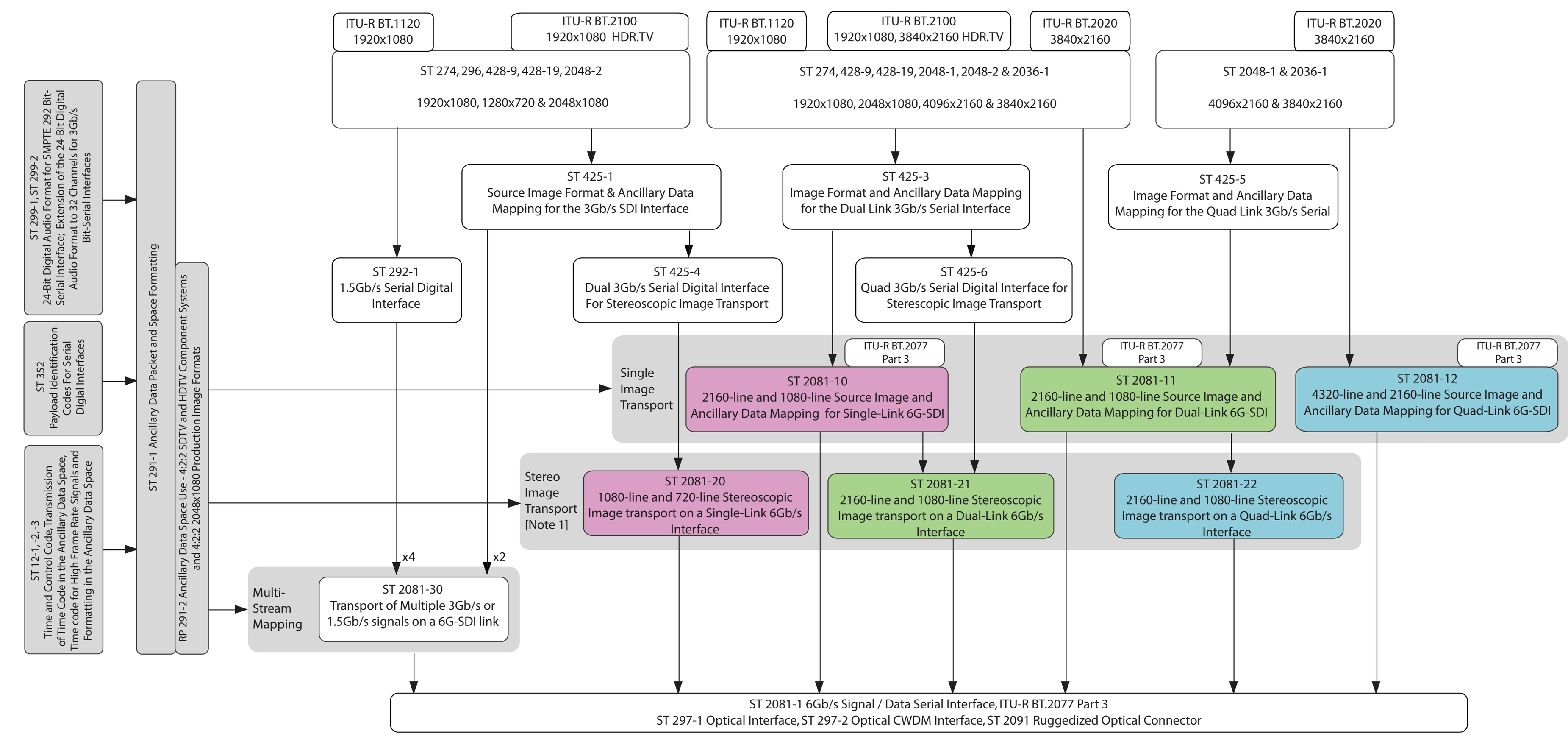
HDTV and 2K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
1080p60/59.94	1920 / 2048	1080	60	ST 425-1 Single-Link 3G (3Gb/s)	ST 425-3 Dual-Link 3G (6Gb/s)
1080p50	1920 / 2048	1080	50		
1080p48/47.98	2048	1080	48		
1080i60/59.94	1920 / 2048	1080	30		ST 425-1 Single-Link 3G (3Gb/s)
1080i50	1920 / 2048	1080	25		
1080p30/29.97	1920 / 2048	1080	30		
1080p25	1920 / 2048	1080	25		
1080p24/23.98	1920 / 2048	1080	24		
720p60/59.94	1280	720	60		
720p50	1280	720	50		
720p30/29.97	1280	720	30		
720p25	1280	720	25		
720p24/23.98	1280	720	24		

UHDTV1 and 4K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p60/59.94	3840 / 4096	2160	60	ST 425-5 Quad-Link 3G (12Gb/s)	
2160p50	3840 / 4096	2160	50		
2160p30/29.97	3840 / 4096	2160	30	ST 425-3 Dual-Link 3G (6Gb/s)	ST 425-5 Quad-Link 3G (12Gb/s)
2160p25	3840 / 4096	2160	25		
2160p24/23.98	3840 / 4096	2160	24		

3D HDTV and 2K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
1080p60/59.94	1920 / 2048	1080	60	ST 425-4 Stereo 3D Dual-Link 3G (6Gb/s)	ST 425-6 Stereo 3D Quad-Link 3G (12Gb/s)
1080p50	1920 / 2048	1080	50		
1080p48/47.98	2048	1080	48		
1080p30/29.97	1920 / 2048	1080	30	ST 425-2 Stereo 3D Single-Link 3G (3Gb/s)	ST 425-4 Stereo 3D Dual-Link 3G (6Gb/s)
1080p25	1920 / 2048	1080	25		
1080p24/23.98	1920 / 2048	1080	24		
720p60/59.94	1280	720	60		
720p50	1280	720	50		
720p30/29.97	1280	720	30		
720p25	1280	720	25		
720p24/23.98	1280	720	24		

3D UHDTV1 and 4K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p30/29.97	3840 / 4096	2160	30	ST 425-6 Stereo 3D Quad-Link 3G (12Gb/s)	
2160p25	3840 / 4096	2160	25		
2160p24/23.98	3840 / 4096	2160	24		

ST 2081 6G SDI / ITU-R BT.2077 Part 3



[Note 3]

720-Line & 1080-Line Multi-Stream				Number Of Channels	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
1080p60/59.94	1920 / 2048	1080	60	2 Channels	
1080p50	1920 / 2048	1080	50		
1080p48/47.98	2048	1080	48		
1080i60/59.94	1920 / 2048	1080	30	4 Channels	2 Channels
1080i50	1920 / 2048	1080	25		
1080p30/29.97	1920 / 2048	1080	30		
1080p25	1920 / 2048	1080	25		
1080p24/23.98	1920 / 2048	1080	24		
720p60/59.94	1280	720	60		
720p50	1280	720	50		
720p30/29.97	1280	720	30		
720p25	1280	720	25		
720p24/23.98	1280	720	24		

HDTV and 2K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
1080p120/119.8	1920 / 2048	1080	120	ST 2081-10 Single-Link 6G (6Gb/s)	ST 2081-11 Dual-Link 6G (12Gb/s)
1080p100	1920 / 2048	1080	100		
1080p96/95.9	2048	1080	96		
1080p60/59.94	1920 / 2048	1080	60		ST 2081-10 Single-Link 6G (6Gb/s)
1080p50	1920 / 2048	1080	50		
1080p48/47.98	2048	1080	48		

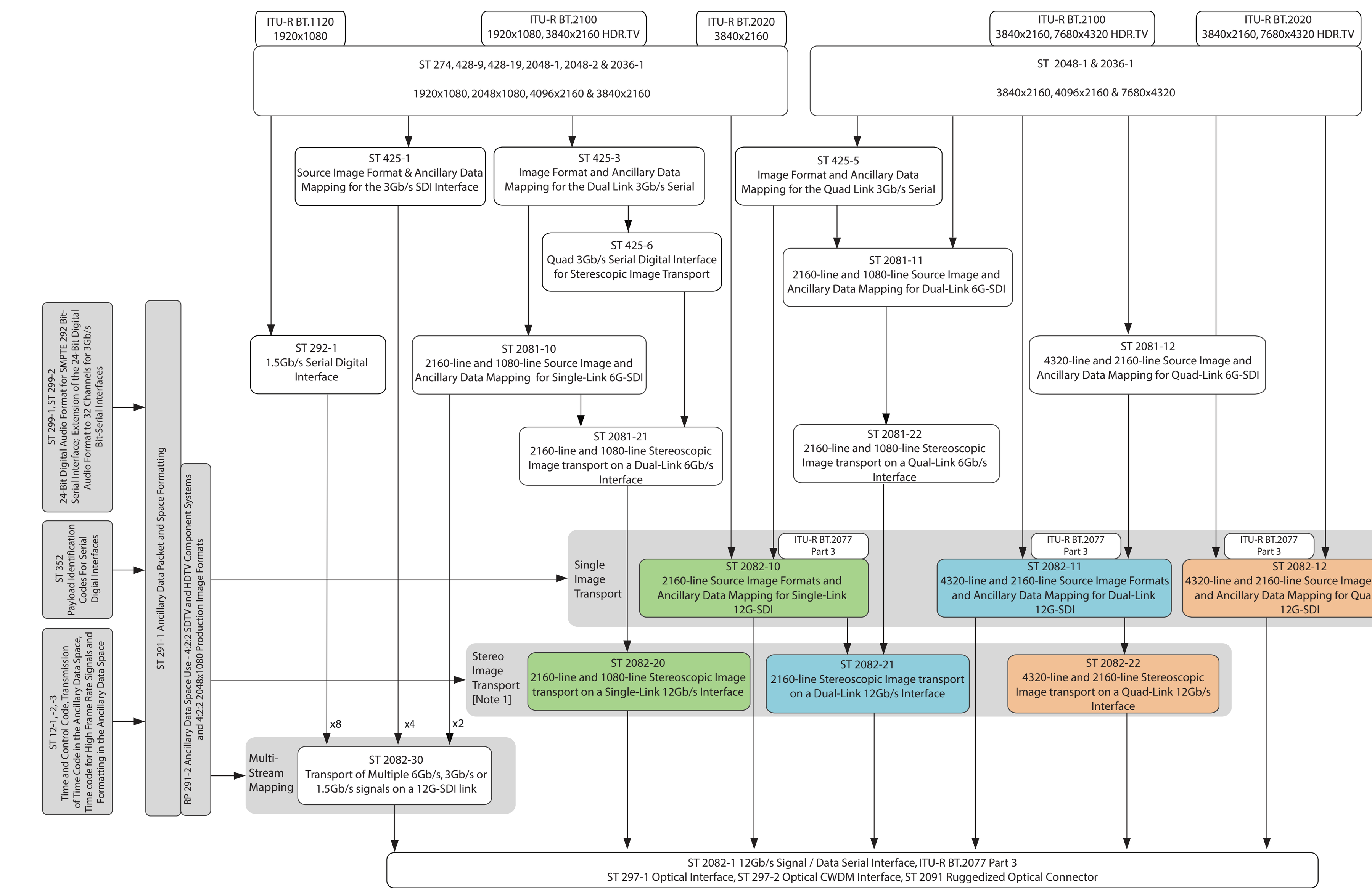
UHDTV1 and 4K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p120/119.8	3840 / 4096	2160	120	ST 2081-12 Quad-Link 6G (24Gb/s) ITU-R BT.2077 Part3	
2160p100	3840 / 4096	2160	100		
2160p96/95.9	4096	2160	96		
2160p60/59.94	3840 / 4096	2160	60	ST 2081-11 Dual-Link 6G (12Gb/s) ITU-R BT.2077 Part3	ST 2081-12 Quad-Link 6G (24Gb/s) ITU-R BT.2077 Part3
2160p50	3840 / 4096	2160	50		
2160p48/47.98	4096	2160	48		
2160p30/29.97	3840 / 4096	2160	30	ST 2081-10 Single-Link 6G (6Gb/s) ITU-R BT.2077 Part3	ST 2081-11 Dual-Link 6G (12Gb/s) ITU-R BT.2077 Part3
2160p25	3840 / 4096	2160	25		
2160p24/23.98	3840 / 4096	2160	24		

UHDTV2 Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
4320p30/29.97	7680	4320	30	ST 2081-12 Quad-Link 6G (24Gb/s) ITU-R BT.2077 Part3	
4320p25	7680	4320	25		
4320p24/23.98	7680	4320	24		

3D HDTV and 2K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
1080p60/59.94	1920 / 2048	1080	60	ST 2081-20 Stereo 3D Single-Link 6G (6Gb/s)	ST 2081-21 Stereo 3D Dual-Link 6G (12Gb/s)
1080p50	1920 / 2048	1080	50		
1080p48/47.98	2048	1080	48		
1080p30/29.97	1920 / 2048	1080	30		ST 2081-20 Stereo 3D Single-Link 6G (6Gb/s)
1080p25	1920 / 2048	1080	25		
1080p24/23.98	1920 / 2048	1080	24		
720p60/59.94	1280	720	60		
720p50	1280	720	50		
720p30/29.97	1280	720	30		
720p25	1280	720	25		
720p24/23.98	1280	720	24		

3D UHDTV1 and 4K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p60/59.94	3840 / 4096	2160	60	ST 2081-22 Stereo 3D Quad-Link 6G (24Gb/s)	
2160p50	3840 / 4096	2160	50		
2160p48/47.98	4096	2160	48		
2160p30/29.97	3840 / 4096	2160	30	ST 2081-21 Stereo 3D Dual-Link 6G (12Gb/s)	ST 2081-22 Stereo 3D Quad-Link 6G (24Gb/s)
2160p25	3840 / 4096	2160	25		
2160p24/23.98	3840 / 4096	2160	24		

ST 2082 12G SDI / ITU-R BT.2077 Part 3



[Note 3]

2160-Line, 1080-Line & 720-line Multi-Stream				Number Of Channels	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p30/29.97	3840 / 4096	2160	30	2 Channels	
2160p25	3840 / 4096	2160	25		
2160p24/2398	3840 / 4096	2160	24		
1080p120/119.8	1920 / 2048	1080	120		
1080p100	1920 / 2048	1080	100		
1080p96/95.9	2048	1080	96		
1080p60/59.94	1920 / 2048	1080	60	4 Channels	2 Channels
1080p50	1920 / 2048	1080	50		
1080p48/47.98	2048	1080	48		
1080i60/59.94	1920 / 2048	1080	30	8 Channels	4 Channels
1080i50	1920 / 2048	1080	25		
1080p30/29.97	1920 / 2048	1080	30		
1080p25	1920 / 2048	1080	25		
1080p24/23.98	1920 / 2048	1080	24		
720p60/59.94	1280	720	60		
720p50	1280	720	50		
720p30/29.97	1280	720	30		
720p25	1280	720	25		
720p24/23.98	1280	720	24		

HDTV and 2K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
1080p120/119.8	1920 / 2048	1080	120		ST 2082-10 Single-Link 12G (12Gb/s)
1080p100	1920 / 2048	1080	100		
1080p96/95.9	2048	1080	96		

UHDTV1 and 4K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p120/119.8	3840 / 4096	2160	120	ST 2082-11 Dual-Link 12G (24Gb/s) ITU-R BT.2077 Part 3	ST 2082-12 Quad-Link 12G (48Gb/s) ITU-R BT.2077 Part 3
2160p100	3840 / 4096	2160	100		
2160p96/95.9	4096	2160	96		
2160p60/59.94	3840 / 4096	2160	60	ST 2082-10 Single-Link 12G (12Gb/s) ITU-R BT.2077 Part 3	ST 2082-11 Dual-Link 12G (24Gb/s) ITU-R BT.2077 Part 3
2160p50	3840 / 4096	2160	50		
2160p48/47.98	4096	2160	48		
2160p30/29.97	3840 / 4096	2160	30		ST 2082-10 Single-Link 12G (12Gb/s) ITU-R BT.2077 Part 3
2160p25	3840 / 4096	2160	25		
2160p24/23.98	3840 / 4096	2160	24		

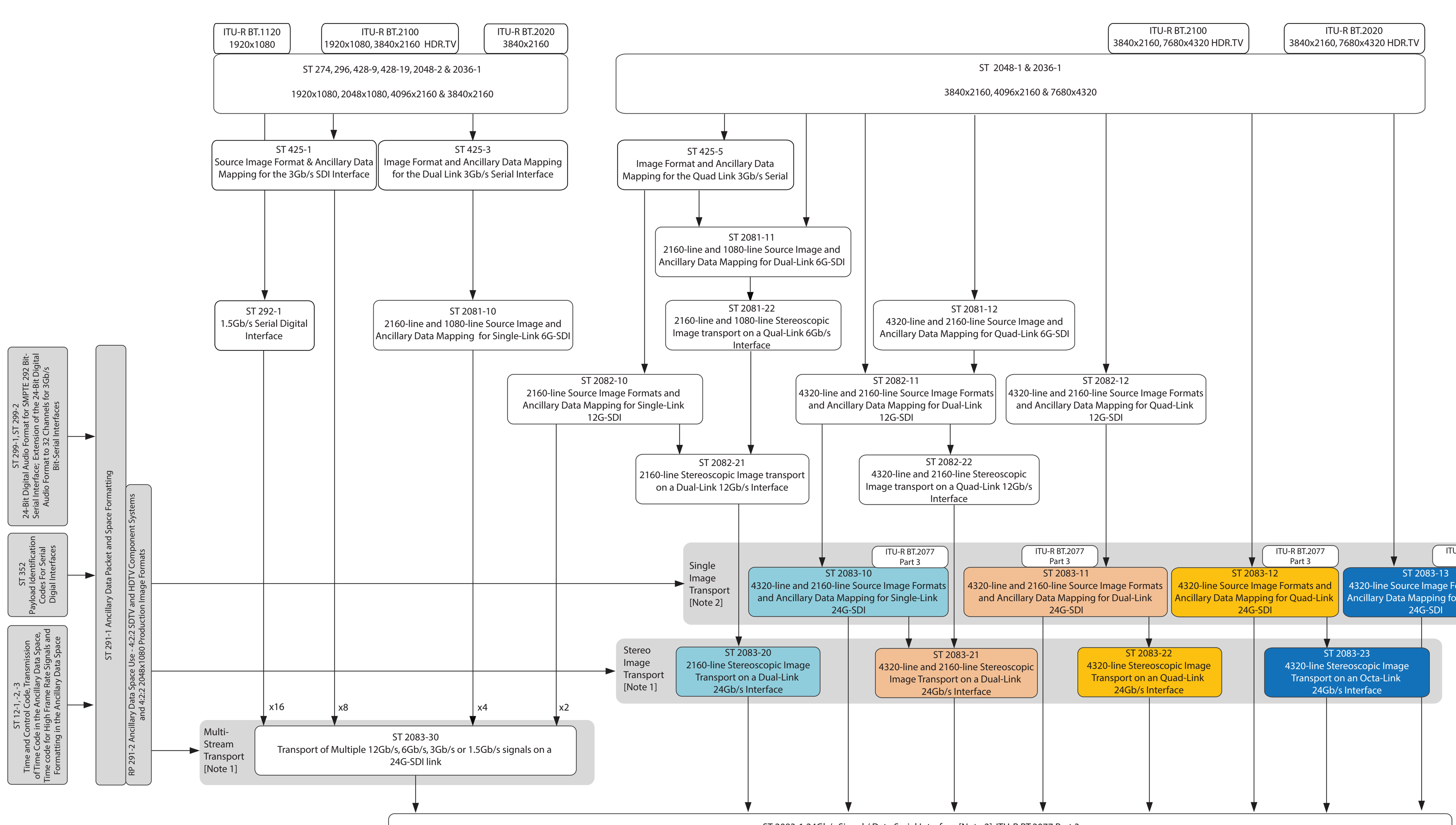
UHDTV2 Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
4320p60/59.94	7680	4320	60	ST 2082-12 Quad-Link 12G (48Gb/s) ITU-R BT.2077 Part 3	
4320p50	7680	4320	50		
4320p30/29.97	7680	4320	30	ST 2082-11 Dual-Link 12G (24Gb/s) ITU-R BT.2077 Part 3	ST 2082-12 Quad-Link 12G (48Gb/s) ITU-R BT.2077 Part 3
4320p25	7680	4320	25		
4320p24/23.98	7680	4320	24		

3D HDTV and 2K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
1080p60/59.94	1920 / 2048	1080	60		ST 2082-20 Stereo 3D Single-Link 12G (12Gb/s)
1080p50	1920 / 2048	1080	50		
1080p48/47.98	2048	1080	48		

3D UHDTV1 and 4K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p60/59.94	3840 / 4096	2160	60	ST 2082-21 Stereo 3D Dual-Link 12G (24Gb/s)	ST 2082-22 Stereo 3D Quad-Link 12G (48Gb/s)
2160p50	3840 / 4096	2160	50		
2160p48/47.98	4096	2160	48		
2160p30/29.97	3840 / 4096	2160	30	ST 2082-20 Stereo 3D SingleLink 12G (12Gb/s)	ST 2082-2 Stereo 3D Dual-Link 12G (24Gb/s)
2160p25	3840 / 4096	2160	25		
2160p24/23.98	3840 / 4096	2160	24		

3D UHDTV2 Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
4320p30/29.97	7680	4320	30	ST 2082-22 Stereo 3D Quad-Link 12G (48Gb/s)	
4320p25	7680	4320	25		
4320p24/23.98	7680	4320	24		

ST 2083 24G SDI (Note 1) / ITU-R BT.2077 Part 3



[Note 3]

2160-Line, 1080-Line & 720-line Multi-Stream				Number Of Channels	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p60/59.94	3840 / 4096	2160	60	2 Channels	
2160p50	3840 / 4096	2160	50		
2160p48/47.98	4096	2160	48		
2160p30/29.97	3840 / 4096	2160	30	4 Channels	2 Channels
2160p25	3840 / 4096	2160	25		
2160p24/23.98	3840 / 4096	2160	24		
1080p120/119.8	1920 / 2048	1080	120		
1080p100	1920 / 2048	1080	100		
1080p96/95.9	2048	1080	96		
1080p60/59.94	1920 / 2048	1080	60	8 Channels	4 Channels
1080p50	1920 / 2048	1080	50		
1080p48/47.98	2048	1080	48		
1080i60/59.94	1920 / 2048	1080	30	16 Channels	8 Channels
1080i50	1920 / 2048	1080	25		
1080p30/29.97	1920 / 2048	1080	30		
1080p25	1920 / 2048	1080	25		
1080p24/23.98	1920 / 2048	1080	24		
720p60/59.94	1280	720	60		
720p50	1280	720	50		
720p30/29.97	1280	720	30		
720p25	1280	720	25		
720p24/23.98	1280	720	24		

UHDTV1 and 4K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p120/119.8	3840 / 4096	2160	120	ST 2083-10 Single-Link 24G (24Gb/s) ITU-R BT.2077 Part 3	ST 2083-11 Dual-Link 24G (48Gb/s) ITU-R BT.2077 Part 3
2160p100	3840 / 4096	2160	100		
2160p96/95.9	4096	2160	96		
2160p60/59.94	3840 / 4096	2160	60		ST 2083-10 Single-Link 24G (24Gb/s) ITU-R BT.2077 Part 3
2160p50	3840 / 4096	2160	50		
2160p48/47.98	4096	2160	48		

3D UHDTV1 and 4K D-Cinema Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
2160p60/59.94	3840 / 4096	2160	60	ST 2083-20 Stereo 3D Single-Link 24G (24Gb/s)	ST 2083-21 Stereo 3D Dual-Link 24G (48Gb/s)
2160p50	3840 / 4096	2160	50		
2160p48/47.98	4096	2160	48		
2160p30/29.97	3840 / 4096	2160	30		ST 2083-20 Stereo 3D Single-Link 24G (24Gb/s)
2160p25	3840 / 4096	2160	25		
2160p24/23.98	3840 / 4096	2160	24		

UHDTV2 Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
4320p120/119.8	7680	4320	120	ST 2083-12 Quad-Link 24G (96Gb/s) ITU-R BT.2077 Part 3	ST 2083-13 Octa-Link 24G (192Gb/s) ITU-R BT.2077 Part 3
4320p100	7680	4320	100		
4320p60/59.94	7680	4320	60	ST 2083-11 Dual-Link 24G (48Gb/s) ITU-R BT.2077 Part 3	ST 2083-12 Quad-Link 24G (96Gb/s) ITU-R BT.2077 Part 3
4320p50	7680	4320	50		
4320p30/29.97	7680	4320	30	ST 2083-10 Single-Link 24G (24Gb/s) ITU-R BT.2077 Part 3	ST 2083-11 Dual-Link 24G (48Gb/s) ITU-R BT.2077 Part 3
4320p25	7680	4320	25		
4320p24/23.98	7680	4320	24		

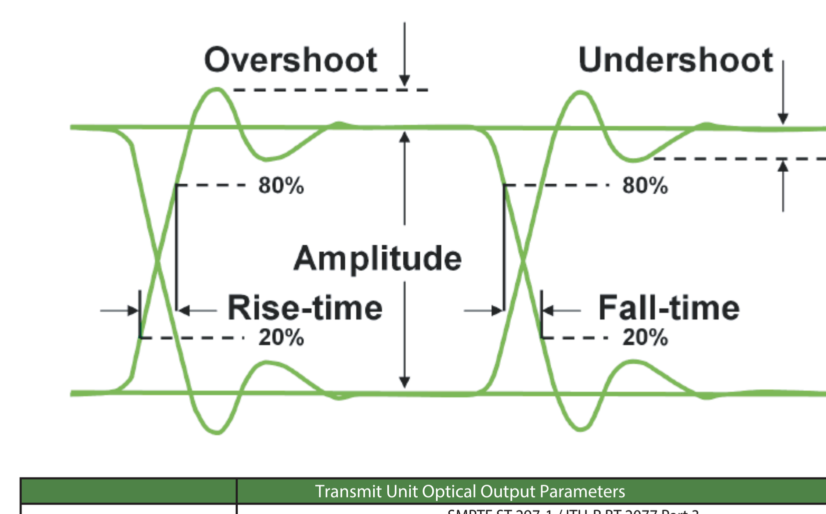
3D UHDTV2 Production				SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames/second (nominal)	10-bit 4:2:2	12-bit 4:2:2 / 4:4:4 10-bit 4:4:4:4
4320p60/59.94	7680	4320	60	ST 2083-22 Stereo 3D Quad-Link 24G (96Gb/s)	ST 2083-23 Stereo 3D Quad-Link 24G (192Gb/s)
4320p50	7680	4320	50		
2160p30/29.97	7680	4320	30	ST 2083-21 Stereo 3D Dual-Link 24G (48Gb/s)	ST 2083-22 Stereo 3D Quad-Link 24G (96Gb/s)
2160p25	7680	4320	25		
2160p24/23.98	7680	4320	24		

Note 1: Future SMPTE Standard

Note 2: Future SMPTE Standards - To be harmonized with 24G-SDI parameters as published in ITU-R BT.2077 part 3

Note 3: Color coding to represent bit rate of each multi-stream channel: 1.5G-SDI | 3G-SDI | 6G-SDI | 12G-SDI

Electrical / Optical Parameters



	Electrical Parameters			
Data Rate	3 Gb/s	6 Gb/s	12 Gb/s	24 Gb/s
Standard	ST 424 ITU-R BT.1120	ST 2081-1 ITU-R BT.2077 Part 3	ST 2082-1 ITU-R BT.2077 Part 3	ST 2083-1 ITU-R BT.2077 Part 3
Coding	Scrambled NRZI	Scrambled NRZI + Sync Bit Insertion		
Amplitude	800mV+/- 10%			
DC Offset	0.0V +/- 0.5V			
Rise/ Fall Time	< 135pS	< 80pS	< 45pS	< 28pS
Delta Rise / Fall Time	+/- 50pS	+/- 35pS	+/- 18pS	+/- 8pS
Over / Undershoot	10% of amplitude			
Timing Jitter (A1) [f1 to f3]	< 0.3 UI	< 4UI up to 10Hz	< 8UI up to 10Hz	< 16UI up to 10Hz
Alignment Jitter (A2) [f3 to f4]	< 0.3 UI	< 0.3 UI	< 0.3 UI	< 0.3 UI
Return Loss	<15dB 5MHz->1.5GHz <10dB 1.5GHz->3GHz	<15dB 5MHz->1.5GHz <10dB 1.5GHz->3GHz <7dB 3GHz->6GHz	<15dB 5MHz->1.5GHz <10dB 1.5GHz->3GHz <7dB 3GHz->6GHz <4dB 6GHz->12GHz	<15dB 5MHz->1.5GHz <10dB 1.5GHz->3GHz <7dB 3GHz->6GHz <4dB 6GHz->12GHz <2dB 12GHz->24GHz

	Transmit Unit Optical Output Parameters			
	SMPTE ST 297-1 / ITU-R BT.2077 Part 3			
	High-Power	Medium-Power	Low-Power SM	Low-Power MM
Transmission Circuit Fiber	SM (9.0/125 um)			MM (50/125um, 62.5/125 um)
Light Source	Laser			
Optical Wavelength	1310 +/- 40 nm 1550 +/- 40 nm			1310 +/- 40nm 850 +/- 40 nm
Max Spectral Line Width	1 nm	4 nm	10 nm	30 nm
Max Optical Power	+10 dBm	0 dBm	-3 dBm	
Min Optical Power	0 dBm	-3 dBm	-12 dBm	
Max Extinction Ratio	5:1 (10:1 preferred)			
Rise / Fall time (optical)	Same as Electrical Performance in SMPTE ST 424, ST 2081-1, 2082-1, 2083-1 or ITU-R BT.2077 Part 3			
Max Reflected Power	-14 dBm			
E/O Transfer Function	Logic '1' maximum intensity / Logic '0' minimum intensity			

Receive Unit Optical Input Parameters	
	SMPTE ST 297-1 / ITU-R BT.2077 Part 3
Minimum Input Overload Power ST 424	-7.5 dBm, (0dBm preferred)
Minimum Input Overload Power ST 2081-1, ST 2082-1, ITU-R BT.2077 Part 3	+0.5 dBm
Minimum Input Overload Power ST 2083-1, ITU-R BT.2077 Part 3	+3 dBm
Minimum Input Power ST 424	-17 dBm
Minimum Input Power ST 2081-1. ST 2082-1, ITU-R BT.2077 Part 3	-14 dBm
Minimum Input Power ST 2083-1, ITU-R BT.2077 Part 3	-9 dBm
Detector damage threshold ST 424, ST 2081-1, ST2082-1, ITU-R BT.2077 Part 3	+1 dBm
Detector damage threshold ST 2083-1, ITU-R BT.2077 Part 3	+3.5 dBm (minimum)

Optical Transmit / Receive Unit				
Data Rate	3 Gb/s	6 Gb/s	12 Gb/s	24 Gb/s
Labeling <Signal Type>	D	E	F	G
Preferred Connector	LC / PC, ST 2091-1			
Optical Module Form Factor	SFP / SFP+	SFP / SFP+ QSFP / QSFP+		

Approved December 2, 2018