## Muxlab Offers Way to Extend 4K Video Signal to 150 Meters

Sending a 4K signal from a camera to a recorder or production truck often involves using fiber optic cable if the distances are fairly long. Now, a company called Muxlab (Montreal, Canada) has a solution that uses CAT 5/6 cable to transfer the 4K video for a distance of up to 150 meters. That's beyond the normal high end for CAT 5/6 of 100 meters.

If the camera can support the new (but unapproved) 6G SDI signaling formats, a single coax cable can run between the 4K camera and the
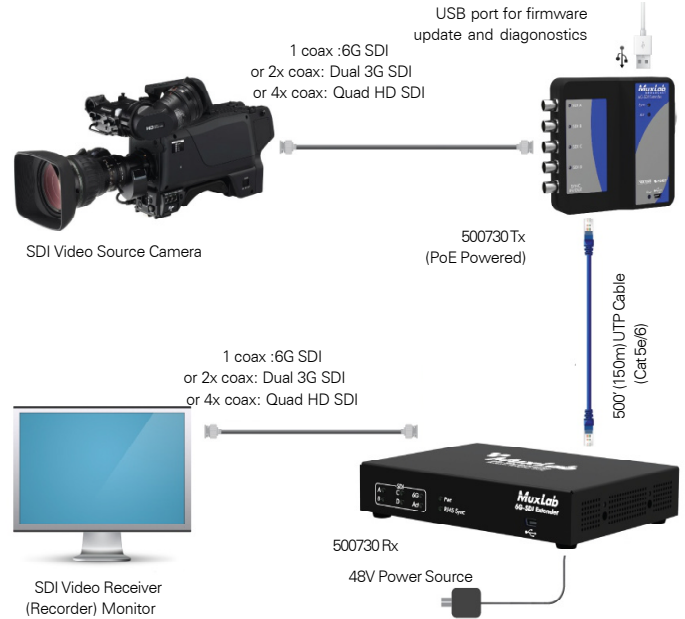
Muxlab's CAT 5/6 cable transfers 4K video to a distance of 150 meters

Muxlab transmit box (500730 Tx). If the camera supports Dual 3G SDI, then only two coax cables are needed, or four if it only has 3G SDI outputs on the camera.

Inside the 500730 Tx box, the SDI formatted video is reformatted to run over basic UTP (untwisted pair) CAT 5/6 cable. The box is broadly based on the HDBaseT protocol which uses CAT 5/6 cable to send an HDMI formatted signal down the cable. But Muxlab uses a proprietary protocol on the CAT 5/6 cable.

According to Muxlab R&D Manager, Marc Bohbot, "The signaling is based on HDBaseT but the protocol or data format is different than that of the HDMI signal. This is the part that is proprietary".

At the receive side, the process is reversed to restore the 4K signal for output on 4x3G-SDI, 2xDual 3G SDI or 1x6G SDI. Power to the Tx modules comes from the Rx module and is carried over the CAT 5/6 cable.

Powering the system is an FPGA, which is quite flexible in its ability to be updated with new functionality. That might be necessary as the 6G SDI and 12G SDI standards have not yet been approved by SMPTE, so there could be some unanticipated changes coming. Firmware updates or diagnostics can be facilitated by a USB connection.

Left are some tables from the SMPTE roadmap chart for 6G and 12G SDI. Bohbot says that its system should support any of the modes in the pink squares where single-link 6G is listed (ST 2081-10). This includes the 3D modes, but the company has not yet tested these, admits Bohbot. Other supported modes include SMPTE 292M, SMPTE 296M, SMPTE 372M, SMPTE 424M, and SMPTE 425M.

– Chris Chinnock

UHDTV1 and 4K D-Cinema Production				SMPTE SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames Per Second (nominal)	10-bit 4:2:2	12-bit 4:2:2 12-bit 4:4:4 10-bit 4:4:4:4
2160p120/119.88	3840 / 4096	2160	120	ST 2081-12 Quad-link 6G (24Gb/s)	
2160p100	3840 / 4096	2160	100	ST 2081-12 Quad-link 6G (24Gb/s)	
2160p96/95.9	4096	2160	96	ST 2081-12 Quad-link 6G (24Gb/s)	
2160p60/59.94	3840 / 4096	2160	60	ST 2081-11 Dual-link 6G (12Gb/s)	ST 2081-12 Quad-link 6G (24Gb/s)
2160p50	3840 / 4096	2160	50	ST 2081-11 Dual-link 6G (12Gb/s)	ST 2081-12 Quad-link 6G (24Gb/s)
2160p48/47.98	4096	2160	48	ST 2081-11 Dual-link 6G (12Gb/s)	ST 2081-12 Quad-link 6G (24Gb/s)
2160p30/29.97	3840 / 4096	2160	30	ST 2081-10 Single-link 6G (6Gb/s)	ST 2081-11 Dual-link 6G (12Gb/s)
2160p25	3840 / 4096	2160	25	ST 2081-10 Single-link 6G (6Gb/s)	ST 2081-11 Dual-link 6G (12Gb/s)
2160p24/2398	3840 / 4096	2160	24	ST 2081-10 Single-link 6G (6Gb/s)	ST 2081-11 Dual-link 6G (12Gb/s)

HDTV and 2K D-Cinema Production				SMPTE SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames Per Second (nominal)	10-bit 4:2:2	12-bit 4:2:2 12-bit 4:4:4 10-bit 4:4:4:4
1080p120/119.88	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	ST 2081-10 Single-link 6G (6Gb/s)	ST 2081-11 Dual-link 6G (12Gb/s)
1080p96/95.9	2048	1080	96	ST 2081-10 Single-link 6G (6Gb/s)	ST 2081-11 Dual-link 6G (12Gb/s)
1080p60/59.94	1920 / 2048	1080	60		ST 2081-10 Single-link 6G (6Gb/s)
1080p50	1920 / 2048	1080	50		ST 2081-10 Single-link 6G (6Gb/s)
1080p48/47.98	2048	1080	48		ST 2081-10 Single-link 6G (6Gb/s)

3D HDTV and 2K D-Cinema Production				SMPTE SDI Mapping Standard	
System Nomenclature	Horizontal Pixels	Vertical Pixels	Frames Per Second (nominal)	10-bit 4:2:2	12-bit 4:2:2 12-bit 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 2081-11 Dual-link 6G (12Gb/s)
1080p50	1920 / 2048	1080	50	ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)	ST 2081-11 Dual-link 6G (12Gb/s)
1080p48/47.98	2048	1080	48	ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)	ST 2081-11 Dual-link 6G (12Gb/s)
1080p30/29.97	1920 / 2048	1080	30		ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)
1080p25	1920 / 2048	1080	25		ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)
1080p24/23.98	1920 / 2048	1080	24		ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)
720p60/59.94	1280	720	60		ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)
720p50	1280	720	50		ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)
720p30/29.97	1280	720	30		ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)
720p25	1280	720	25		ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)
720p24/23.98	1280	720	24		ST 2081-20 Stereo 3D Single-link 6G (6Gb/s)