

Understanding DTP Systems

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Abstract

The ability to transport audio, video, control, and remote power over shielded CATx cable is a growing necessity for accommodating today's diverse presentation environments and professional AV system applications. This guide will help you understand how to effectively manage and integrate these signal types into Extron DTP® digital twisted pair AV systems. An included series of best practices provides insight on how to successfully integrate DTP Systems in your AV application, covering topics such as DTP components, the importance of digital cable quality, distributing AV content and control, as well as HDBaseT compatibility.

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Introduction

This document is a collection of best practices designed to ensure a successful installation of an Extron DTP® System, and reliable performance throughout the entire system.

DTP System Elements and Capabilities

Extron DTP Systems is a family of products for extending audio, video, and control signals, along with providing DC power over a single shielded CATx cable to span distances not achievable with native video cabling such as HDMI. DTP Systems products may be divided into the following broad functional types:

- DTP Transmitter – a product that combines AV and control input signals, and reformats them for long distance transmission over a shielded CATx cable. A variety of DTP transmitters are available to support video input signal types including DisplayPort, HDMI, DVI, 3G-SDI, and VGA. Supported control signal types include RS-232 and IR.
- DTP Receiver – A product that accepts DTP signals sent from a DTP transmitter, and reproduces the AV and control signals for transmission to a display, switcher, or other device.
- Distribution Amplifier – A product that accepts AV and control input signals, and reformats them for long distance transmission over shielded CATx cable to multiple destinations. These distribution amplifiers provide several DTP outputs to extend the same source AV content to two or more displays in an application.
- DTP Switcher or Matrix Switcher – A video switching product supporting a variety of input and output signal types, including DTP. A DTP switcher or matrix switcher provides centralized switching, processing, and control for the AV system.

The simplest application for DTP products is point-to-point transmission of audio, video, and control signals from a video source to a display. The advantages of this approach over using conventional AV and control cabling are:

- The separate audio, video, and control signals are consolidated onto one shielded CATx cable – This saves the cost of acquiring and installing separate cables as well as minimizing the space occupied by the cable run.
- Transmission distance is greatly increased – Digital video formats such as HDMI and DisplayPort were not originally meant for the extended cable lengths required in professional installations. DTP products enable overall transmission distances up to 230 feet (70 meters) or 330 feet (100 meters).

- Built-in video signal conversion – DTP endpoints, i.e. transmitters and receivers, are available for a variety of video formats including DisplayPort, HDMI, DVI, 3G-SDI, and VGA. Video signal conversion built into the devices ensure that any DTP transmitter is compatible with any DTP receiver, regardless of the transmitter's input video format and receiver's output video format. See figure 1 below.

Beyond point-to-point signal extension, DTP products are available to provide centralized AV switching, signal processing, and system control to function as the core of a complete professional AV system, meanwhile delivering all the advantages of long distance cable extension and consolidation.

The advantages of a centralized DTP switching system include:

- Compatibility with all DTP endpoints – The DTP connections on centralized switchers are compatible with the entire line of DTP transmitters and receivers. This gives the AV system designer freedom to choose endpoints that suit the video input and output formats of sources and displays, provide sub-switching in convenient locations, as well as provide reliable signal extension up to 230 feet (70 meters) or 330 feet (100 meters) to accommodate the system's distance requirements.
- Full audio processing – Most DTP switching and signal processing products provide audio embedding and de-embedding, and level adjustments to manage the audio signal path.

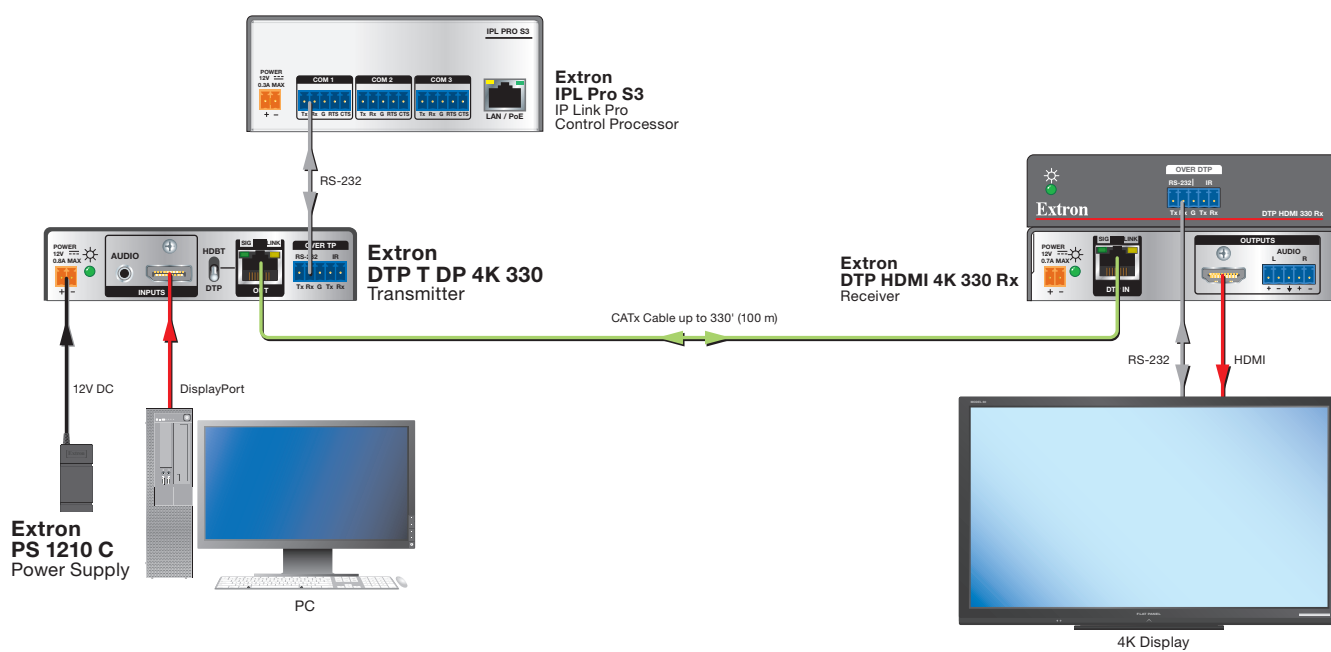


Figure 1: This application illustrates point-to-point signal transmission where a DTP transmitter sends a DisplayPort video signal along with digital audio, RS-232 control signals from the AV control system, and power over a 330 foot (100 meter) length of shielded CATx cable to a DTP receiver and connected HDMI display. Note that the use of a DTP DisplayPort transmitter and a DTP HDMI receiver eliminates the need for any additional signal conversion from DisplayPort to HDMI.

- Remote power for endpoints – All DTP switching and signal processing products can provide remote power to connected endpoints, simplifying the design and installation by eliminating the need to power the endpoints separately.
- Large selection of products with diverse capabilities – The line of DTP switchers ranges from the IN1604 DTP with four inputs and one DTP output, to the DTP CrossPoint 108 4K with 10x8 matrix switching, 4K scaling, and DSP with acoustic echo cancellation. DTP switchers are available to cover a wide variety of AV system designs from conference rooms to auditoriums and divisible rooms.

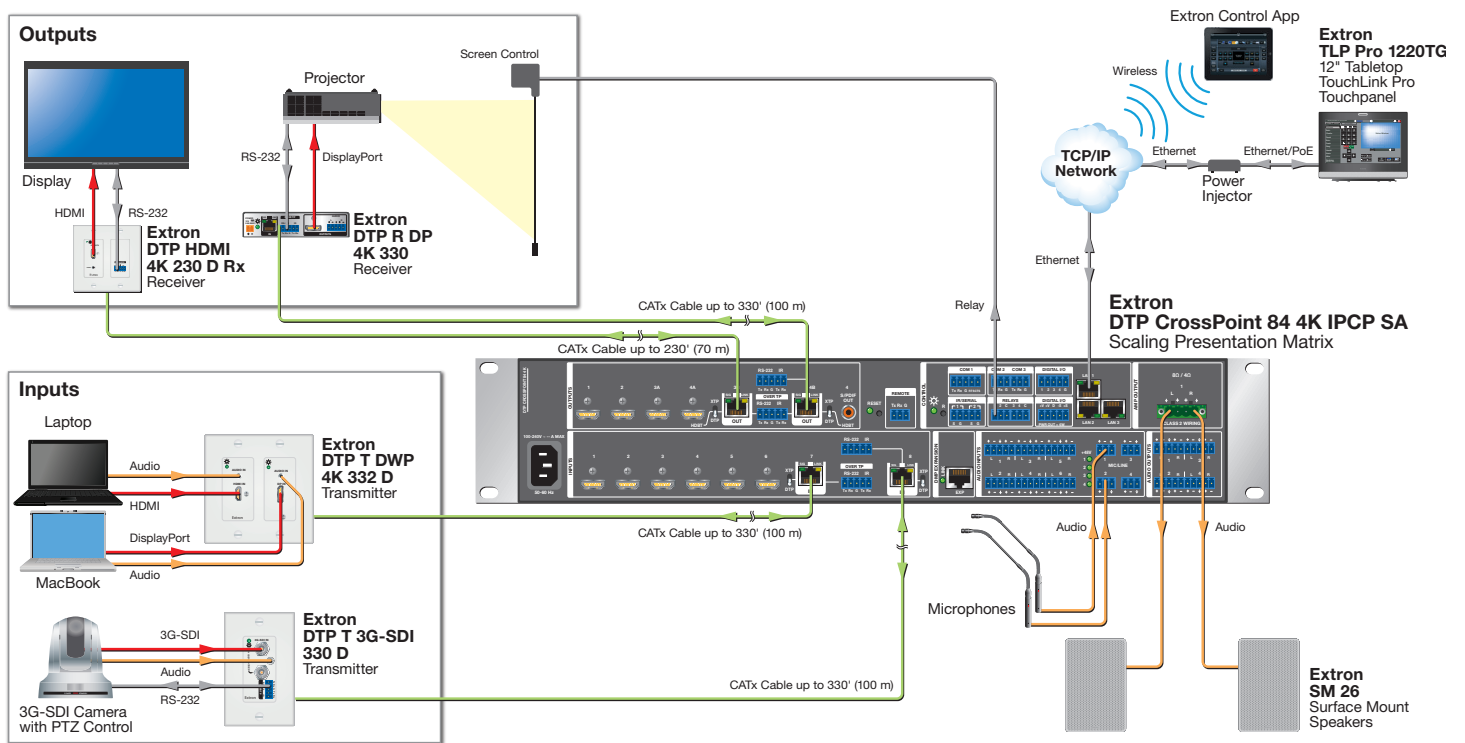


Figure 2: This application depicts a centralized DTP AV switching system. DTP transmitters extend AV from two remote locations. The DTP CrossPoint provides AV matrix switching for two displays, along with audio power amplification. A touchpanel is connected to the built-in control processor, which inserts RS-232 signals onto the DTP connections to control the camera, DTP switching transmitter, and both displays.

Best Practices for System Implementation

The following are guidelines for achieving optimal performance when installing DTP Systems. We will cover key aspects of:

- Maximum transmission distances for extending audio, video, and control signals
- Proper cabling and connections to ensure optimal signal integrity
- Distributing AV content, including 4K digital video, and control signals
- Utilizing the remote powering capabilities of DTP products
- HDBaseT compatibility and integrating HDBaseT-enabled displays

Maximum Transmission Distance

Extron DTP products are available in two transmission distance grades:

- DTP 230 Products – Maximum distance of 230 feet (70 meters) for 1080p, 130 feet (40 meters) for resolutions greater than 1920x1200 e.g. 4K
- DTP 330 Products – Maximum distance of 330 feet (100 meters) regardless of video resolution

In general, DTP endpoints, i.e. transmitters and receivers, are available in both DTP 330 and DTP 230 versions for design flexibility and optimized overall system cost. For example, the Extron DTP T HWP 4K 231 D and DTP T HWP 4K 331 D HDMI transmitters have identical functionality except for maximum transmission distance. In regards to video and control signal capability, DTP 330 products are compatible with DTP 230 products; but when a DTP 230 product is connected to a DTP 330 product, the maximum transmission distance is limited by the DTP 230 product at 230 feet (70 meters). When transmitting 4K signals, DTP 230 products support a maximum transmission distance of 130 feet (40 meters). We will delve into further detail in the “Distributing 4K Digital Video” section later in this guide.

Resolution	Refresh Rate (Hz)	Required Data Rate
640x480	60 Hz	755.25 Mbps
720p	60 Hz	2.23 Gbps
1080p	60 Hz	4.46 Gbps
1920x1200	60 Hz	4.62 Gbps
2560x1600	60 Hz	8.06 Gbps
UHD 3840x2160	30 Hz	8.91 Gbps
4K 4096x2160	30 Hz	8.91 Gbps

Table 1: Data rates for uncompressed transport of common video resolutions

Cabling and Connections

With the capability to simultaneously transport uncompressed video, audio, and control signals, DTP System digital data rates are comparable to 10G Ethernet, and therefore have similar cabling requirements. Table 1 indicates the data rates required for uncompressed transport of some common video resolutions.

To reach the required transmission distances at these data rates, signal integrity is of paramount importance. Proper wire gauge is essential to maintain signal strength, appropriate shielding is needed to control interference, and precise cable construction is necessary to limit crosstalk and to control signal reflections. Extron XTP DTP 24 shielded twisted pair cable meets all these criteria and is strongly recommended for

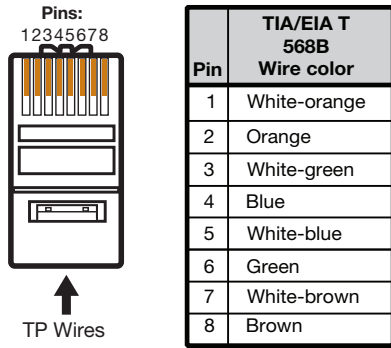


Figure 3: Proper termination of shielded CATx cable for DTP Systems

DTP installations. **As a minimum, Extron recommends solid conductor, 24 AWG shielded twisted pair cable with minimum 400 MHz bandwidth.** Skew-free twisted pair cable is not recommended for DTP Systems.

When installing cable, there are a few additional recommendations that are vital to ensuring optimal system performance. Avoid the use of patch points since they introduce discontinuities in the cable run, adversely affecting signal loss and EMI issues. However, if they are necessary, limit the quantity to two patch points per cable run. When bundling cables in a system, do not fill conduit more than 40 percent nor comb the cable in the first 20 meters. This reduces the possibility of alien crosstalk between cables, as does limiting the amount of cable ties or Velcro used to group cables together. It is also important to separate twisted pair cabling from AC power cables. Furthermore, use an “S” pattern if looping is necessary, and maintain a minimum bend radius of 2.5" (6.35 cm) for XTP DTP 24 cabling or 3.5" (8.9 cm) for XTP DTP 24P cabling.

Cable Termination

Professional AV systems often require custom cable lengths for optimized cost and space utilization. Unlike HDMI or DisplayPort, CATx cables for DTP Systems are very amenable to field termination. DTP CATx terminations must follow the TIA/EIA 568B wiring standard, as illustrated in figure 3.

To maintain shielding effectiveness, correctly ground the shield at both ends of the cable and use shielded plug (male) or jack (female) connectors. If patch points are unavoidable, shielded couplers are strongly recommended when two shielded, terminated cables must be connected together.

Extron offers high quality cable termination supplies and accessories to ensure proper shielding in DTP installations. The XTP DTP 24 Plug shielded RJ-45 plug kit is designed to be crimped using the CTU 45 universal RJ-45 termination tool. The shielded XTP DTP 24 Punch Down Jack features a keystone-style snap-in design for easy installation in wallplates and other mounting frames. The XTP DTP 24 Shielded RJ-45 Coupler also features a keystone snap-in design.

Extron XTP DTP 24 cable is a shielded twisted pair cable that is engineered for optimum signal transmission in DTP Systems. It utilizes an SF/UTP design with four unshielded 24 AWG twisted pair conductors inside an overall braid and foil shield. XTP DTP 24 cable is certified to 475 MHz bandwidth at distances up to 330 feet (100 meters) and has been independently tested and verified to meet performance requirements set by the HDBaseT Alliance. Additionally, this cable is engineered and tested to exceed HDMI error rate specifications of less than one pixel per billion at 100 meters. Plenum and non-plenum rated versions are available to suit the particular needs of the installation.



Figure 4: XTP DTP 24 cable, couplers, punch down jacks, and plugs ensure an end-to-end cable infrastructure with maximum performance.

Verifying Continuity and Signal Presence

Verify the continuity of installed Category twisted pair cable and Extron XTP DTP 24 shielded twisted pair cable using a wire map test and using LED indicators on the DTP units. The wire map test is used to identify physical errors of wiring CATx twisted pair cable in an installation. It ensures that a CATx cable has been properly terminated pin for pin at each end. The wire map also checks for continuity to the remote end, shorts between two or more conductors, crossed pairs, split pairs, reversed pairs, and any other mis-wiring.

In addition to the wire map test, signal transmission can be verified by the signal and link LED indicators associated with the DTP RJ-45 connector. When the signal flow between two connected DTP products is successful, the signal and link indicators will remain lit a solid green and solid amber color. Continuously blinking or unlit LEDs indicate faulty signal transmission.

Distributing AV Content

Every DTP Systems product has been carefully engineered to provide professional-grade quality and reliability, with unique features to help integrators install and configure AV systems of the highest quality. DTP Systems consist of a comprehensive line of products supporting the various video formats encountered in pro AV and will evolve and grow as video technology develops. Extron provides DTP products supporting HDMI, DisplayPort, DVI, 3G-SDI/HD-SDI/SDI, and also analog formats such as RGB, YUV, composite, and S-video. Supported video resolutions range from 480i up to 2560x1600 and 4K/UHD. The high performance DTP scalers and signal processors convert between all of these resolutions while preserving video quality. DTP products are available in wallplate, rack mountable, and floor box form factors to suit professional environments. The extensive variety of video formats, resolutions, and form factors available in DTP Systems make it a complete solution.

Appendix 1 on page 15, is a summary of available DTP System products. Transmitters and switchers support most video formats encountered in professional AV. Any product with a DTP output is compatible with any product with a DTP input. Therefore, no additional video format conversion is necessary, and the system designer can mix and match transmitters and receivers to suit system requirements.

When incorporating a DisplayPort transmitter and receiver into an AV system, consider whether the products support SST - Single Stream Transport or MST - Multi-Stream Transport. Extron DTP products for DisplayPort support SST for video transmission between a single source device and sink device.

In terms of EDID and HDCP management, DTP endpoints support DDC pass-through, so DTP products deployed for simple point-to-point signal extension work as if connected by standard video cabling. DTP switchers and matrix switchers feature Extron EDID Minder® and Key Minder® technologies to give complete control over the system EDID strategy and enable fast, reliable switching of video signals encrypted using HDCP. All DTP products with HDMI, DVI, and DisplayPort connections are HDCP compliant. Some products, as listed in Appendix 1, also support HDCP 2.2 for transmission and display of protected 4K content. These products are backward-compatible with earlier HDCP versions.

Distributing 4K Digital Video

DTP Systems offers a comprehensive range of products for extending, processing, and switching 4K video content:

- Select DTP transmitters (see table A1-1)
- All DTP receivers, distribution amplifiers, and CrossPoint matrix switchers

All DTP products with 4K capability support 4K/30 at 8 bits per color and 4:4:4 chroma sampling. Select transmitter and receiver products support HDCP 2.2 for point to point distribution (see tables A1-1, A1-2). All DTP 330 products, including all DTP CrossPoint® matrix switchers, support 4K transmission up to 330 feet (100 meters). For DTP 230 transmitters, receivers, and distribution amplifiers, the maximum distance for 4K video is 130 feet (40 meters). Figure 5 is an example of extending 4K signals using the DTP T DWP 4K 332 D.

The DTP CrossPoint 84 matrix switcher supports 4K switching, but not 4K scaling. It accepts 4K at the HDMI and DTP inputs, and can route 4K signals to the HDMI outputs, although the internal scaler will not accept 4K inputs. The DTP outputs are limited to maximum resolutions of 1920x1200 and 1080p.

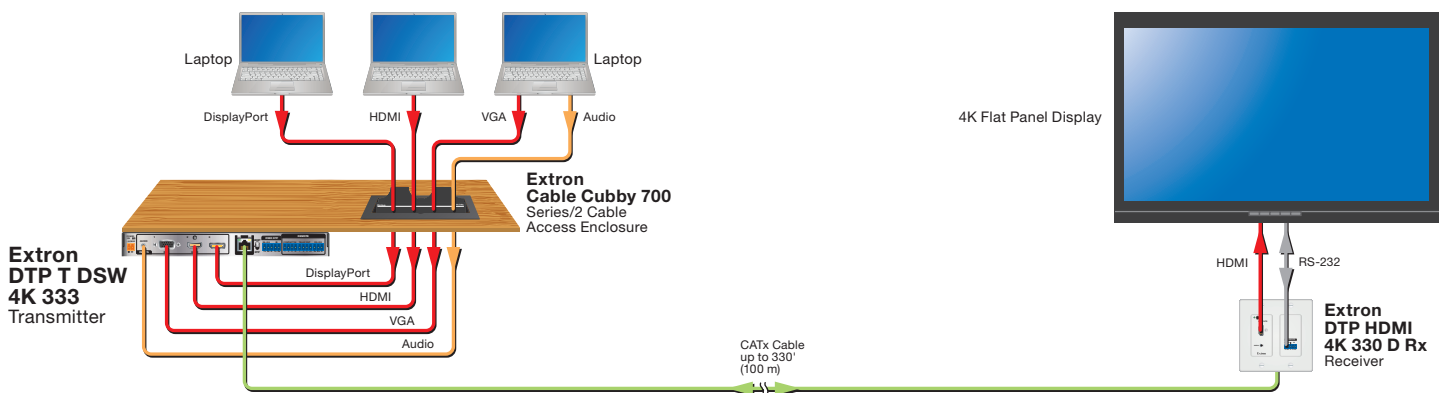


Figure 5: Simple 4K switching and signal extension using DTP 4K transmitter and receiver

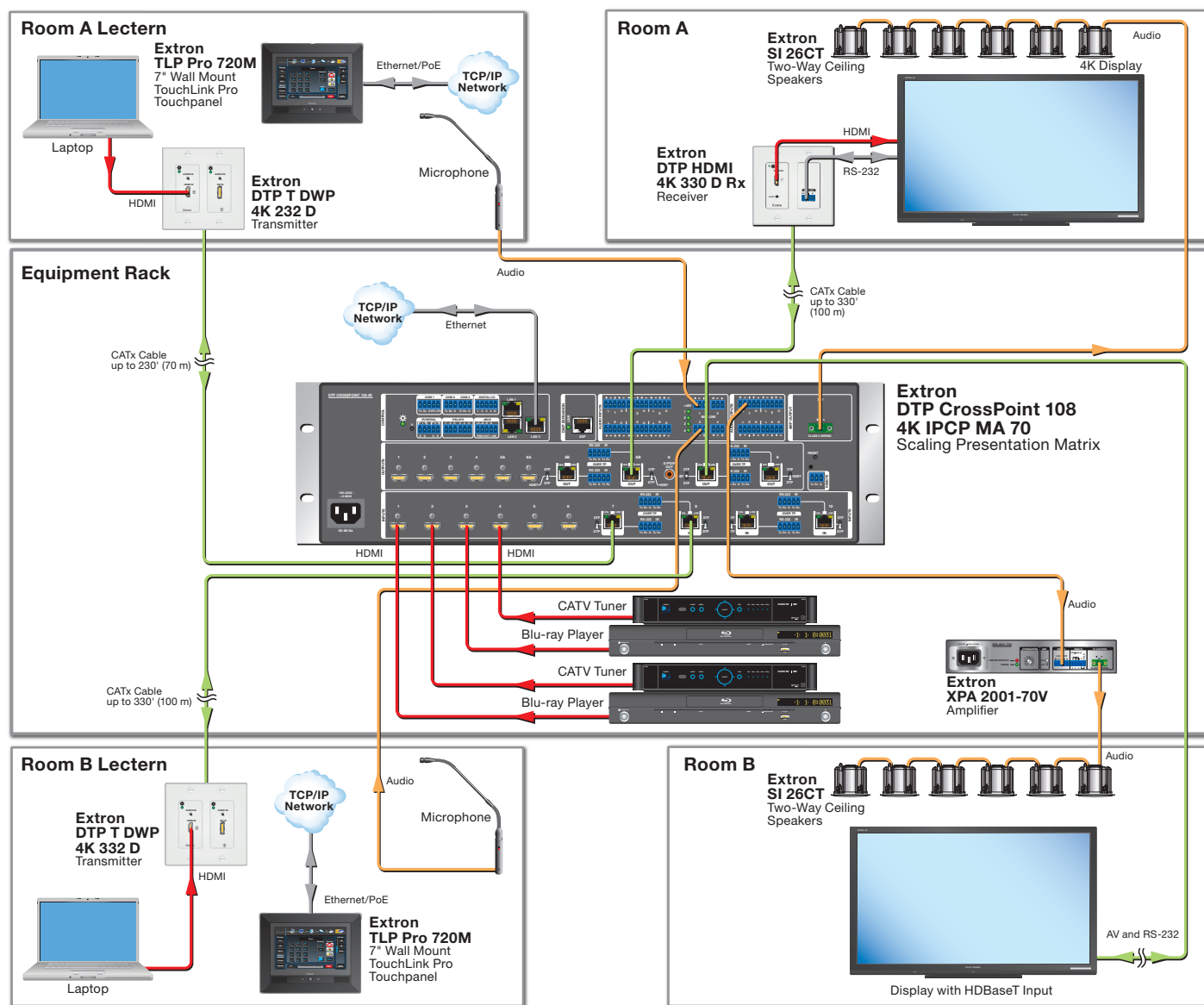


Figure 6: Complete 4K AV system for a divisible room, using the DTP CrossPoint 108 4K IPCP MA 70 for matrix switching, signal conversion, signal extension, audio, and control.

For applications requiring 4K switching and scaling, use the DTP CrossPoint 4K Series, available in 10x8, 8x6, 8x4, and 8x2 switching configurations. Incorporating Extron exclusive Vector™ 4K scaling technology, the DTP CrossPoint 4K Series provides independent scaling up to 4K at each DTP output, or downscaling of 4K source signals for interoperability with lower resolution displays to suit application needs. Figure 6 depicts a complete 4K matrix switching system using the DTP CrossPoint 108 4K IPCP MA 70 to convert lower resolution signals for optimal viewing on displays throughout the room. To ensure you select the ideal Extron 4K products, including DTP 4K products, Extron identifies all of the parameters that are critical to meeting 4K video performance requirements. This detailed product specification for 4K video performance is called the Extron True4K™ Specification. A True 4K Specification always includes resolution, frame

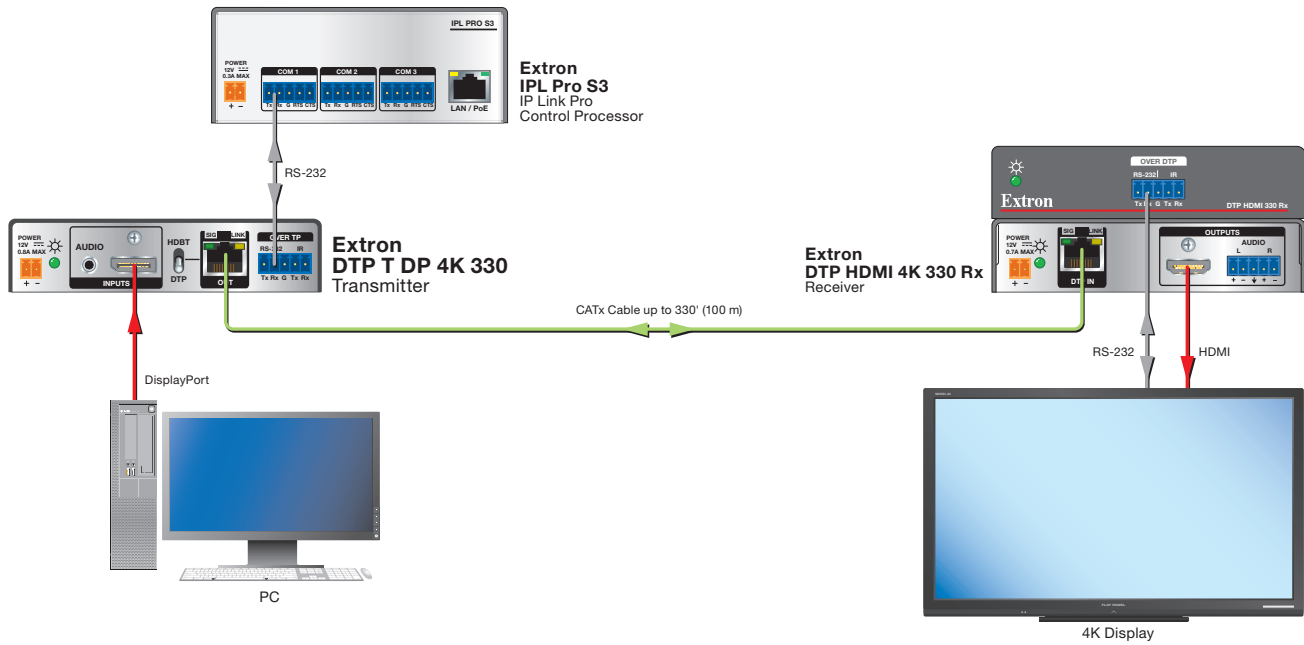


Figure 7a: In addition to extending 4K video, the DTP T DP 4K 330 sends connected RS-232 signals over the shielded CATx cable to control the video display connected at the DTP receiver.

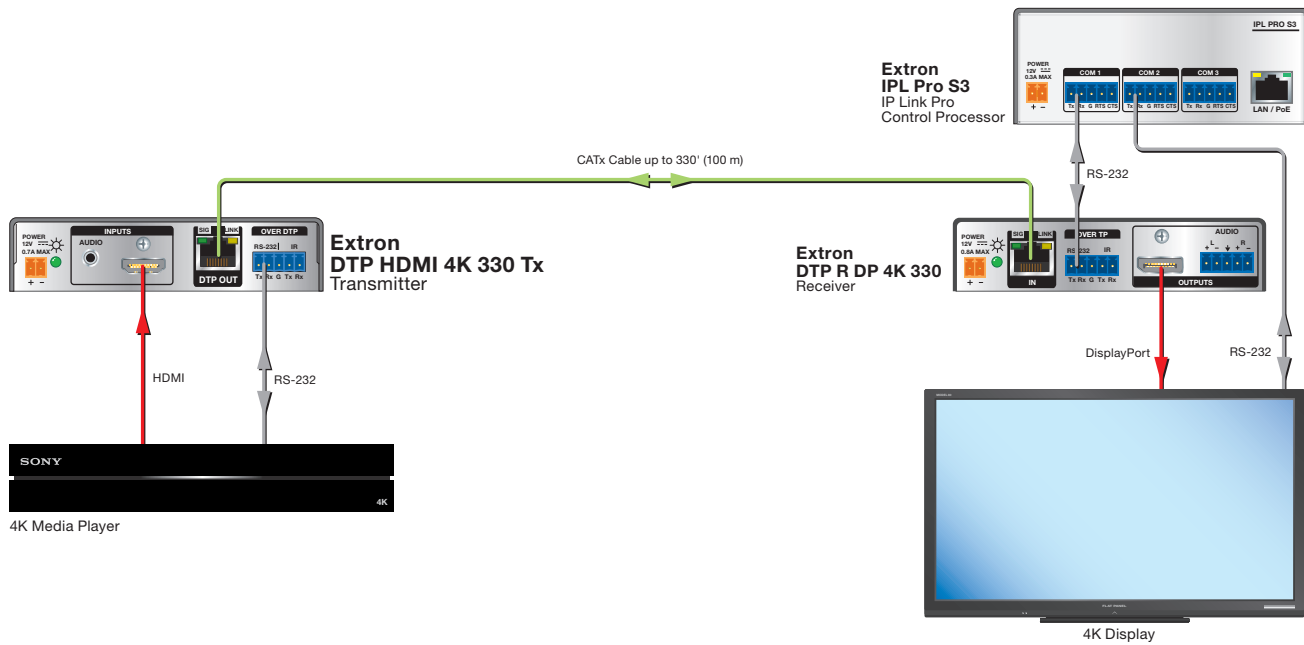


Figure 7b: RS-232 signals are connected at the DTP receiver and extended over the shielded CATx cable to control the media player connected to the DTP transmitter.

TRUE 4K SPECIFICATION		
Max 4K Capabilities		
Resolution and Refresh Rate	Chroma Sampling	Max Bit Depth per Color
4096 x 2160 at 30 Hz	4:4:4	8 bit
3840 x 2160 at 30 Hz		
4096 x 2160 at 60 Hz	4:2:0	
3840 x 2160 at 60 Hz		
Frame Rate ¹	24, 25, 30, 50, or 60 fps	
Chroma Sampling ¹	4:4:4, 4:2:2, or 4:2:0	
Color Bit Depth ¹	8 bits per color	
Signal type	10.2 Gbps (3.4 Gbps per color)	
Max. video data rate	HDMI 1.4, HDCP 2.2	
NOTE: ¹ Subject to the maximum data rate limit. Use our calculator (http://www.extron.com/product/videotools.aspx) to determine video parameters supported by this data rate.		

Figure 8: Each Extron 4K product includes a True4K Specification that always lists resolution, frame rate, color sampling, and color bit depth, as well as the 4K signal types and maximum data rate that is supported.

rate, color sampling, and color bit depth, as well as information about the 4K video signal types and the maximum 4K data rate supported by the product. See Figure 8 for an example of a True4K specification.

Distributing Control Signals

A key advantage of DTP Systems is the ability to send control signals as well as AV over a single shielded CATx cable. All DTP endpoints have connections for RS-232 and IR to facilitate end-to-end control signal transmission. Figure 7a and 7b illustrate simple point-to-point extension of control and video signals.

For centralized switching systems, Extron offers control signal pass-through in switchers such as the MPS 602 and IN1608. Figure 9 illustrates how to extend pass-through control signals for DTP switchers. Note that RS-232 jumper connections are required. DTP CrossPoint matrix switchers have the added capability of Ethernet insertion. With Ethernet insertion, a direct end-to-end RS-232 connection is not necessary. Rather, RS-232 signals are generated at the switcher by a control processor connected via Ethernet, freeing RS-232 ports at the control processor. Figure 10 depicts Ethernet control extension. Many DTP switching transmitters also have additional RS-232 ports that are dedicated for control of the switching transmitter itself, to facilitate input selection, HDCP authorization, and other functions driven by the system control processor.

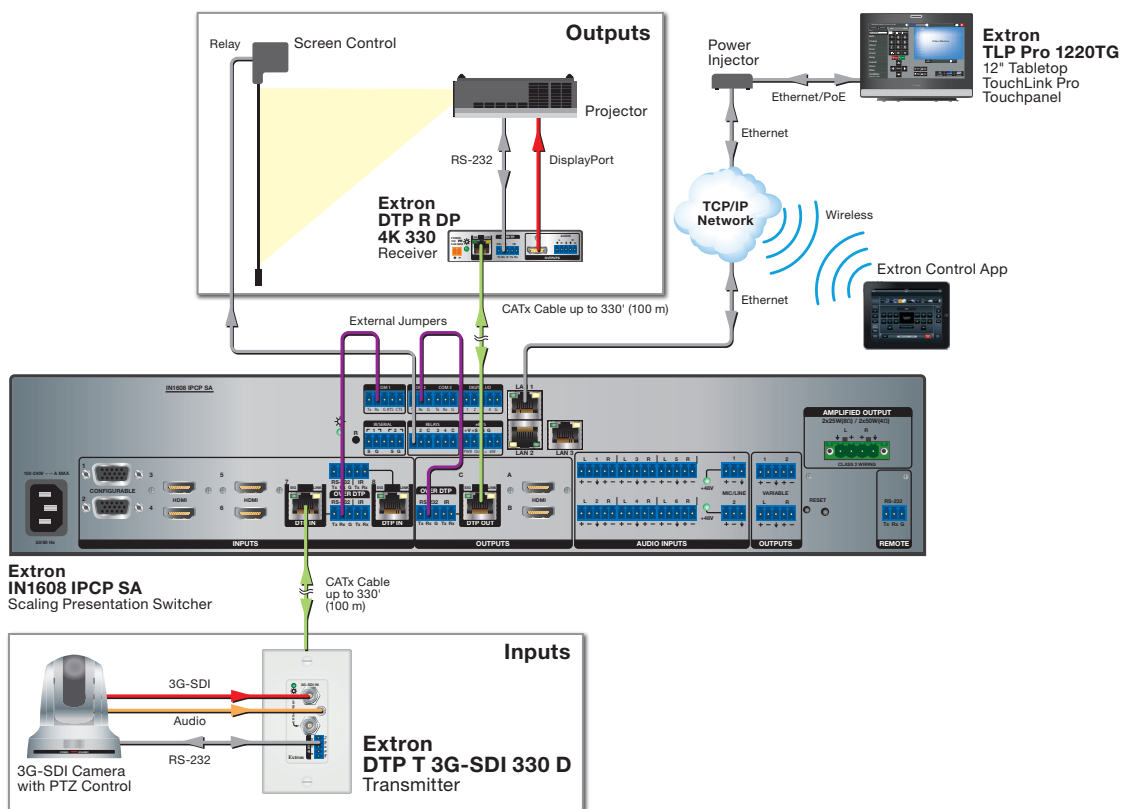


Figure 9: Extension of pass-through control signals from control processor ports to DTP endpoints.

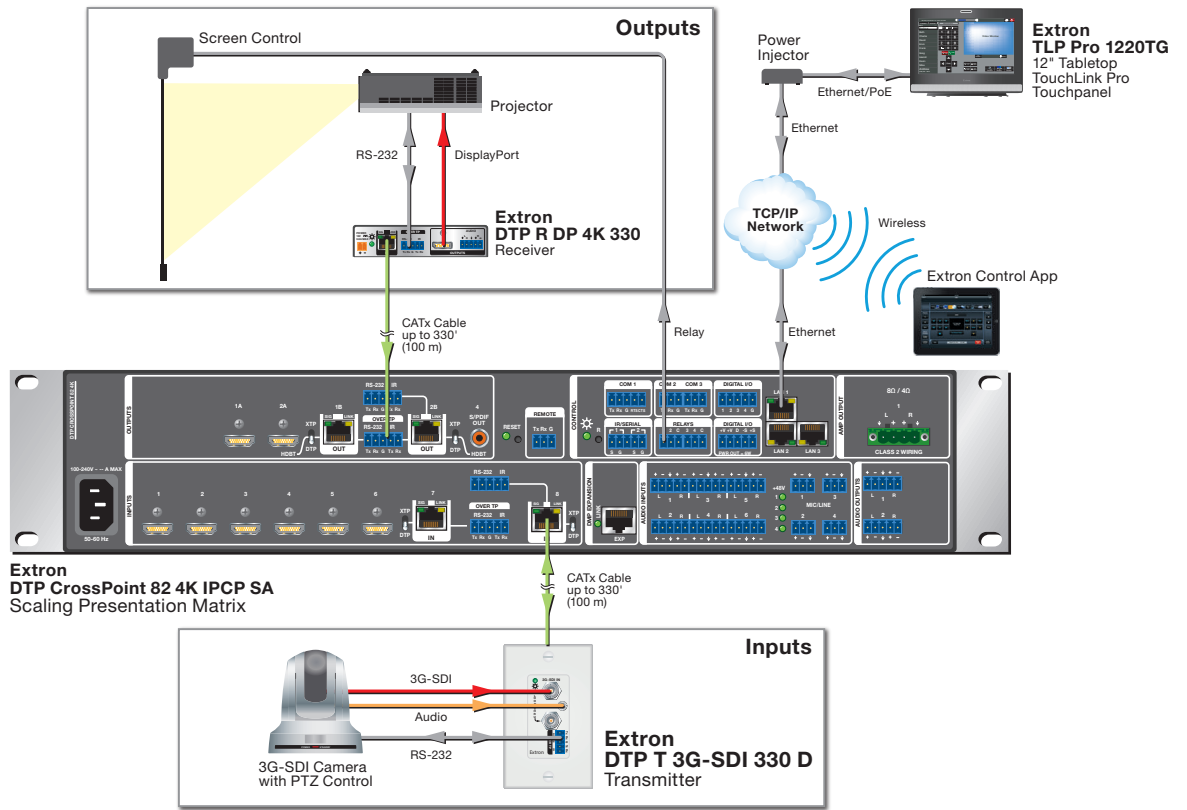


Figure 10: Ethernet insertion for DTP control signals frees control processor RS-232 ports

Distributing Analog Audio Separate Analog Audio Channel

DTP transmitters are uniquely able to digitize analog audio and send it over DTP alongside the video and control signals. This digitized analog audio is in addition to the digital audio already embedded on the video signal. At the other end of the cable, DTP receivers have a dedicated analog audio output for this signal. When sent to DTP switchers and matrix switcher, this signal is treated as an additional analog stereo audio input. See figure 11. Note that this is a true separate audio channel and is not embedded onto the video signal. The availability of a separate analog audio channel is beneficial when connecting to an external audio power amplifier, audio DSP, and speakers in an audio system, or when integrating the DTP equipment with existing hardware.

Analog Audio Embedding

Another option to distribute analog audio is by embedding the audio onto the digital video signal. Audio embedding streamlines integration and is particularly advantageous when connecting to displays without analog audio inputs. This function can be performed at the central switcher such as the IN1608 or DTP CrossPoint matrix switcher. Additionally, select DTP transmitters have both separate audio channel capability as well as audio embedding. These include all the two-input wallplate products such as the DTP T UWP 232 D, DTP T UWP 332 D, DTP T HWP 232 D,

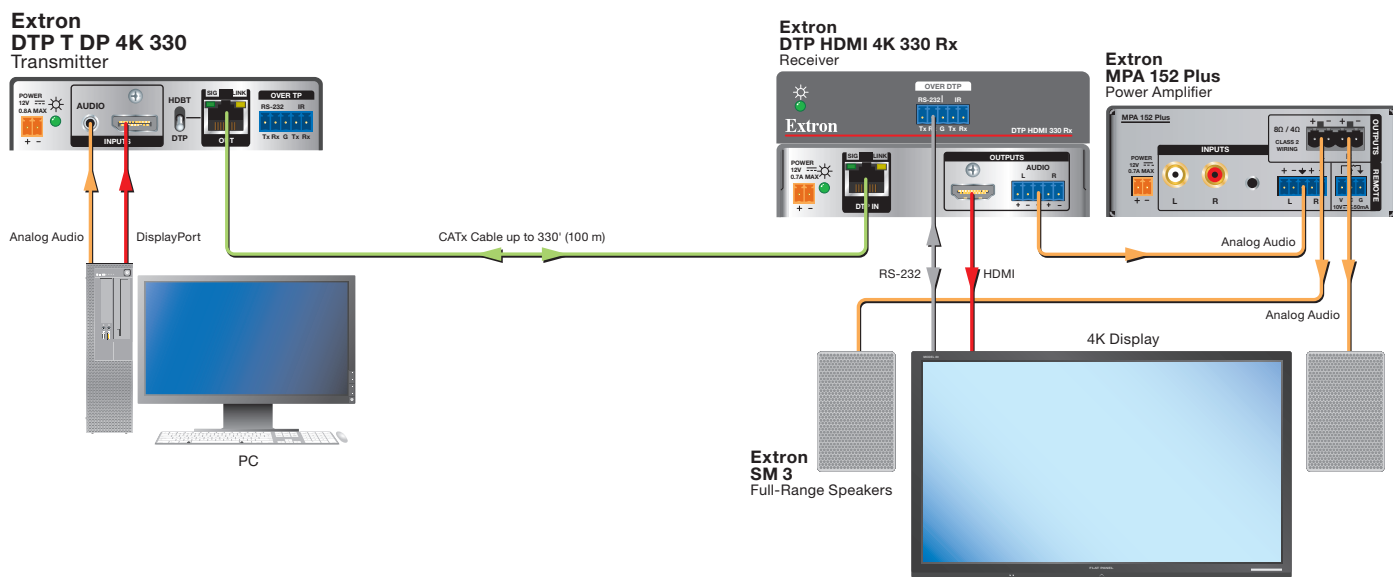


Figure 11: Distributing analog audio as a separate audio channel using the same shielded CATx cable as video and control

DTP T HWP 332 D, DTP T DWP 4K 232 D, DTP T DWP 4K 332 D, DTP T DSW 4K 233, and DTP T DSW 4K 333.

Remote Power

DTP endpoints have the flexibility to serve as either the source or the recipient of DC power sent over the CATx cable. In simple point-to-point applications, the endpoints can share a single power supply, located at either the transmitter or the receiver. See figure 12.

When incorporating a centralized DTP switcher, the switcher can provide DC power to all connected DTP endpoints, thus simplifying both the design and installation. See figure 13. Note that the DTP T DSW 4K 233/333 products are exceptions to the above. These products can supply power to a connected DTP receiver, but cannot be powered remotely over the twisted pair connection.

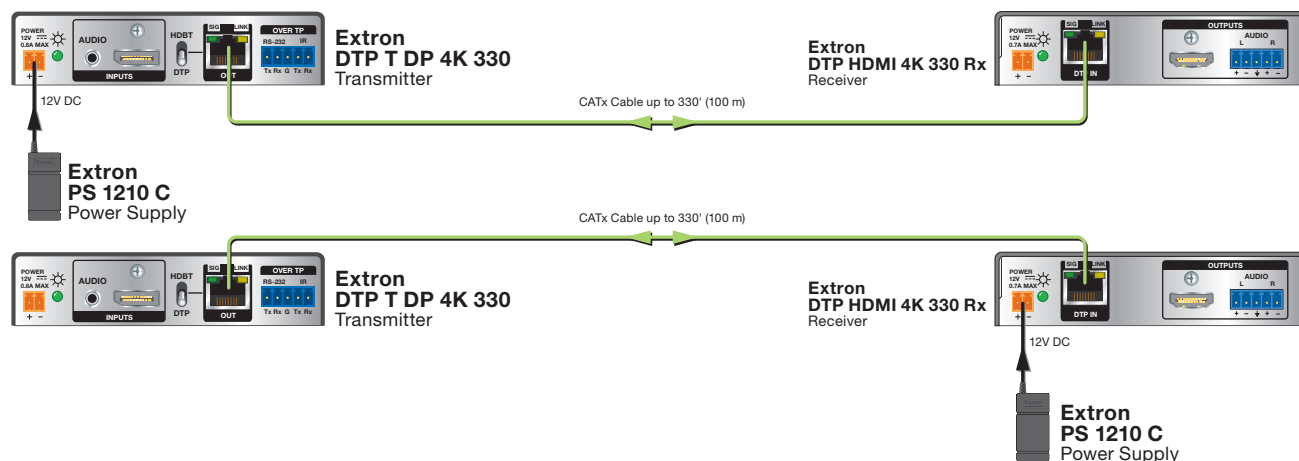


Figure 12: A single power supply installed at either the DTP transmitter or the DTP receiver can power both endpoints in a point-to-point application.

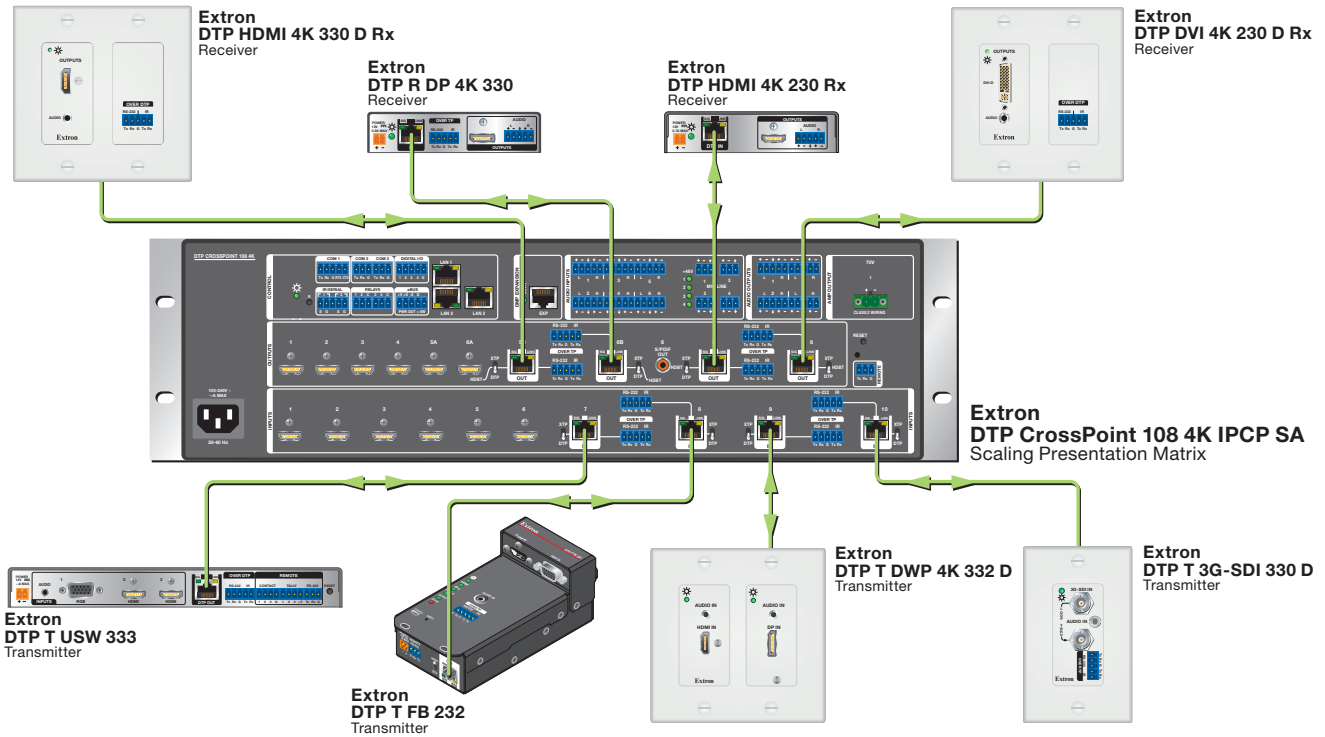


Figure 13: From the IN1604 DTP to the DTP CrossPoint 108 4K, DTP distribution amplifiers and switchers built for centralized switching can remotely power all of the DTP endpoints that are connected to them.

HDBaseT Compatibility

DTP Systems products are based on HDBaseT technology, but also add proprietary Extron technologies to enable additional functionality. As more display products incorporate HDBaseT inputs, Extron has included an HDBaseT compatibility mode in many new DTP products, with a growing number having full HDBaseT certification. See Appendix 2. HDBaseT compatibility allows integrators to take advantage of HDBaseT-enabled displays by eliminating the need for a receiver at the display video input.



Figure 14: DTP or HDBaseT mode selection using a switch beside the twisted pair output connection

HDBaseT-compatible DTP products include a switch to set the output to DTP or HDBaseT mode. See figure 14. When set to HDBaseT mode, only digital video with embedded audio, RS-232, and IR control are supported over the CATx cable. Remote power capability and separate audio transmission are not supported. When installing the DTP product in an HDBaseT environment, the output mode selection switch must be set before connecting sources and displays. There is no change in transmission distance capability between HDBaseT and DTP modes. Products capable of 330 feet (100 meters) maximum cable distance remain so capable in either mode setting. The same is true for products that are capable of 230 feet (70 meters) maximum cable distance.

Appendix 1

DTP Transmitters and Switching Transmitters										
Model Name	4K Support	HDCP Version	Video Input Connections					Audio Embedding	Form Factor	Distance
			DisplayPort	DVI	HDMI	SDI	VGA			
DTP HDMI 4K 230 Tx	Yes	2.2			1				1/4 rack	230 feet (70 m)
DTP DVI 4K 230 Tx	Yes	2.2		1					1/4 rack	230 feet (70 m)
DTP T DP 4K 230	Yes	1.4	1						1/4 rack	230 feet (70 m)
DTP T HD2 4K 230	Yes	1.4			1				1/4 rack	230 feet (70 m)
DTP DVI 4K 230 D Tx	Yes	2.2		1					2-gang	230 feet (70 m)
DTP T HWP 4K 231 D	Yes	2.2			1				1-gang	230 feet (70 m)
DTP T 3G-SDI 230 D							1		1-gang	230 feet (70 m)
DTP HDMI 4K 330 Tx	Yes	2.2			1				1/4 rack	330 feet (100 m)
DTP DVI 4K 330 Tx	Yes	2.2		1					1/4 rack	330 feet (100 m)
DTP T DP 4K 330	Yes	1.4	1						1/4 rack	330 feet (100 m)
DTP T HD2 4K 330	Yes	1.4			1				1/4 rack	330 feet (100 m)
DTP T HWP 4K 331 D	Yes	2.2			1				1-gang	330 feet (100 m)
DTP T 3G-SDI 330 D							1		1-gang	330 feet (100 m)
DTP T DWP 4K 232 D	Yes	1.4	1		1			Yes	2-gang	230 feet (70 m)
DTP T HWP 232 D	Yes	1.4			2			Yes	2-gang	230 feet (70 m)
DTP T UWP 232 D	Yes	1.4			1		1	Yes	2-gang	230 feet (70 m)
DTP T USW 233		1.4			2		1		1/2 rack	230 feet (70 m)
DTP T DSW 4K 233	Yes	1.4	1		1		1	Yes	1/2 rack	230 feet (70 m)
DTP T MK 232		1.4			1		1	Yes	MK wallplate	230 feet (70 m)
DTP T EU 232		1.4			1		1	Yes	EU wallplate	230 feet (70 m)
DTP T FB 232		1.4			1		1	Yes	Floor box	230 feet (70 m)
DTP T DWP 4K 332 D	Yes	1.4	1		1			Yes	2-gang	330 feet (100 m)
DTP T HWP 332 D		1.4			2			Yes	2-gang	330 feet (100 m)
DTP T UWP 332 D		1.4			1		1	Yes	2-gang	330 feet (100 m)
DTP T USW 333		1.4			2		1		1/2 rack	330 feet (100 m)
DTP T DSW 4K 333	Yes	1.4	1		1		1	Yes	1/2 rack	330 feet (100 m)
DTP T MK 332		1.4			1		1	Yes	MK wallplate	330 feet (100 m)
DTP T EU 332		1.4			1		1	Yes	EU wallplate	330 feet (100 m)
DTP T FB 332		1.4			1		1	Yes	Floor box	330 feet (100 m)

A1-1: Summary of available DTP System transmitters and switching transmitters



Figure 15: DTP transmitters are available in a wide variety of form factors to provide convenient connection points for local and remote sources.

Appendix 1

DTP Distribution Amplifiers and Receivers								
Model Name	Function	HDCP Version	Video Output Connections				Form Factor	Distance
			DisplayPort	DVI	HDMI	DTP		
DTP HD DA4 4K 230	Distribution amplifier	1.4			1	4	Full rack	230 feet (70 m)
DTP HD DA8 4K 230	Distribution amplifier	1.4			1	8	Full rack	230 feet (70 m)
DTP HD DA4 4K 330	Distribution amplifier	1.4			1	4	Full rack	330 feet (100 m)
DTP HD DA8 4K 330	Distribution amplifier	1.4			1	8	Full rack	330 feet (100 m)
DTP HDMI 4K 230 Rx	Receiver	2.2			1		1/4 rack	230 feet (70 m)
DTP DVI 4K 230 Rx	Receiver	2.2		1			1/4 rack	230 feet (70 m)
DTP R DP 4K 230	Receiver	1.4	1				1/4 rack	230 feet (70 m)
DTP HDMI 4K 230 D Rx	Receiver	2.2			1		2-gang	230 feet (70 m)
DTP DVI 4K 230 D Rx	Receiver	2.2		1			2-gang	230 feet (70 m)
DTP HDMI 4K 330 Rx	Receiver	2.2			1		1/4 rack	330 feet (100 m)
DTP DVI 4K 330 Rx	Receiver	2.2		1			1/4 rack	330 feet (100 m)
DTP R DP 4K 330	Receiver	1.4	1				1/4 rack	330 feet (100 m)
DTP HDMI 4K 330 D Rx	Receiver	2.2			1		2-gang	330 feet (100 m)

A1-2: Summary of available DTP System distribution amplifiers and receivers



Figure 16: DTP receivers provide convenient connection points at remote display locations, extending video, audio, and control signals up to 330 feet (100 meters) over a shielded twisted pair cable from a DTP receiver or other DTP-enabled product.



Figure 17: Distribution amplifiers with DTP outputs are engineered for reliable operation in commercial AV applications, extending the same source AV content to two or more displays.

DTP Switchers and Matrix Switchers										
Model Name	Video Input Connections				Video Output Connections				Scaled Video Outputs	HDBaseT Compatibility
	DisplayPort	HDMI	VGA	DTP	HDMI	VGA	DTP	HDBaseT		
MPS 602		3	2	1	1	1*	1			
Annotator 300	1	1	1		2		1	1	1	Switch selectable***
IN1604 DTP		3	1				1	1	1	Switch selectable***
IN1608		4	2	2	2		1		1	
IN1608 HDBT		4	2	2	2			1	1	Fixed***
DTP CrossPoint 84		6		2	2		2	2	2	Switch selectable***
DTP CrossPoint 82 4K		6		2	2**		2	2	2	Switch selectable***
DTP CrossPoint 84 4K		6		2	2**		2	2	2	Switch selectable***
DTP CrossPoint 86 4K		6		2	2**		4	4	4	Switch selectable***
DTP CrossPoint 108 4K		6		4	6**		4	4	4	Switch selectable***

* Available for VGA inputs only

** Two HDMI outputs are mirrored with two DTP outputs, not individually matrix switched

*** Refer to Table A2-1: HDBaseT Compatibility for additional information

A1-2: Summary of available DTP switchers and matrix switchers for centralized switching

Appendix 2

HDBaseT-Compatible DTP Products				
Model Name	Function	Number of HDBaseT Compatible Outputs	Form Factor	Distance
DTP T DP 4K 230	Transmitter	1	1/4 rack	230 feet (70 m)
DTP T HD2 4K 230	Transmitter	1	1/4 rack	230 feet (70 m)
DTP T HWP 4K 231 D	Transmitter	1	1-gang	230 feet (70 m)
DTP T DP 4K 330	Transmitter	1	1/4 rack	330 feet (100 m)
DTP T HD2 4K 330	Transmitter	1	1/4 rack	330 feet (100 m)
DTP T HWP 4K 331 D	Transmitter	1	1-gang	330 feet (100 m)
DTP T DWP 4K 232 D	Switching transmitter	1	2-gang	230 feet (70 m)
DTP T MK 232	Switching transmitter	1	MK wallplate	230 feet (70 m)
DTP T EU 232	Switching transmitter	1	EU wallplate	230 feet (70 m)
DTP T FB 232	Switching transmitter	1	Floor box	230 feet (70 m)
DTP T DWP 4K 332 D	Switching transmitter	1	2-gang	330 feet (100 m)
DTP T MK 332	Switching transmitter	1	MK wallplate	330 feet (100 m)
DTP T EU 332	Switching transmitter	1	EU wallplate	330 feet (100 m)
DTP T FB 332	Switching transmitter	1	Floor box	330 feet (100 m)
DTP T DSW 4K 233	Switching transmitter	1	1/2 rack	230 feet (70 m)
DTP T DSW 4K 333	Switching transmitter	1	1/2 rack	330 feet (100 m)
DTP CrossPoint 84 - all models	Matrix Switcher	2	2U, full rack	330 feet (100 m)
DTP CrossPoint 82 4K - all models	Matrix Switcher	2	2U, full rack	330 feet (100 m)
DTP CrossPoint 84 4K - all models	Matrix Switcher	2	2U, full rack	330 feet (100 m)
DTP CrossPoint 86 4K - all models	Matrix Switcher	4	3U, full rack	330 feet (100 m)
DTP CrossPoint 108 4K - all models	Matrix Switcher	4	3U, full rack	330 feet (100 m)
IN1608 HDBT	Scaling Presentation Switcher	1	1U, full rack	330 feet (100 m)
IN1608 SA HDBT	Scaling Presentation Switcher	1	2U, full rack	330 feet (100 m)
IN1608 MA 70 HDBT	Scaling Presentation Switcher	1	2U, full rack	330 feet (100 m)
IN1608 IPCP SA HDBT	Scaling Presentation Switcher	1	2U, full rack	330 feet (100 m)
IN1608 IPCP MA 70 HDBT	Scaling Presentation Switcher	1	2U, full rack	330 feet (100 m)
IN1604 DTP	Scaler	1	1/2 rack	330 feet (100 m)
Annotator 300	Annotation Processor	1	1U, full rack	330 feet (100 m)
DTP HD DA4 4K 230	Distribution Amplifier	4	1U, full rack	230 feet (70 m)
DTP HD DA8 4K 230	Distribution Amplifier	8	1U, full rack	230 feet (70 m)
DTP HD DA4 4K 330	Distribution Amplifier	4	1U, full rack	330 feet (100 m)
DTP HD DA8 4K 330	Distribution Amplifier	8	1U, full rack	330 feet (100 m)

A2-1: DTP Products with HDBaseT Compatibility



Figure 18: DTP switchers and matrix switchers provide centralized switching, processing, and control for the AV system, in addition to AV signal extension.

Extron Electronics, headquartered in Anaheim, CA, is a leading manufacturer of professional AV system integration products. Extron products are used to integrate video and audio into presentation systems in a wide variety of locations, including classrooms and auditoriums in schools and colleges, corporate boardrooms, houses of worship, command-and-control centers, sports stadiums, airports, broadcast studios, restaurants, malls, and museums.

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