

Crestron **DMCO Type 7**
DigitalMedia™ Streaming Output Cards
Reference Guide



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DigitalMedia Streaming Output Cards: DMCO Type 7

Introduction

Designed for Crestron® DM-MD32X32, DM-MD16X16, and DM-MD8X8 DigitalMedia™ switchers, DMCO Type 7 streaming output cards provide video and audio mixing capabilities that can generate streams up to 25 Mbps. Prior to the development of DMCO Type 7 cards, DigitalMedia technology provided point-to-point video and audio transport. With the development of DMCO Type 7 cards, video and audio can be distributed via Ethernet, allowing much flexibility in network design. A direct connection between the DigitalMedia switcher and the endpoint is no longer required. DMCO Type 7 cards require configuration of a logical route using SIMPL programming.

This document provides the following information:

- An overview of the key features of DMCO Type 7 cards
- Ethernet configuration information related specifically to DMCO Type 7 cards
- Common applications of DMCO Type 7 cards and associated configuration guidelines

NOTE: For a complete listing of available DMCO Type 7 models, refer to www.crestron.com.

Key Features

Key features of DMCO Type 7 cards are as follows:

- **H.264 Streaming**—High-performance H.264 streaming capability enables enterprise-wide distribution of HD content over an IP network. Streaming expands the capabilities of DigitalMedia to remove all distance limitations and allow distribution to virtually any device—anywhere in the world. Streaming is an essential component of any complete DigitalMedia system, allowing for high-definition signal routing to Crestron touch screens, mobile devices (including tablets), digital signage displays, remote buildings, and global offices without requiring any new or dedicated wiring. Live streaming to computers and mobile devices can be facilitated through integration with a content management server such as Wowza[®] or Kaltura[®].
- **Composite of Two Video and Audio Inputs into a Single Stream**—DMCO Type 7 cards composite two inputs and generate a single stream that supports resolutions up to HD 1080p at bit rates up to 25 Mbps. Each streaming output is fed internally by two separate switcher inputs, allowing any two input sources to appear picture-in-picture (PIP) or picture-by-picture (side-by-side) in a single stream. High-quality video and audio is maintained using high-performance H.264 video and AAC audio compression.

NOTE: If no video is detected on a stream, a blue screen is displayed.

- **Flexible Stream Configuration**—DigitalMedia provides many deployment options to address a wide range of streaming applications and accommodate each organization's specific IT requirements. Streaming supports both unicast and multicast—with or without RTSP (Real Time Streaming Protocol). Streaming connections can be configured to stream directly to one or more specific IP addresses or to use RTSP to manage the configuration of numerous connections automatically. Any streaming output can be configured to stream via the **LAN** port of the DM[®] switcher or via a dedicated **CONTENT LAN** port of a DMCO Type 7 card, allowing the option to combine control and content on a single network or isolate them onto separate networks.
- **Instant Switching**—Built-in scaling enables instant and trouble-free switching between sources of any type or resolution. While the scaler is in full-frame mode, two video windows can be swapped. The desired video to be displayed can be set on Input 1 while the video to be switched to can be set on Input 2. While Input 1 is displaying the stream, the video can be swapped so that Input 2 is displayed full frame without any black screen or delay.
- **Flexible Window Sizing**—DMCO Type 7 cards support a user-defined window size from 5% to 95% of the frame size. The window size can be set for PIP and picture-by-picture (side-by-side) video windows. The border size can also be set to allow the windows to be moved.

- **Audio Mixing**—Audio support includes stereo signals as well as multichannel audio signals down-mixed to stereo via a DM switcher input card with DSP, for example, the DMC-HD-DSP.

NOTE: Streaming output supports stereo audio only. Multichannel surround sound audio cannot be streamed unless down-mixed to stereo. If a DM switcher input card with DSP is not used, audio may not be heard if a multichannel source is selected.

- **Low Encoder Latency**—Encoder latency is under 500 ms (typically between 150 ms and 300 ms). Total system latency is determined by individual latencies of the encoder, network, and decoder.
- **HDCP Management**—Since HDCP protected content is not supported by streaming devices, DMCO Type 7 cards manage the HDCP protected content by ensuring that it is not transmitted over a streaming device. If a stream contains HDCP content, it is displayed as a red screen.

DigitalMedia transmitters and receivers can coexist with streaming devices. HDCP content is sent to the devices that support it and is blocked from the devices that do not support it.

Ethernet Configuration

DMCO Type 7 cards stream audio and video over an Ethernet network. A stream can be output via the **CONTENT LAN** port of a streaming output card or via the **LAN** port of a DM switcher.

Using Crestron Studio™, SIMPL Windows, or DMTool, the operational mode of the **CONTENT LAN** port can be set to one of the following:

- **Auto**—When in automatic mode (default setting), a streaming output card outputs a stream via the **CONTENT LAN** port only if a link is detected. If a link is not detected, the card uses the internal DigitalMedia network via the **LAN** port of the DM switcher.
- **Enable**—If the **CONTENT LAN** port is enabled, the card streams via the **CONTENT LAN** port regardless of whether a link is detected.
- **Disable**—If the **CONTENT LAN** port is disabled, the card streams via the internal DigitalMedia network regardless of whether a link is detected.

NOTE: Regardless of the operational mode and link status of the **CONTENT LAN** port, an Ethernet connection to the CPU card of the DigitalMedia switcher is necessary for control of the switcher.

The **CONTENT LAN** port allows a system designer to have separate LAN connections for control and content. Sample scenarios include the following:

- Streaming of a live show. In this scenario, the control LAN can connect to the gear in the booth that has no Internet access and the content LAN can connect to a network that does have Internet access.
- The DigitalMedia switcher is behind a control subnet and streaming to a device on the corporate LAN is desired.

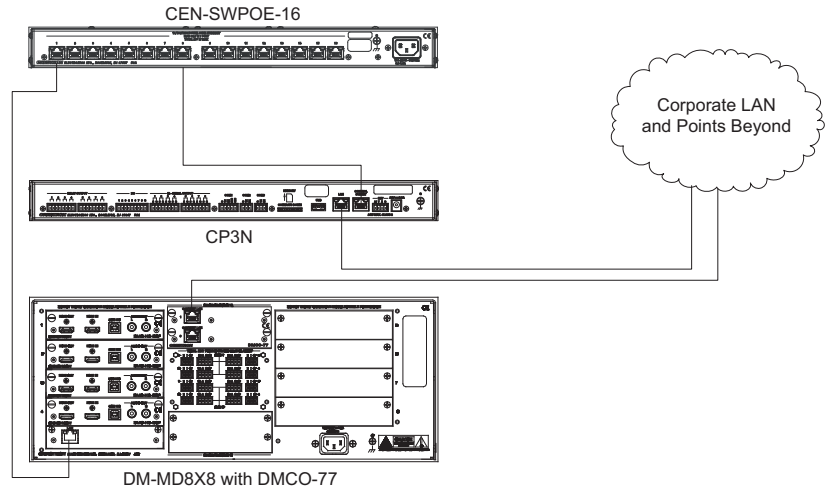
The IP address of the streaming output card encoder differs from the IP address of the DigitalMedia switcher. By default, DHCP (Dynamic Host Configuration Protocol) is enabled for the streaming output card encoder:

- When using the internal DigitalMedia network, the encoder is on the same network as the CPU card of the DM switcher and will request an IP address from the same DHCP server.
- When using the **CONTENT LAN** port, the encoder can be on a different network and will request an IP address from the DHCP server on that network.

NOTE: Similar to other types of DM switcher output cards, DMCO Type 7 cards receive a private IP address from the DM switcher in Private Network Mode (PNM); however, DMCO Type 7 cards also include a dedicated encoder that requires its own IP address. Regardless of the configuration of a DM switcher or streaming output card, the encoder requires a public IP address outside of the private DM network.

The following illustration demonstrates use of the **CONTENT LAN** port to separate the output of the DMCO Type 7 card from the internal network.

Separation of DMCO Type 7 Output from Internal Network



Using Crestron Studio, SIMPL Windows, or DMTool, DHCP can be disabled and a static IP address can be set. When the Ethernet parameters are changed, the encoder drops the <Encoder_Ready_Fb> signal low while the Ethernet parameters are reconfigured. Once reconfiguration is complete, the <Encoder_Ready_Fb> signal goes high, indicating that the encoder is ready to start streaming.

Applications

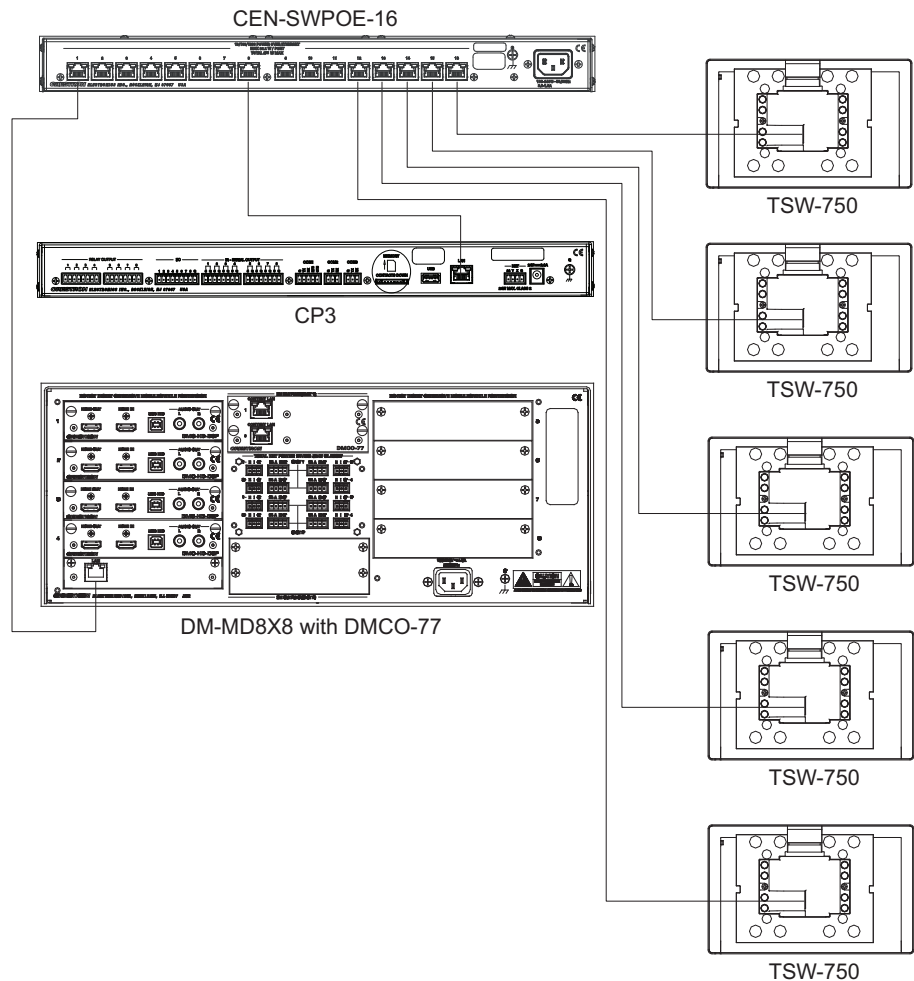
Common applications of DMCO Type 7 cards include the following:

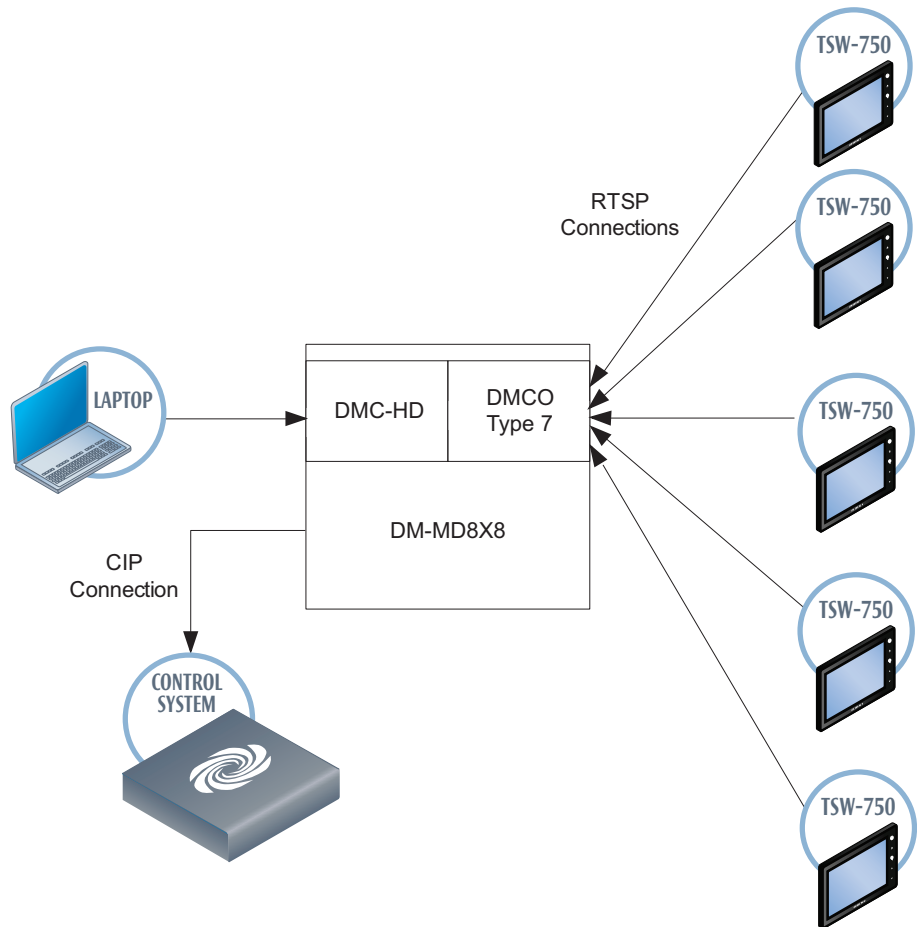
- Streaming to touch screens via unicast and RTSP
- Streaming to a content management server via unicast
- Streaming to touch screens via multicast and RTSP
- Streaming to digital signage displays via multicast and UDP

Streaming to Touch Screens (Unicast and RTSP)

The following illustrations demonstrate physical and logical connections for a sample application in which a DMCO Type 7 card streams to touch screens via unicast and RTSP connections.

Physical Connections—Streaming to Touch Screens via Unicast and RTSP



Logical Connections—Streaming to Touch Screens via Unicast and RTSP

In the sample application, TSW-750 touch screens are configured to connect directly to a DMCO Type 7 card. The connection between each touch screen and the DMCO Type 7 card is a unicast RTSP connection. The packets are duplicated for each touch screen.

Since the touch screens are on the same network, the **CONTENT LAN** port of the DMCO Type 7 card is disabled; therefore, the card streams via the internal DigitalMedia network.

Configuration Guidelines: To configure the DMCO Type 7 card to stream to touch screens via unicast RTSP connections, refer to the following guidelines:

- Using VT Pro-e[®], set embedded video object properties as follows:
 - a. Set *Video Aspect Ratio* to **16:9**.
 - b. Set *Source ID* to **252-Streaming Video**.
 - c. Enter the URL of the streaming output encoder.
 - d. Set a unique join number for the URL.
 - e. Ensure that all other values are set to the default.

- Using Crestron Studio or SIMPL Windows, do the following:
 - ⇒ Ensure that the <Session_Initiation> parameter of the DMCO Type 7 card is set to **0 (By Receiver)**, which is the default setting and specifies a unicast RTSP stream. The DMCO Type 7 card waits for a connection from a touch screen (receiving device).
 - ⇒ Configure the streaming settings according to the following recommendations for touch screens:
 - Wire the serial join <Client_URL_Fb> directly to the <URL_Serial_Join> for the embedded video object defined in VT Pro-e.
 - Set <Stream_Format> to **1 (720p30)**.
 - Set <Stream_Bitrate> to **1000** kbps.

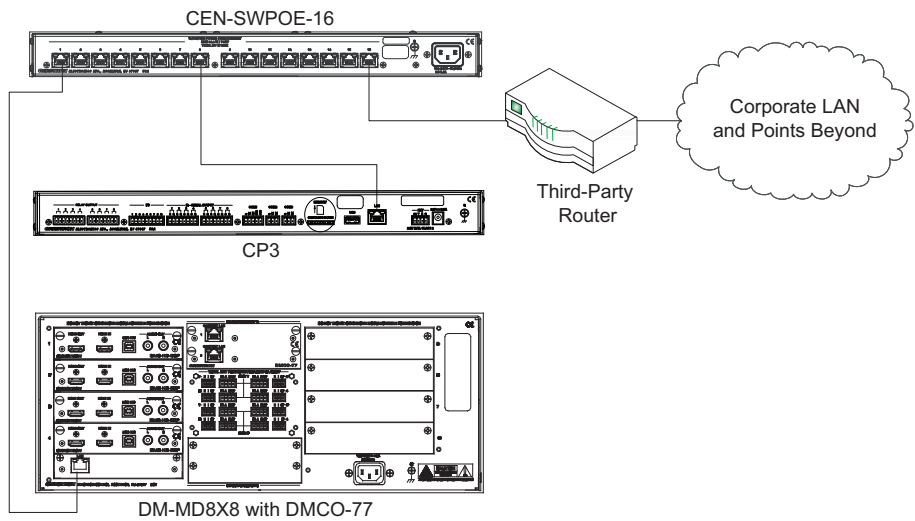
NOTE: The DMCO Type 7 card can generate up to 25 streams at 1000 kbps totaling 25,000 kbps; therefore, the maximum number of touch screens that can be connected is 25.

- Set <Stream_Profile> to **2 (Baseline)**.

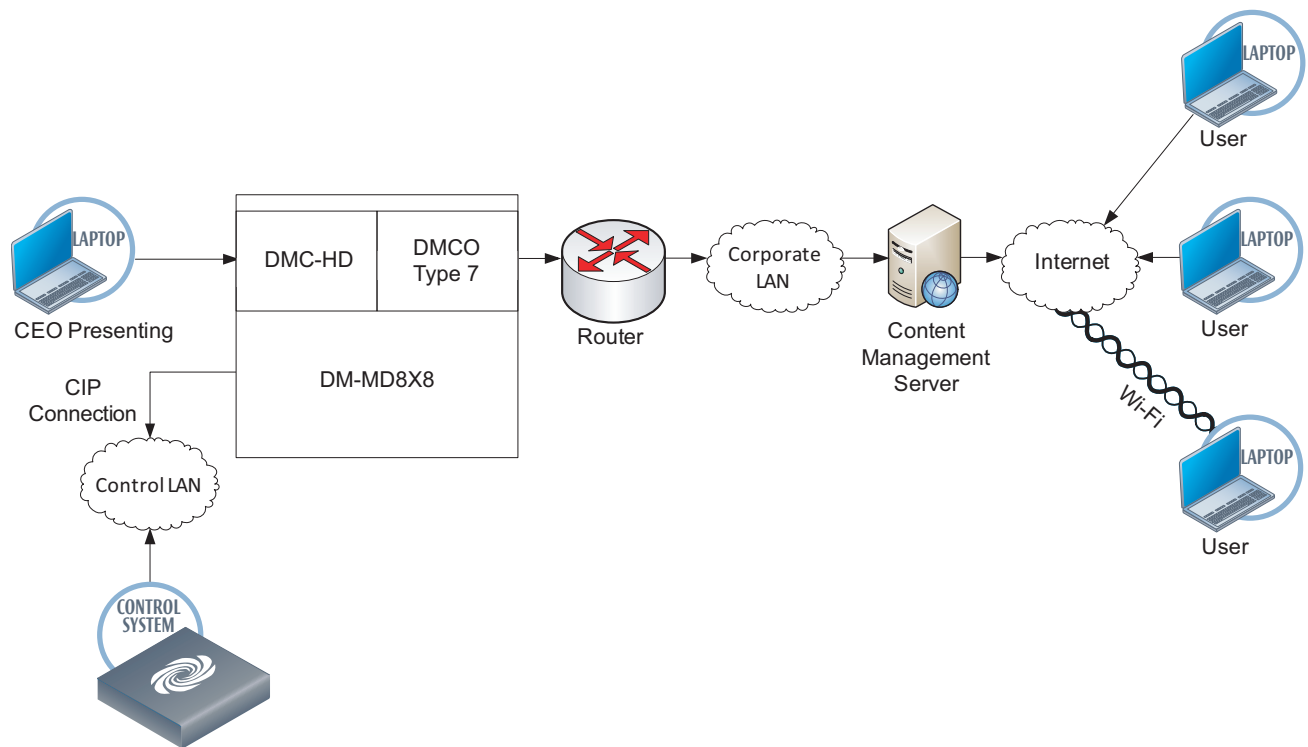
Streaming to a Content Management Server (Unicast)

The following illustrations demonstrate physical and logical connections for a sample application in which a DMCO Type 7 card streams to a content management server using a unicast connection. The streaming output card is configured to connect to an IP address and can therefore traverse firewalls.

Physical Connections—Streaming to Content Management Server via Unicast



Logical Connections—Streaming to Content Management Server via Unicast



In the sample application, the CEO is presenting in a lecture hall and the executive conference center. The feed is sent to the DM-MD8X8 switcher. The DMCO Type 7 card is configured to connect to a content management server located at headquarters, which is at a remote location. Only one connection is required between the DMCO Type 7 card and the content management server.

The content management server connects to the Internet. Users wishing to view the presentation connect their devices to the content management server.

The DM-MD8X8 switcher connects to the control LAN, and the **CONTENT LAN** port of the DMCO Type 7 card connects to the corporate LAN. The control LAN is isolated from the corporate LAN.

Configuration Guidelines: To configure the DMCO Type 7 card to stream to a content management server, refer to the following guidelines:

- Using Crestron Studio or SIMPL Windows, do the following:
 - ⇒ Set the <Session_Initiation> parameter of the DMCO Type 7 card to **1 (By Transmitter)**. In this scenario, the DMCO Type 7 card transmits a stream to a content management server from behind a firewall. Since the DMCO Type 7 card initiates the connection, it can traverse network boundaries and firewalls.

NOTE: When <Session_Initiation> is set to **1 (By Transmitter)**, port 2048 is used to transmit.

- ⇒ Specify the <Target_URL>, which sets the string value of the video stream URL of the content management server.
- ⇒ Assert the <Enable_Stream_as_TS> join.

NOTE: Transport Stream (TS) encapsulation is recommended.

- Configure the content management server to properly receive the stream. To do so, consult the content management server documentation.

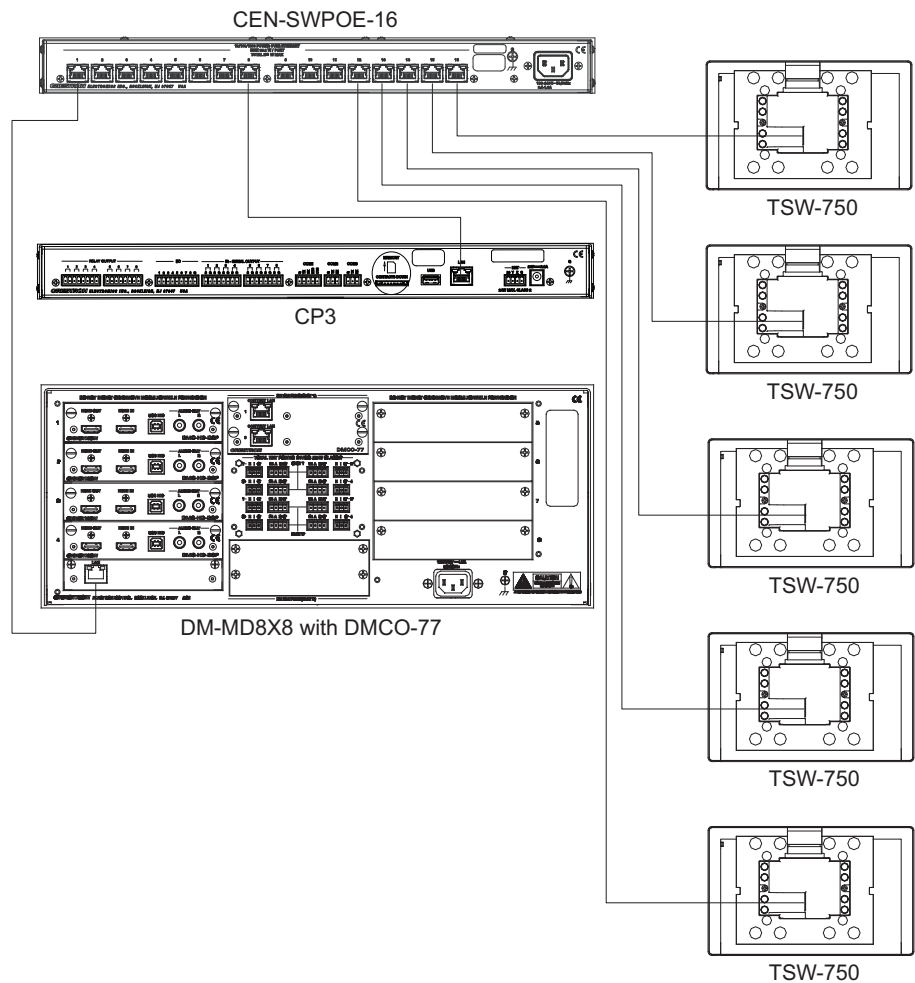
Streaming to Touch Screens (Multicast and RTSP)

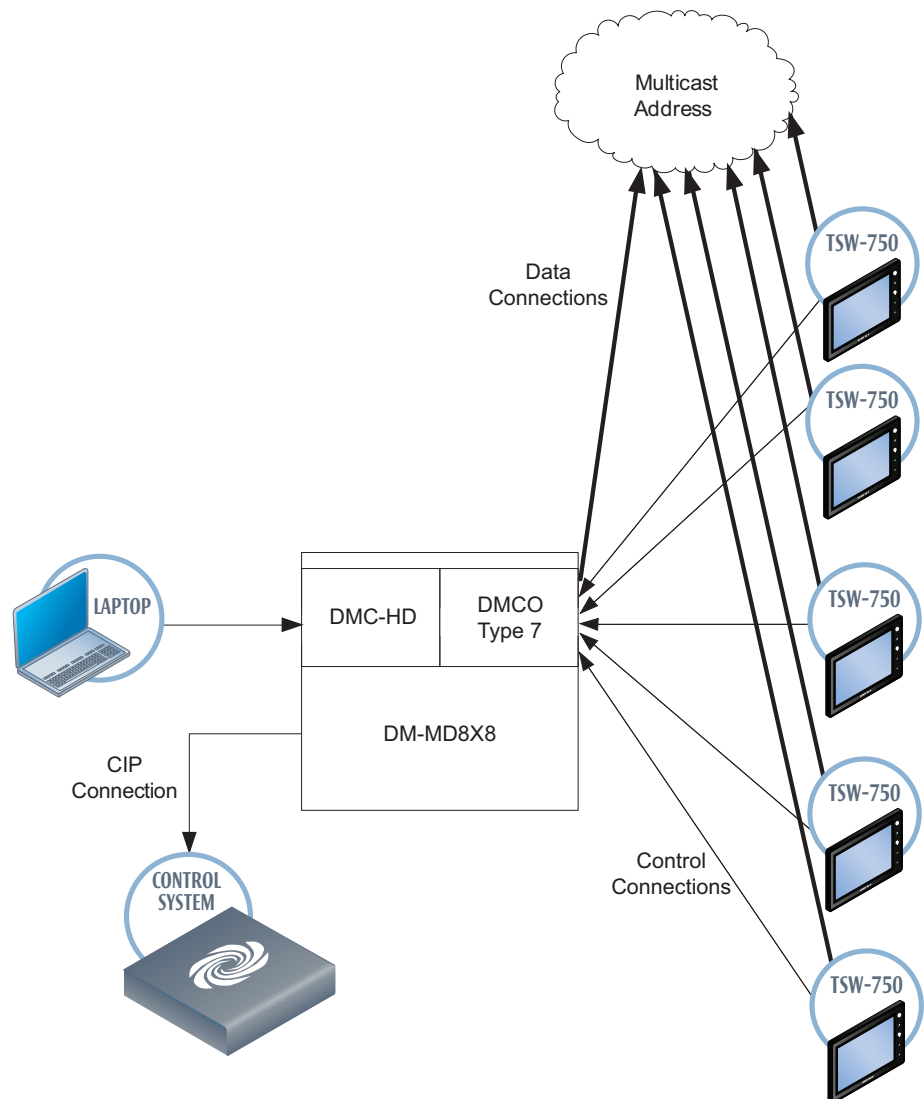
NOTE: TSW series firmware versions 1.008 and earlier do not support multicast streaming from DMCO Type 7 cards. Support will be added in later versions of the TSW firmware.

NOTE: In a multicast and RTSP application, network hardware and configuration must support multicasting.

The following illustrations demonstrate physical and logical connections for a sample application in which a DMCO Type 7 card streams to touch screens using multicast and RTSP connections.

Physical Connections—Streaming to Touch Screens via Multicast and RTSP



Logical Connections—Streaming to Touch Screens via Multicast and RTSP Connections

In the sample application, TSW-750 touch screens are configured to connect directly to a DMCO Type 7 card. The DMCO Type 7 card sends the stream parameters to the touch screens and the multicast address to which the touch screens are to connect. The actual data for the stream comes from the multicast address. The DMCO Type 7 card sends a single stream to the address and the network hardware replicates the address for the devices that are subscribed. The DMCO Type 7 card begins transmitting only after the first device connects.

Since the touch screens are on the same network, the **CONTENT LAN** port of the DMCO Type 7 card is disabled. As a result, the DMCO Type 7 card streams via the internal DigitalMedia network.

Multicast is useful for distributing high bandwidth streams to a number of dedicated decoders. Since RTSP is used, the configuration is passed to the decoder which then requires minimal configuration.

Configuration Guidelines: To configure the DMCO Type 7 card to stream to touch screens via multicast RTSP connections, refer to the following guidelines. Using Crestron Studio or SIMPL Windows, do the following:

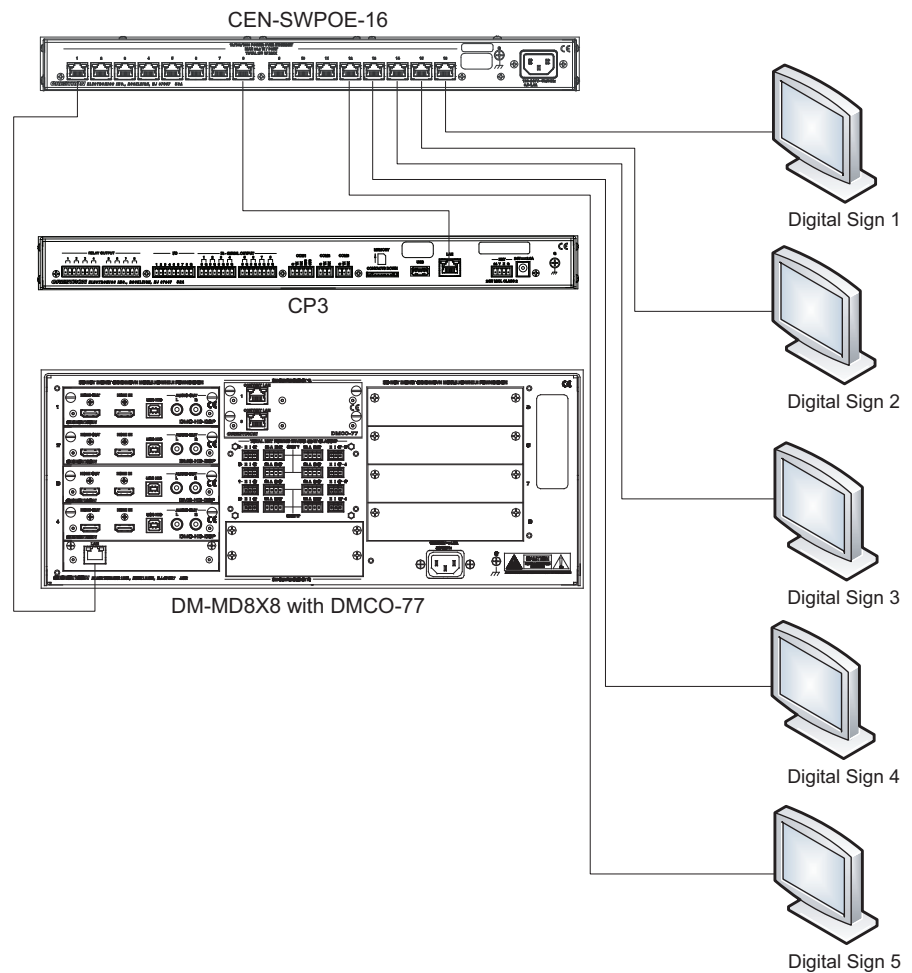
- Set the <Session_Initiation> parameter of the DMCO Type 7 card to **2 (Multicast via RTSP)**. This setting is similar to setting **0 (By Receiver)** except that the packets are sent via multicast. Packet replication is done by the network hardware rather than by the DMCO Type 7 card. As a result, there is no limit to the number of touch screens supported.
- Specify the <Multicast Address> to which the DMCO Type 7 card is to stream.

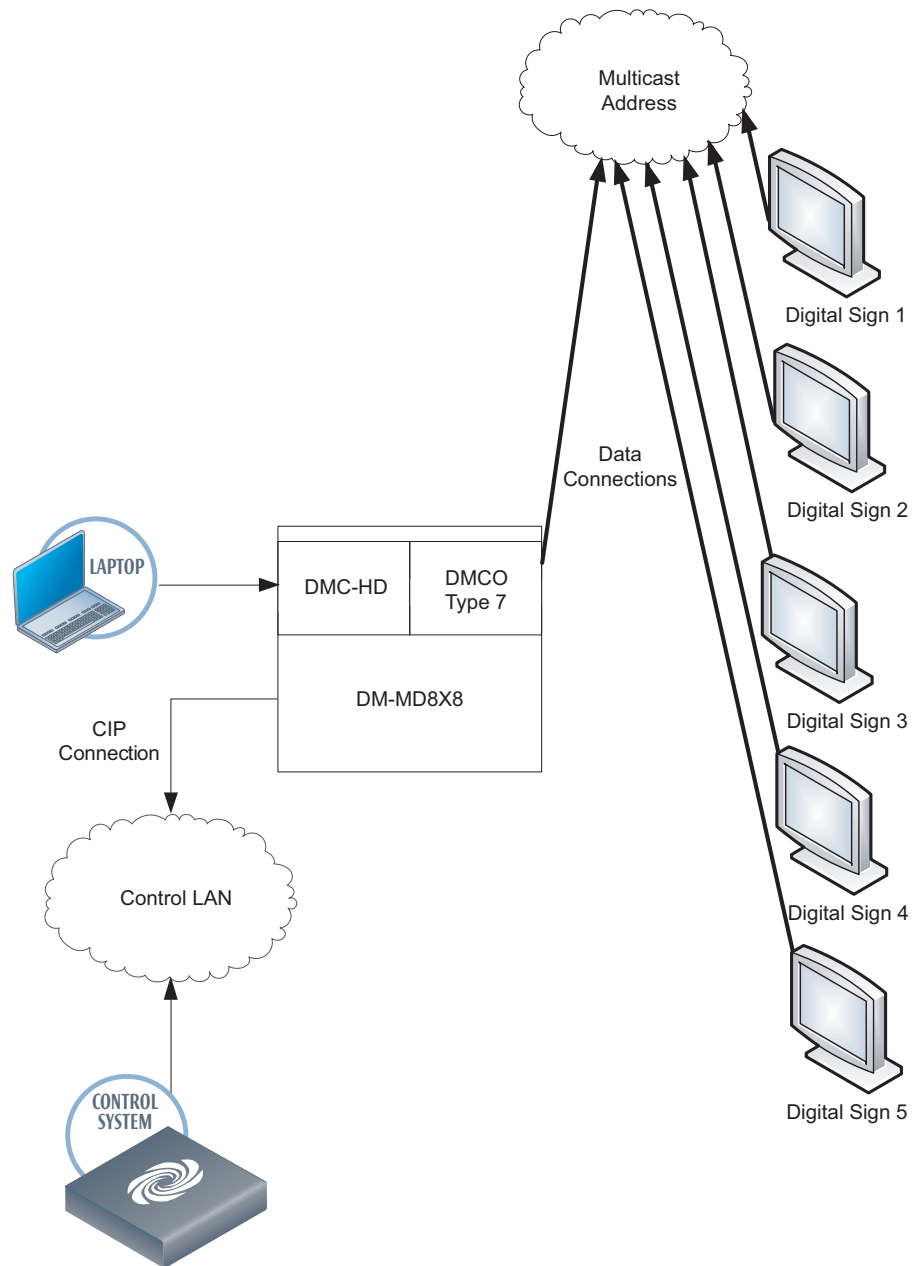
Streaming to Digital Signage Displays (Multicast and UDP)

The following illustrations demonstrate physical and logical connections for a sample application in which a DMCO Type 7 card streams using multicast and UDP.

NOTE: In this application, network hardware and configuration must support multicasting.

Physical Connections—Streaming to Touch Screens Using Multicast and UDP Connections



Logical Connections—Streaming to Touch Screens Using Multicast and UDP Connections

In the sample application, all digital signs are configured to connect to a multicast address. RTSP is not used and no configuration parameters are exchanged. The DMCO Type 7 card always transmits the stream regardless of whether there are listeners. As a result, devices do not need to negotiate with the DMCO Type 7 card—the devices can simply reconnect to the stream. In addition, if the connection between the DMCO Type 7 card and the multicast address is interrupted, the stream can resume without intervention when the connection is restored.

Configuration Guidelines: To configure the DMCO Type 7 card to stream using multicast and UDP connections, refer to the following guidelines. Using Crestron Studio or SIMPL Windows, do the following:

- Set the <Session_Initiation> of the DMCO Type 7 card to **3 (Multicast via UDP)**.

NOTE: When <Session_Initiation> is set to **3 (Multicast via UDP)**, port 9700 is used to transmit.

- Assert the <Enable_Stream_as_TS> join.

NOTE: Transport Stream (TS) encapsulation is recommended.

Further Inquiries

To locate specific information or resolve questions after reviewing this guide, contact Crestron's True Blue Support at 1-888-CRESTRON [1-888-273-7876] or, for assistance within a particular geographic region, refer to the listing of Crestron worldwide offices at www.crestron.com/offices.

To post a question about Crestron products, log onto Crestron's Online Help at www.crestron.com/onlinehelp. First-time users must establish a user account to fully benefit from all available features.

Return and Warranty Policies

Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange or service without prior authorization from Crestron. To obtain warranty service for Crestron products, contact an authorized Crestron dealer. Only authorized Crestron dealers may contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number and return address.
2. Products may be returned for credit, exchange or service with a Crestron Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to Crestron, 6 Volvo Drive, Rockleigh, N.J. or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. Crestron reserves the right in its sole and absolute discretion to charge a 15% restocking fee plus shipping costs on any products returned with an RMA.
3. Return freight charges following repair of items under warranty shall be paid by Crestron, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

CRESTRON Limited Warranty

Crestron Electronics, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of three (3) years from the date of purchase from Crestron, with the following exceptions: disk drives and any other moving or rotating mechanical parts, pan/tilt heads and power supplies are covered for a period of one (1) year; touch screen display and overlay components are covered for 90 days; batteries and incandescent lamps are not covered.

This warranty extends to products purchased directly from Crestron or an authorized Crestron dealer. Purchasers should inquire of the dealer regarding the nature and extent of the dealer's warranty, if any.

Crestron shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended or if it has been subjected to misuse, accidental damage, modification or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced or removed.

This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall Crestron be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. Crestron is not liable for any claim made by a third party or made by the purchaser for a third party.

Crestron shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty.

Except as expressly set forth in this warranty, Crestron makes no other warranties, expressed or implied, nor authorizes any other party to offer any warranty, including any implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supersedes all previous warranties.

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