SME 100

H.264 STREAMING MEDIA ENCODER

Advanced Video Processing for High Performance AV Streaming

- Streams DVI, RGB, HDTV, and video signals with audio over IP networks
- Use with the SMD 101 H.264 decoder to provide complete end-to-end streaming systems
- Compatible with many third-party H.264 devices including set-top box decoders
- Supports input signal resolutions up to 1920x1200, including HDTV 1080p/60
- DVI, RGB, HDTV, and standard definition video upscaling and downscaling
- Integrated three-input AV switcher

Extron Electronics
INTERFACING, SWITCHING AND CONTROL

Introduction

The Extron **SME 100** is designed specifically for pro AV applications and features an integrated three-input switcher with audio, plus buffered loop-throughs for simplified integration into AV systems. It is a live streaming media encoder that accepts DVI, RGB, HDTV, and standard definition signals for delivering media over an IP network. The SME 100 employs standards-based H.264 / MPEG-4 AVC compression, making it highly compatible with hardware decoders such as the Extron SMD 101, set-top box decoders, or software players operating from PCs. High performance Extron signal processing scales and optimizes video input signals for the intended viewing application. Encoding controls also provide adjustments for bit rate and quality. The SME 100 significantly expands AV system capabilities by extending AV signals over networks.

Enhance AV Capabilities With Streaming

Use of standards based compression creates an open technology environment providing a high degree of compatibility streaming into platforms that support the H.264 / MPEG-4 AV standard. Live H.264 media streaming can enhance AV system functionality in many ways. Helpdesk staff can view live content at their PCs and actively monitor AV systems. Presentation overflow rooms can easily be added by streaming to a PC connected to a projector or flat-panel display. Corporate and educational facilities can simplify their AV system designs by installing DVD players, satellite receivers, and other sources in a central location, streaming to individual rooms as needed. The SME 100 can also be used for broad media delivery across the Internet when used with a media server and Content Delivery Network - CDN.

H.264 / MPEG-4 AVC Encoding

The SME 100 employs the H.264 / MPEG-4 AVC compression standard. The H.264 Baseline, Main, or High profiles may be applied at Levels 5, 4.x, or 3.x, providing the ability to optimize the video bit rate and coding complexity for streaming to third party decoding devices or PCs using software media players such as VLC® or Quicktime®. The SME 100 will automatically deliver a software media plugin to a newly connected PC, enabling quick presentation of streamed AV content. The SME 100 also offers a variety of streaming transport protocols and push or pull streaming management can be used, providing the flexibility to apply it with third party decoding devices and different network system configurations.

Designed for Pro AV Integration

A host of familiar, integrator-friendly features make the SME 100 ideal for professional AV applications. The integrated three-input switcher accepts common video signal formats together with stereo audio, from DVI to analog RGB and composite video. The universal video input can accept multiple analog formats and automatically detect between them. Each input has a buffered loop-through, allowing the SME 100 to be easily integrated into a new or legacy system without the need for additional AV equipment such as distribution amplifiers. The SME 100 also includes audio breakaway so that any connected audio source can be assigned to the streamed output.

Overview

Multiple Control Features

The SME 100 can be quickly configured from the front panel or through the USB port. It can also be controlled using a Web browser to access embedded HTML pages, or through Ethernet or serial RS-232 ports. Video streams can be viewed live from the Extron embedded HTML interface while making encoder adjustments. Encoding and streaming configurations can be saved into unique presets so the user can quickly switch between different streaming applications. The SME 100 also includes several predefined presets for common streaming applications.

Image Quality

The SME 100 accepts standard definition and high resolution video signals up to WUXGA 1920x1200 and HDTV 1080p/60. The same high performance video processing in Extron's flagship scalers and signal processors is used in the SME 100 to optimize video and computer graphic input signals, with high quality upscaling and downscaling to deliver the best possible image presentation for various AV streaming requirements.

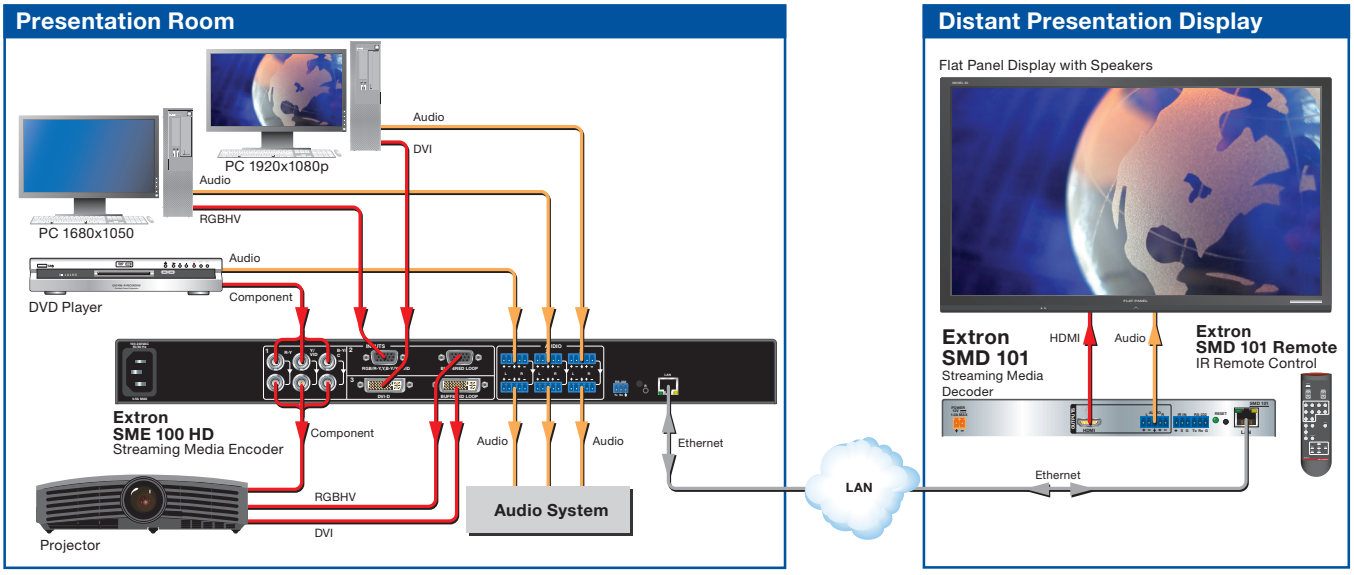
Compression and Encoding Control

Encoding controls are available to optimize quality and data coding for use with specific decoding devices. These include the H.264 profile and level, video resolution, frame rate, and audio and video bit rate management. The Group of Pictures - GOP length can also be adjusted, allowing the user to specify use of fewer or more frames in the compression process. The bit rate can be set as variable or constant, from rates well below 1 Mbps up to 10 Mbps, to meet network bandwidth or image quality requirements.

Extron SMD 101 H.264 Decoder

The SMD 101 is a compact, high performance H.264 decoder used with Extron SME 100 encoders to provide complete end-to-end AV streaming systems. It is used in H.264 enterprise streaming applications to decode live streams from SME 100 encoders or play back network-accessible AV media files available from network shares. The SMD 101 is compatible with streaming resolutions and refresh rates up to 1080p/60 and features an integrated scaler, offering selectable output resolutions from 640x480 to 1920x1200.

The SMD 101 offers integration-friendly control options including a handheld IR remote control, wired IR, RS-232, or Ethernet and an easy-to-navigate Web interface providing simple, flexible control and management. SMD 101 playlists and channel lists make selection of live streaming and media file playback from an AV control system or the SMD 101 remote simple. This compact, energy-efficient decoder is an ideal counterpart to the SME 100 encoder in overflow, monitoring, multi-channel streaming systems, high resolution signage, and messaging applications.



Line Streaming of a presentation from the SME 100 to the SMD 101 Decoder

Input Features

Supports input signal resolutions up to 1920x1200, including HDTV 1080p/60

The SME 100 supports a wide range of input resolutions, from standard definition up to the high resolutions commonly used for computer-video and HDTV.

Auto Input Format Detection

For the universal video input, the SME 100 can detect the incoming signal format, automatically reconfiguring itself to provide the appropriate decoding and signal processing. This feature can reduce the number of required outputs for a matrix switcher, lowering system cost while improving manageability.

Auto-Image™ setup

When activated, the unit automatically analyzes the incoming video signal and then automatically adjusts sizing, centering, and filtering to optimize image quality. This can save time and effort in fine tuning displayed images.

Auto Input Memory

When activated, the SME 100 automatically stores size, position, and picture settings based on the incoming signal. When the same signal is detected again, these image settings are automatically recalled from memory.

EDID Minder®

Automatically manages EDID - Extended Display Identification Data communication with connected DVI and VGA input sources. EDID Minder® ensures that all sources power up correctly and reliably output content, whether or not they are actively connected to the display device through the input loop-throughs.

Picture controls

Multiple image adjustments are available including brightness, contrast, color, tint, and detail, as well as horizontal and vertical positioning, sizing, and zoom. A total of 16 user memory presets are available for each input to store all image settings.

Advanced deinterlacing

The SME 100 provides optimized image quality through advanced motion adaptive deinterlacing for 1080i and standard definition signals from sources including cable or satellite set-top boxes.

Quad standard video decoding

The SME 100 uses a digital, five-line adaptive comb filter to decode NTSC 3.58, NTSC 4.43, PAL, and SECAM for integration into systems worldwide.

Integrated three-input AV switcher

The SME 100 accepts commonly used video signal formats together with stereo audio, from DVI to analog RGB and composite video. The universal video input can accept a variety of analog formats and automatically detect between them.

Buffered input loop-throughs for video and audio

Each input has a buffered loop-through, so that the SME 100 can be integrated into a new or legacy system without the need for additional AV equipment such as distribution amplifiers.

Audio switching

The SME 100 features audio switching for three stereo balanced or unbalanced input sources with buffered loop-throughs.

Audio breakaway

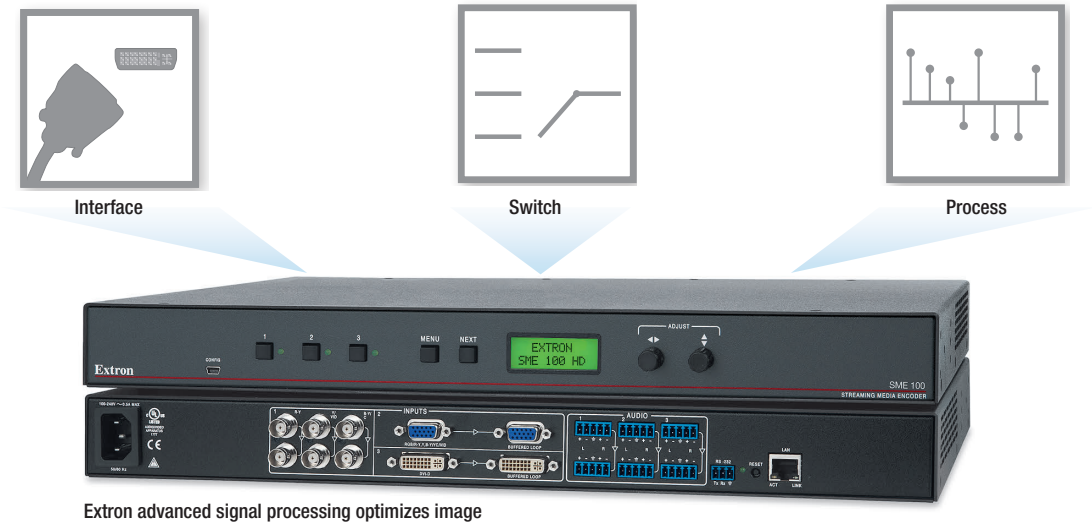
The SME 100 can break an audio signal away from its corresponding video signal, allowing it to be encoded for streaming with a different video input.

Audio input gain and attenuation

Gain or attenuation can be adjusted for each input to eliminate noticeable differences when switching between sources, or adjusting audio levels for the output stream.

Standards-based H.264 / MPEG-4 AVC encoding

SME 100 uses the H.264 standard and offers selection of the Baseline, Main, or High profiles at Levels 5, 4x, or 3x, making it highly compatible with PCs and 3rd party decoding devices.



Extron advanced signal processing optimizes image quality for a wide variety of AV input signals.

Output Features

DVI, RGB, HDTV, and standard definition video upscaling and downscaling

DVI, RGB computer-video, high definition video, and standard definition video sources can all be scaled to a range of defined streaming resolutions. The SME 100 features an advanced scaling engine that preserves image quality when upscaling or downscaling an input signal.

Flexible Streaming Transport and Session Management Protocols

The SME 100 offers use of RTP/RTSP, RTSP interleaved, and HTTP tunneling transport protocols for pull streaming applications. Native RTP and MPEG-2 Transport Streams - TS are available for unicast and multicast push streaming applications. Session Announcement Protocol - SAP and Session Description Protocol - SDP can be used for push streaming session management.
This variety of transport and session management protocols makes the SME 100 compatible with a variety of H.264 devices and system configurations.

Aspect ratio control

The aspect ratio of the streamed output can be controlled by selecting a FILL mode, which provides a full screen output, or a FOLLOW mode, which preserves the original aspect ratio of the input signal.

Encoding quality controls

Several encoding controls are available to optimize quality and data coding for use with specific decoding devices, including the H.264 profile and level, video resolution, frame rate, and audio and video bit rates.

Encoding and streaming presets

Up to 16 presets can be established for both encoding and streaming configurations, making control and management of different streaming applications easy.

Glitch-free switching

Switching is glitch-free with a cut transition. Presentations are enhanced by eliminating distracting visual jumps, glitches, and distortion commonly experienced when switching between computer and video sources.

Internal test patterns for calibration and setup

The SME 100 offers 15 test patterns as well as on-screen display - OSD data overlay including Time Stamp, average bit rate, frame rate, time and date, and system information to aid in calibration and setup of the encoder.

AAC audio encoding

Variable audio compression is available to support different streaming bit rates.

User-adjustable audio delay

Audio delay can be adjusted to adapt the streamed output to different network conditions.

Ethernet monitoring and control

The SME 100 is controllable over the Ethernet connection supporting configuration and real-time management from Extron or third party control systems.

Embedded preview window

The SME 100 provides an intuitive Web interface with an embedded video window to view the live stream as well as source input and encoding adjustments.

Embedded Web page HTML

The SME 100 Web interface includes basic HTML code that can be copied and pasted to quickly create Web pages for viewing SME 100 AV streams on networked PCs.

RS-232 control port

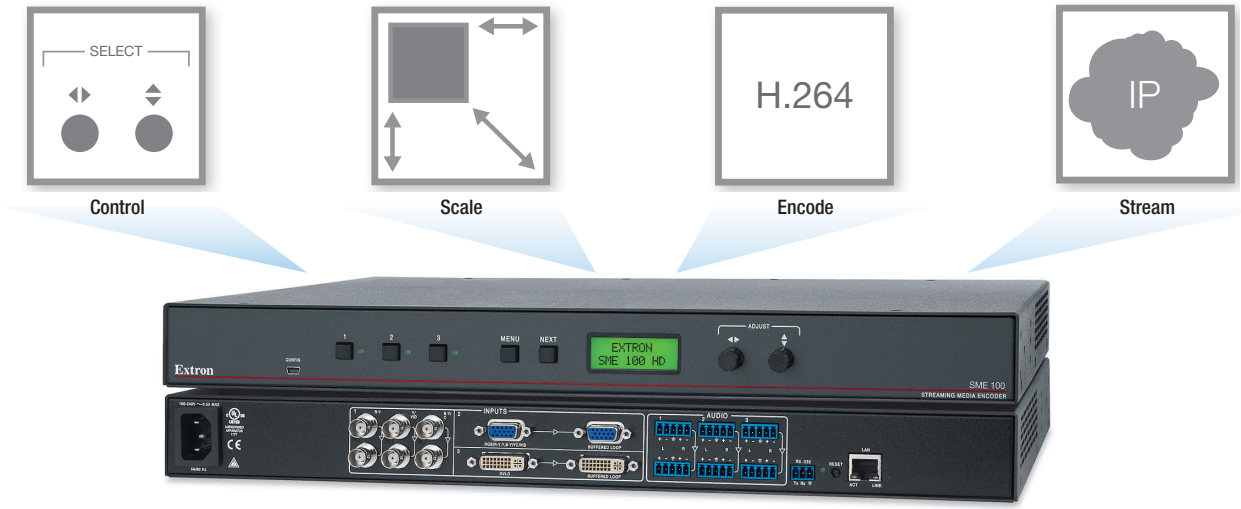
Using serial commands, the SME 100 can be controlled and configured via the Extron Windows®-based control program, or integrated into a control system. Extron products use the SIS™ - Simple Instruction Set command protocol, a set of basic ASCII code commands that allow for quick and easy programming.

Power Save Mode

The SME 100 can be set to automatically mute video and sync output to the display device when no active input signal is detected. This allows a display, connected to the input loop-throughs, to automatically enter into standby mode to save energy and enhance lamp or panel life.

Low Power Mode

The SME 100 can be configured to operate in a low power mode when an active signal input is not present.



The SME 100 offers flexible control, scaling, and encoding capability to support a wide range of streaming devices and destinations.

Overview

Integrated three-input AV switcher
The SME 100 accepts common video signal formats from DVI to analog RGB and composite video, together with stereo audio.

Auto-Image™ setup
Quickly set up new sources such as presentation laptops.

Standards-based H.264 / MPEG-4 AVC encoding
Use of the H.264 standard, including optional selection of the Baseline, Main, or High profiles at Levels 5, 4x, or 3x, makes SME 100 highly compatible with PCs and third party decoding devices.

User-friendly interface
An intuitive LCD interface, direct access buttons, and precise rotary controls simplify system setup and operation.

SME 100 front panel

High performance video processing
Optimizes low and high resolution input signals to deliver the best possible image quality for AV streaming, from resolutions as low as 166x120 to HDTV 1080p.

Picture controls
Brightness, contrast, color, tint, detail, position, size, and zoom can be adjusted to enhance picture quality and improve coding efficiency.

Test patterns
Video and audio test patterns, including on-screen data overlay, can be used to test, monitor, and troubleshoot network streaming.

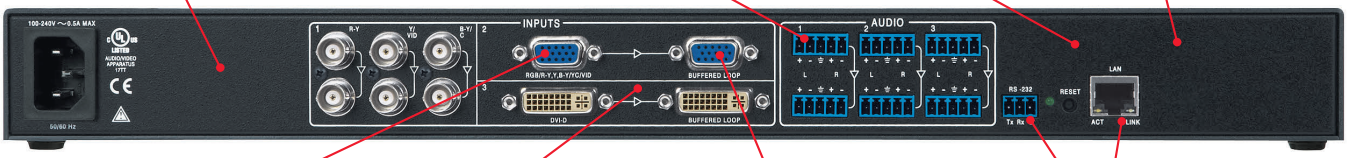
Encoding and streaming presets
Up to 16 presets can be established for both encoding and streaming configurations, providing easy control and management in different streaming applications.

High quality scaling
DVI, RGB, and video input signals can be upscaled or downscaled to match the optimum resolution for a variety of displays at selectable resolutions from 166x120 up to 720p and 1080p.

Audio breakaway
Provides the capability to assign any audio input to the AV encoder.

Encoding quality controls
Several user controls are available to adjust the encoded AV output, such as the H.264 profile and level, video resolution, bit rate, and frame rate.

Embedded HTML Web interface
The embedded HTML interface provides intuitive system configuration and user adjustment of encoder settings.



SME 100 rear panel

Universal analog video input
Accepts and automatically detects a variety of video signal types, simplifying integration with a matrix switcher.

EDID Minder®
Automatically manages EDID communication with connected DVI and VGA inputs, ensuring continuous, reliable output as sources are switched.

Buffered input loop-throughs
Allow for easy integration into AV systems without the need for additional equipment.

Ethernet and RS-232 control
Remote control and monitoring plus real-time adjustment of AV encoding.

Control Software

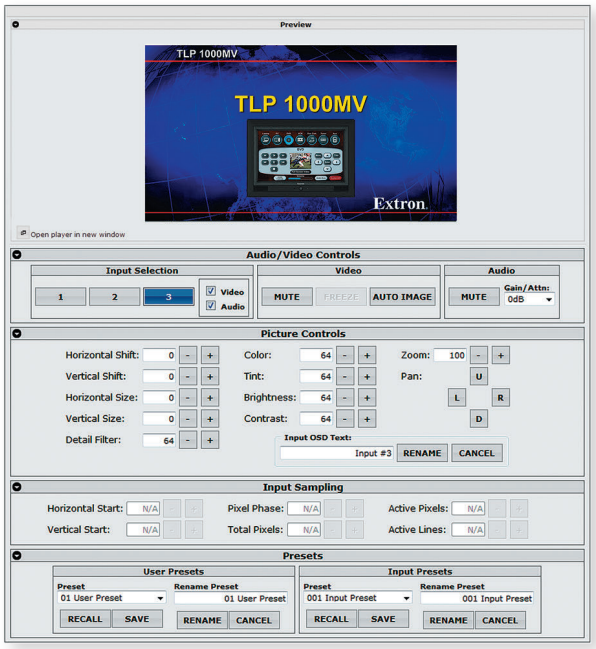
SME 100 Control Software

Embedded Control Software

The SME 100 can be fully configured and controlled using the embedded control software, which can be accessed using a Web browser on a PC over a network. The software allows for system setup and configuration, as well as management and adjustment of AV streaming. With a live video preview window available within the embedded software, AV or IT staff can remotely monitor and make adjustments to media streams in real-time.

AV Integration Controls At-a-Glance

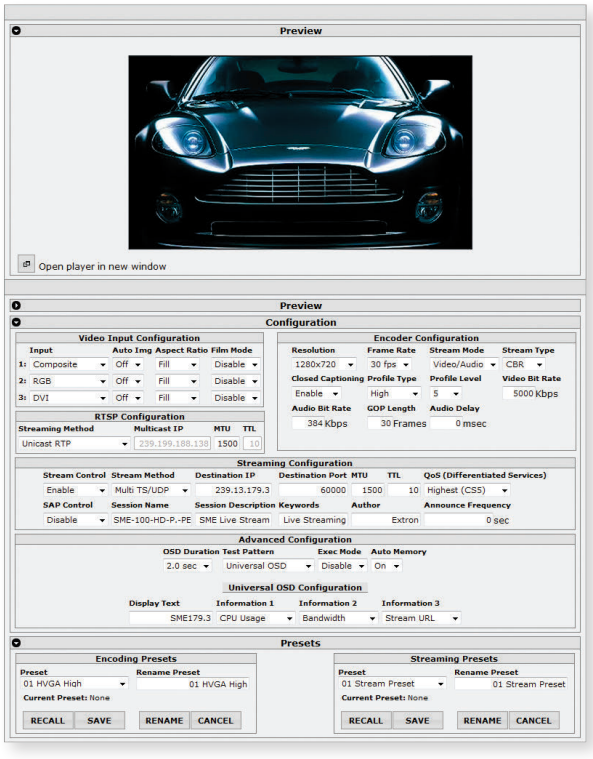
The SME 100 embedded HTML interface includes a Web page that provides all the essential control and configuration options for optimizing the AV input signals, including source switching, audio and video muting, audio breakaway switching, and picture controls. Clicking the Auto-Image button quickly sets up a newly connected laptop or other VGA source. For precise calibration of analog RGB sources, pixel controls are also available. Picture control and pixel adjustments can be saved into 16 available user presets with customizable names. The SME 100 also automatically stores and recalls settings based on the incoming signal frequency. Additional input presets are available for setting up the universal analog video input to receive various signals from a switcher or matrix switcher.



SME 100 signal input controls

Quick Access and Control Over Streaming Configurations

Another Web page provides control over all the encoding and streaming settings for the AV output. Up to 16 encoding presets can be created that define specific configurations for the streaming resolution, frame rate, H.264 profile and level, video bit rate, GOP length, closed captioning, audio bit rate, and audio delay. Up to 16 presets can also be established to define specific network and streaming settings, including the streaming transport protocol, destination address and port, streaming session management, and more. The ability to create various encoding and streaming presets makes programming and control of SME 100 easy, while maintaining the flexibility to adapt to different application requirements.

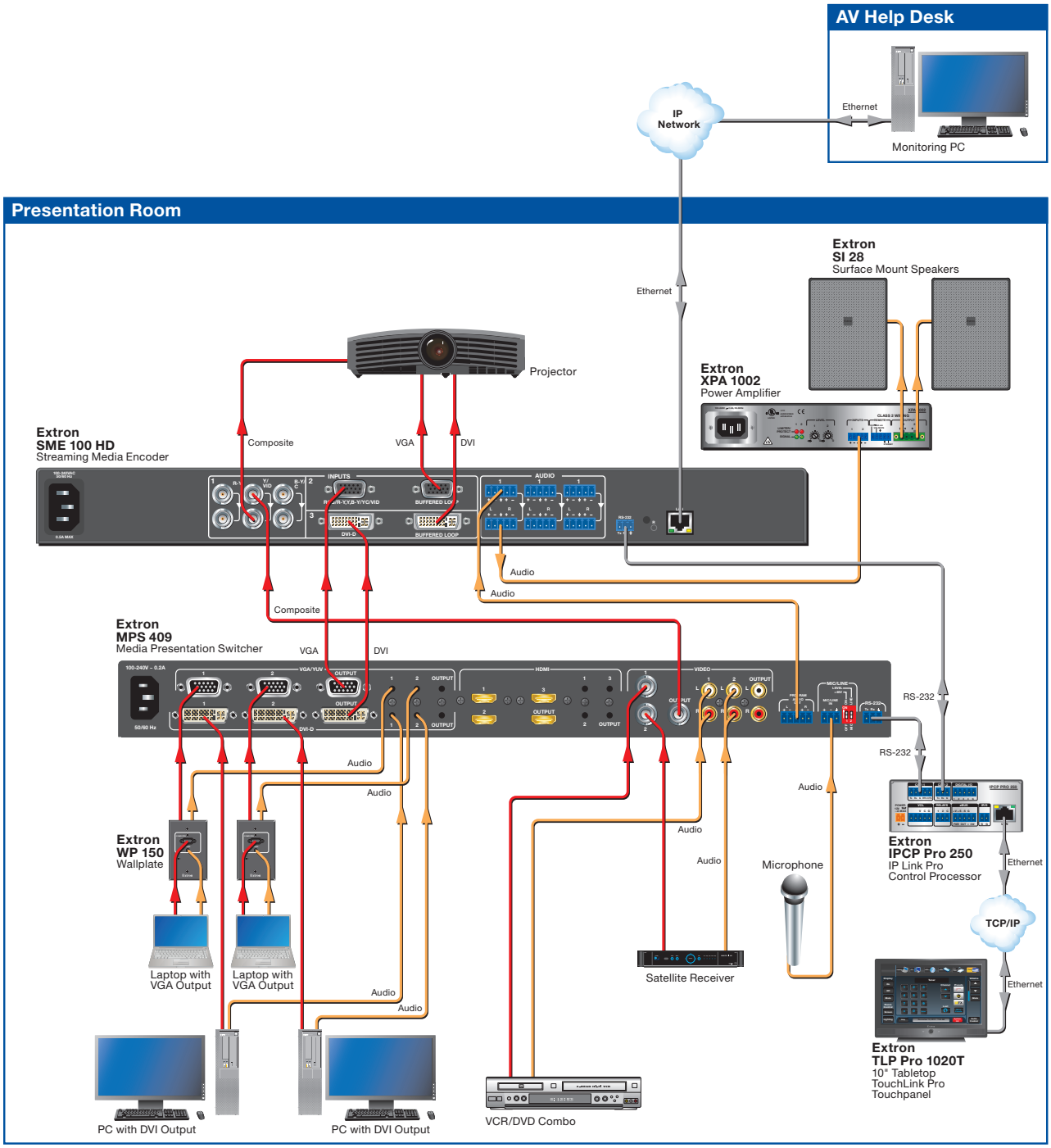


SME 100 encoding configuration

Applications

AV Presentation and Remote Room Monitoring

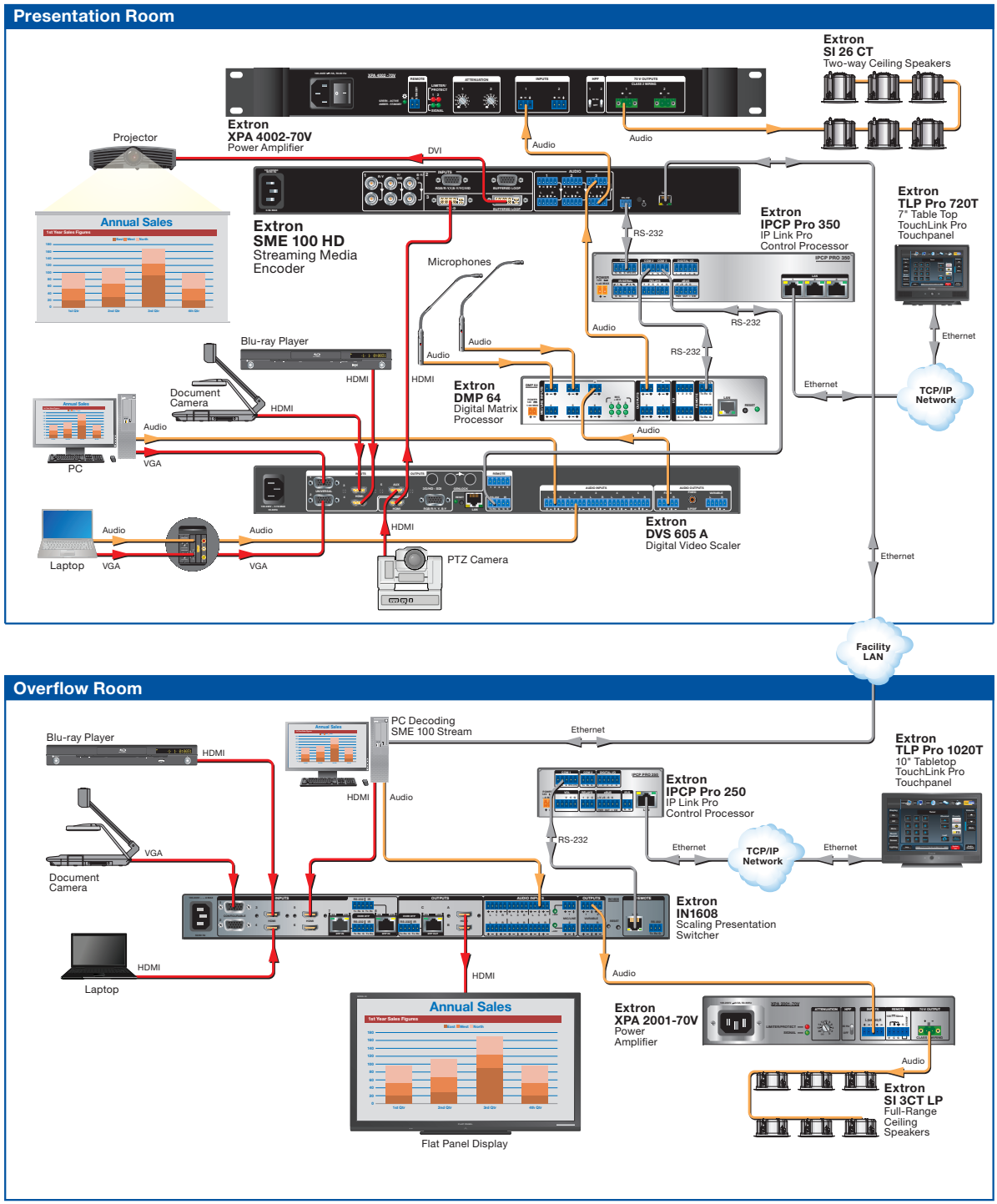
Many organizations with presentation environments want the ability to monitor and support live presentation sessions from a remote location, such as a help desk. Adding video streaming capability to presentation systems allows AV staff to view the same live content from their PCs. This can be accomplished by adding an SME 100 HD to an existing AV presentation system between a switcher, such as the Extron MPS 409, the projector, and audio system. The input loop-throughs of the SME 100 HD allow it to be installed without affecting AV system functions. An integrated three-input switcher on the SME 100 HD enables selection of the DVI, VGA, or standard definition output from the MPS 409 presentation switcher to be streamed to the help desk PC, which initiates streaming by accessing the SME 100 HD embedded Web page. A streaming decoder plugin is delivered to the PC if one is not detected.



Applications

Presentation or Videoconference Overflow

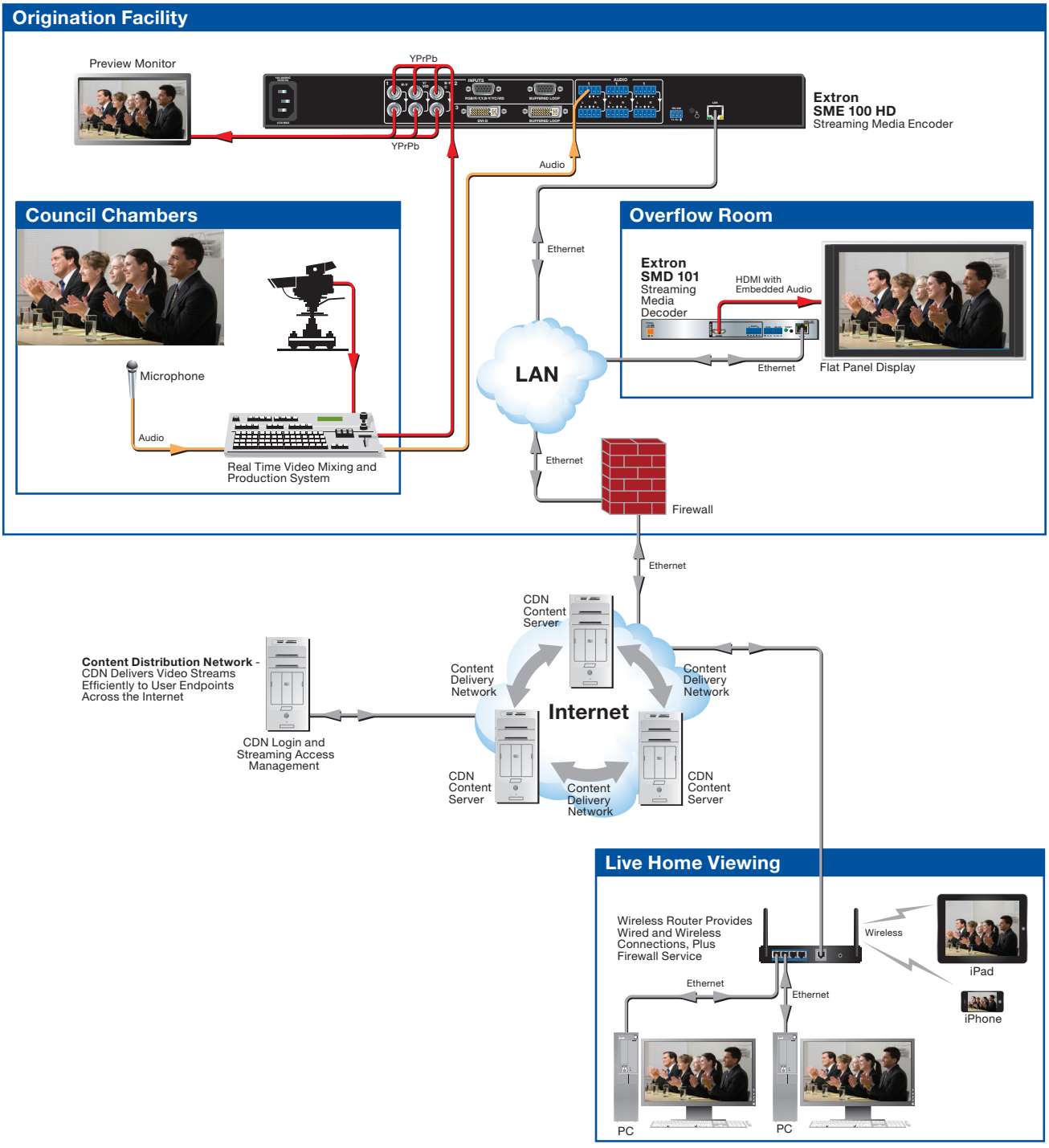
Corporate organizations periodically deliver live announcements to employees such as strategic updates or quarterly business results. Reaching everyone in the company is challenging, due to the fact that most companies will have only a few presentation rooms. The SME 100 HD can be used to quickly extend presentations to overflow rooms. All that is required is to interface the SME 100 HD to the DVI and audio outputs of an AV system, and loop it through to the local display and sound system. The presentation can be easily streamed to an overflow room and decoded from a PC.



Applications

Live Streaming Over the Internet for Local Governments

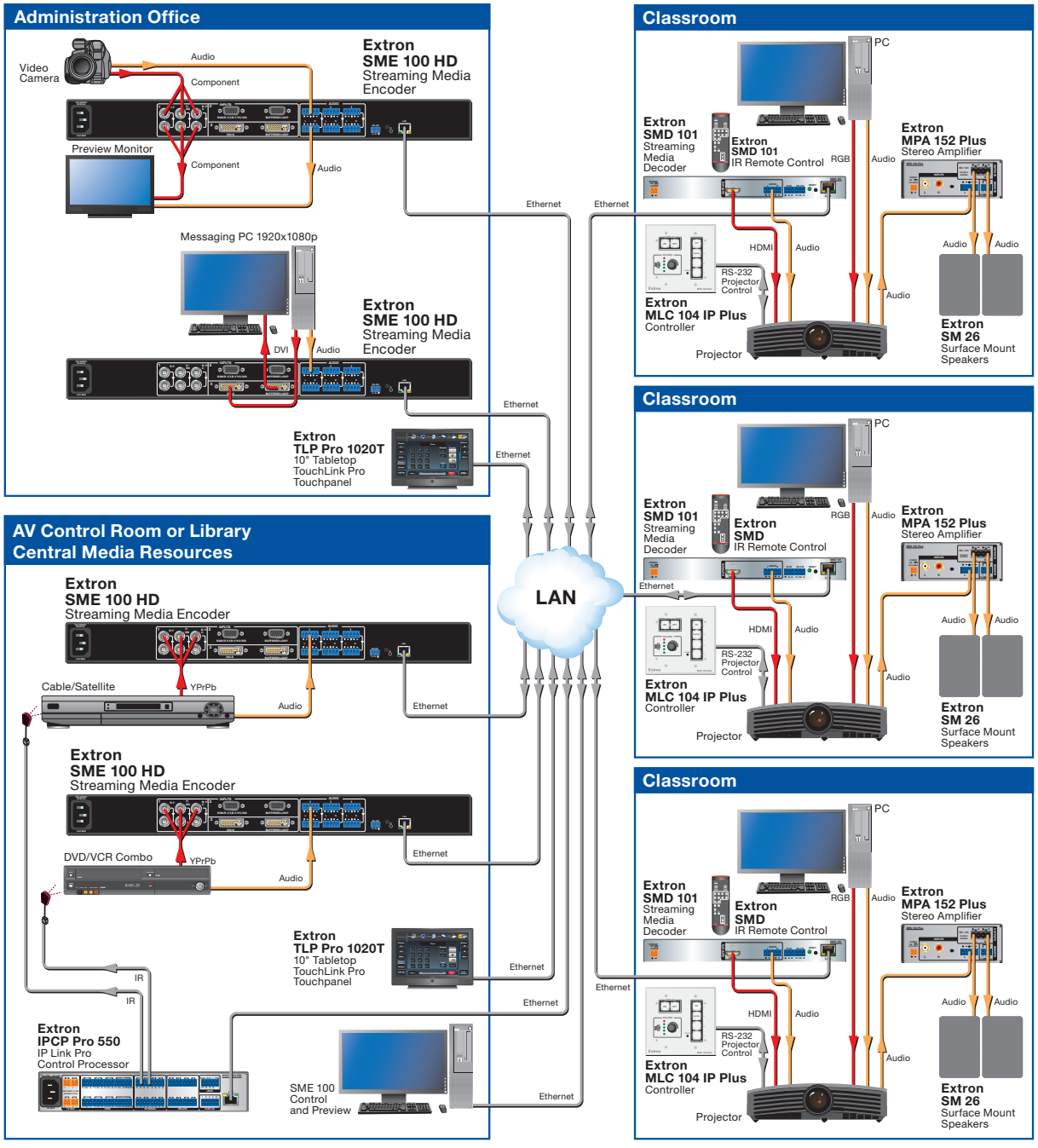
Many local state and city governments would like to make meeting or committee sessions easily accessible to their citizens over the Internet. Live or on-demand streaming of these sessions will make it convenient for them to become more aware and involved with the political process. An SME 100 HD accepts camera video and audio from a real-time mixing and production system and starts a push streaming sesssion delivering 720p video to a Content Delivery Network – CDN located outside the facility. The CDN manages broad delivery of the media to users over the Internet. Internally, an overflow room with an SMD 101 decoder can initiate a pull streaming session from the SME 100 HD allowing a larger internal audience to participate in the event.



Applications

Streaming of Morning Announcements

Many schools broadcast morning announcements to provide students, teachers, and staff with the day's schedule and other important information. Extron SME 100 encoders stream centrally located AV sources across the campus LAN to Extron SMD 101 decoders located in classrooms. They are controlled from an Extron IPCP Pro 550 control processor and Extron TLP Pro 1020T TouchLink touchpanels. The administration office includes two SME 100 HD encoders, one which streams announcements from a camera and microphone, and a second unit that streams campus messages prepared on a PC. In addition, a combination DVD/VCR player and a cable/satellite tuner located in the Central Media Center streams content to one or many classrooms. Instructors in each classroom use the SMD 101 Remote to select the appropriate streaming channel. An Extron MLC 104 IP Plus connected to the projector is used to select between the classroom PC and streaming sources presented by the SMD 101.



Specifications

VIDEO INPUT AND LOOP-THROUGH

Number/signal type	1 RGBHV, RGBS, RGsB, RGBcvS, component video (Y, R-Y, B-Y; interlaced, progressive, HD) S-video, or composite video, with buffered loop-through 1 component video (Y, R-Y, B-Y; interlaced, progressive, HD) S-video, or composite video, with buffered loop-through 1 single link DVI-D with buffered loop-through
Connectors	2 female 15-pin HD: RGB, component video, S-video, composite video input and loop-through 2 x 3 female BNC: component video, S-video, composite video input and loop-through 2 female DVI-I: DVI-D input and loop-through
Horizontal frequency	15 kHz to 100 kHz
Vertical frequency	50 Hz to 120 Hz
Resolution range	640x480 to 1600x1200, 1920x1200 (reduced blanking), 480i, 480p, 576i, 576p, 720p, 1080i, and 1080p, digitized pixel for pixel; higher resolutions are undersampled.

VIDEO PROCESSING

Digital sampling	30 bit, 10 bits per color, 13.5 MHz standard (low resolution video), 165 MHz standard (RGB, YUVp, DVI)
Colors	1 billion, 1024 per color channel
Compression	H.264/AVC (ITU-T H.264, ISO/IEC 14496-10) Encoding profiles: High, Main, Baseline; Encoding Levels: 5, 4.x, 3.x; 4:2:0, 8 bits per color, IP framing, configurable GOP
Bit rate	200 kbps to 10 Mbps
Bit rate control	Selectable (variable, constrained, or constant)
Latency	130 msec* (encode), 600 msec* (encode/decode)
Closed Captioning	EIA-608-B Closed Captioning

NOTE: *Indicates minimum latency. Encoder, decoder, and network dependencies apply.

VIDEO OUTPUT

Scaled resolution	
SME 100 HD	166x120 (QSIF), 176x144 (QCIF), 320x240 (SIF), 352x288 (CIF), 480x320, 480x360, 640x360, 640x480, 720x480, 800x480, 720x576, 800x600, 1024x768, 720p, 1080p
Frame rate	Up to 30 fps for all output rates
Formats	H.264/AVC (High, Main, Baseline Profile Type, and 3.0, 3.1, 3.2, 4.0, 4.1, 4.2, 5.0 Profile level)

SYNC

Input type	RGBHV, RGBS, RGsB, RGBcvS, and component video (tri-level or bi-level)
Standards	NTSC, PAL MPEG-4/H.264 (ITU-T H.264, ISO/IEC 14496-10:2003 MPEG-4 Part 10, AVC)

AUDIO INPUT WITH LOOP-THROUGH

Number/signal type	3 stereo, balanced or unbalanced, with loop-through
Connectors	(6) 3.5 mm 5-pole captive screw connectors (3 input, 3 loop-through)

AUDIO PROCESSING

Sampling rate	48 kHz
Compression	AAC-LC MPEG-4 (ISO/IEC 14496-3:2005)
Bit rate	16 kbps to 384 kbps

AUDIO OUTPUT

Number/signal type	1 AAC-LC digital audio over Ethernet

CONTROL/REMOTE — ENCODER

Serial control port	1 bidirectional RS-232, 3.5 mm captive screw connector, 3-pole
USB control ports	1 front panel female mini USB B
USB standards	USB 2.0, low speed
Program control	Extron control/configuration program for Windows® Extron Simple Instruction Set (SIS™) Microsoft® Internet Explorer®, Apple® Safari®*, Mozilla® Firefox®*, Google® Chrome™* (*Certain browser dependencies may apply.)

NETWORK

Ethernet data rate	10/100Base-T, half/full duplex with autodetect
Maximum Transmission Unit	1100-1500 MTU, adjustable
Protocols	
Streaming	Pull:RTP/RTCP(RFC 3550), RTSP(RFC 2326), Interleaved RTSP(RTP/RTSP), RTP/RTSP tunneled through HTTP unicast or multicast Push:MPEG2-TS/UDP*(ISO/IEC 13818-1), MPEG2-TS/RTP*(RFC 2250, IPTV-ID-0087, ETSI TS 102 034), Direct RTP(RFC 3984), SAP (RFC2974),SDP (RFC4566), unicast or multicast
Transport	TCP, UDP, multicast IGMPv3 (RFC 3376) or unicast
All supported	IGMPv3(RFC 3376), IP, UDP, SSL, DHCP, HTTP, HTTPS, RTP, RTSP, SNMP V2 (RFC 1213), SAP (RFC2974),SDP (RFC4566), QoS(RFC 2474), NTPv4 (RFC 4330)

NOTE: * Indicates that portions of the RFC and other standards may apply.

GENERAL

Power	Internal Input: 100-240 VAC, 50-60 Hz
Power consumption	20 watts
Thermal dissipation	69 BTU/hr
Enclosure dimensions	1.7" H x 17.5" W x 8.5" D (1U high, full rack wide) (4.3 cm H x 44.4 cm W x 21.6 cm D) (Depth excludes connectors and knobs.)
Product weight	4 lbs (1.8 kg)
Regulatory compliance	
Safety	CE, c-UL, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
Warranty	3 years parts and labor

Model	Version Description	Part number
SME 100 HD	H.264 HD Encoder	60-1061-01

For complete specifications, please go to www.extron.com
Specifications are subject to change without notice.

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