

MIT

Design Standards

Audiovisual Systems

T02 Thematic Folder

Issued 2022



Department
of Facilities

Table of Contents

1. MIT AUDIOVISUAL SYSTEM DESIGN STANDARDS	2
1.1 INTRODUCTION	2
1.2 AUDIOVISUAL DESIGN AND INSTALLATION STANDARDS	2
1.3 AUDIOVISUAL CONTROL BOOTHS AND CLOSETS.....	2
1.4 ELECTRICAL POWER REQUIREMENTS FOR AV EQUIPMENT	4
1.5 THIRD PARTY SYSTEMS: INTEGRATION OF FIRE ALARM, LIGHTING CONTROL AND WINDOW SHADES.....	4
1.6 CONDUIT AND CABLE PATHWAYS FOR AV EQUIPMENT	5
2. DISPLAY SYSTEMS	6
2.1 PROJECTION TECHNOLOGY	6
2.2 PROJECTION SCREEN SYSTEMS	7
2.3 FLAT PANEL DISPLAY TECHNOLOGY	7
2.4 DISPLAY INSTALLATION REQUIREMENTS	8
3. AUDIOVISUAL CONTROL SYSTEMS AND COMPONENTS	9
3.1 PREFERRED MANUFACTURERS	9
3.2 AUDIO SYSTEM COMPONENTS	10
3.3 PRESS PLATE CONNECTIVITY	11
3.4 PRESS PLATE ROUTING AND CONTROL.....	12
3.5 DISTANCE LEARNING STANDARDS	13
3.6 ADDITIONAL INFORMATION	14
3.7 AV / IP	14
4. APPENDIX A - MIT AUDIOVISUAL SUPPORTED EQUIPMENT POLICY	14
5. APPENDIX B – ASSISTIVE LISTENING REQUIREMENTS	17
6. APPENDIX C - MIT WIRELESS MICROPHONE (FCC) REQ.	19
7. APPENDIX D – DIGITAL SIGNAGE	20

1. MIT AUDIOVISUAL SYSTEM DESIGN STANDARDS

1.1 Introduction

Audiovisual (AV) systems are integral to many aspects of MIT, from classrooms, to conference rooms and performance spaces. Through advance planning and design activities, MIT Audiovisual Services can engineer systems that meet the needs of the end users and provide a quality experience for all program participants. An AV system should be designed with end-users as part of the facility design process to assure that all electrical, architectural and design criteria are included and considered. Advance planning of AV systems is key to a successful system and seamless integration into the room environment.

1.2 Audiovisual Design and Installation Standards

Audiovisual design and installation practices shall comply with the following standards issued by AVIXA (Audiovisual and Integrated Experience Association) and ANSI/INFOCOMM:

1. INFOCOMM 2014 - AV/IT Infrastructure Guidelines for Higher Education.
2. AVIXA A102.01:2017 - Audio Coverage Uniformity in Listener Areas.
3. AVIXA F501.01:2015 - Cable Labeling for Audiovisual Systems.
4. AVIXA V202.01:2016 - Display Image Size for 2D Content in Audiovisual Systems.
5. ANSI-J-STD-710 - 2015 - Audio, Video and Control Architectural Drawing Symbols Standard.
6. ANSI/INFOCOMM 2M-2010 - Standard Guide for Audiovisual Systems Design and Coordination Processes.
7. ANSI/INFOCOMM 3M-2011 - Projected Image System Contrast Ration.
8. ANSI/INFOCOMM 4:2012 - Audiovisual Systems Energy Management.
9. ANSI-INFOCOMM 10:2013 - Audiovisual Systems Performance Verifications.

Refer to Appendix A for the MIT Supported Audiovisual Equipment Policy (4/21) which includes the Supported/Serviceable Equipment List, Unsupported Equipment Announcement Period, Options for Unsupported Equipment, Common List of Unsupported Items and Approved Manufacturers.

1.3 Audiovisual Control Booths and Closets

In some classrooms, lecture halls and conference rooms, an AV equipment booth or closet is required to support the programmatic needs of the room. The following criteria should be used to guide the design process:

1. Regardless of equipment location, AV systems typically require specialized racks to secure the equipment. The required brand of AV equipment racks is provided by the following manufacturer who provides rack systems that can be configured in a wide variety of ways, depending on the program and architectural demands of the room.
 - a. Middle Atlantic <http://www.middleatlantic.com/products/racks-enclosures.aspx>.
2. A detailed AV design is required to properly configure the racks needed for the system in advance of final architectural planning. In some cases, in-wall or above ceiling storage systems may be needed or desired. Middle Atlantic and other manufacturers provide solutions for non-traditional AV rack systems.
3. For rooms where AV equipment can be stored in an under counter height credenza, the space allocated for an AV rack shall be a minimum 24 inch wide and 24 inch deep. Depending on the AV system design complexity, more than one rack may be needed. The rack(s) should be accessible by the means of casters, silicone sliding strips on the base of the rack, or a slide-out rail system where the base of the rack is secured to the inside of the cabinet.
4. If the AV rack is mounted under a credenza countertop, the counter shall have cable pass through capabilities by use of grommets or slots as required by the system operation needs.
5. If the countertop is to be used for end-user devices (laptops, tablets, etc.) the placement of duplex electrical outlets and network connection points should be considered along the wall above the countertop.
6. If an AV equipment closet is planned for the space, the closet dimensions shall be at minimum 36 inch wide by 36 inch deep. The rack should be able to be pulled out of the closet and into the hallway/classroom by means of casters on the base of the rack. Appropriate cable service lengths must be provided to enable the rack to be pulled out for service.
7. For any AV equipment locations (credenza, AV rack closet or projection booth), proper cooling in the space should be considered depending on the system components planned. A heat load calculation shall be performed by the AV designer/consultant to enable proper cooling for the space. In some cases, passive cooling may be sufficient, but in other areas, a dedicated cooling system (or separate AV space zone) should be provided to prevent damage to electronics from heat generated by the AV system components.
8. Access to AV closets, cabinets, rack rooms, and booths controlled by system owners should be equipped with MIT standard Schlage locks and door hardware. It is preferred that AV cabinets and doors be equipped with the standard FA6 key and lockset. Lightweight cabinet locks are not approved for AV equipment storage locations.
9. In renovation or new construction, a card reader access to the AV room should be provided, along with the lockset.
10. Lighting in projection booths or closets should be operated independently of the lighting

system for the room. Fully dimmable down lights shall be provided over work areas. Indirect dimmable florescent lights shall also be provided in the ceiling grid system, where applicable.

1.4 Electrical Power Requirements for AV Equipment

To properly specify the electrical needs for an AV system, a full AV system design must be completed with input from the system owner, end users and AV system designers. Depending on the complexity of the overall project, an electrical engineer may be required to specify the proper electrical power requirements for the AV system.

This is especially true for full renovations or new construction projects. This design must be done in advance of the final room design and pricing by general contractors to prevent change orders related to AV system requirements.

1. Dedicated circuits must be provided for any outlets that will connect to the AV system. This includes AV rack power, video displays (projectors and flat panels), end-user device connection locations (power outlets for laptops, tablets or other portable devices). These input locations may be spread around the room and final locations must be determined with the end-users, AV designer, architect and electrical engineer.
2. All AV related power circuits must be on the same electrical phase to reduce the potential of audio and video interference developing in the AV system. This is evident in 60 Hz audio buzz in the sound system or rolling dark bands in video displays.
3. Isolated grounds are not required for AV equipment.
4. Electrical outlet quantities are dependent upon the size of the AV system. In general, a quad outlet is required for each AV rack in a closet or credenza location. Each quad outlet shall be rated at 20 amp and on a separate circuit, unless otherwise specified.
5. At video display locations, a duplex outlet is required at minimum. Depending on the system components, a quad outlet is often desired to power peripheral devices that are stored behind the display.
6. Ceiling mounted outlets shall be accessible at below ceiling level, either in a ceiling mounting system or outlet integrated into the ceiling.

1.5 Third Party Systems: Integration of Fire Alarm, Lighting Control and Window Shades

1. To assure building code compliance AV systems with amplified audio require a connection to the building fire alarm system. Electrical engineers must design the fire alarm system with a connection to the AV system to enable a N/C (normally closed) dry contact closure from the fire alarm system. Once the AV system receives this signal, it will turn off the amplified audio. These details shall be shown on the electrical drawings for the project and noted that a connection to the AV system is required. This is a

minimum required by code. Please confirm any additional AV system functions with MIT Fire Safety Engineer.

2. Where applicable, a connection to the Lutron room lighting system shall be provided to the AV control system. The electrical engineers, in conjunction with the lighting designer and electrical contractor, are responsible to specify, provide and wire the appropriate lighting system interface to the AV control system as part of their scope. In addition, the Lutron integration codes shall be provided to the Crestron AV system programmer to enable the appropriate scene control through the AV system.
3. Location of the Lutron scene-setting controller shall be in the AV booth or in another secure location within the room that will enable scenes to be changed while monitoring the room lighting.
4. Where applicable, a connection to the window shade system shall be provided to the AV control system. The electrical engineers, in conjunction with the shade designer and electrical contractor, are responsible to specify, provide and wire the appropriate shade system interface to the AV control system as part of their scope. In addition, any control codes or addresses for the shades shall be provided to the Crestron AV system programmer to enable the appropriate scene control through the AV system.

1.6 Conduit and Cable Pathways for AV Equipment

To properly connect AV system components together, proper wiring infrastructure should be provided. In the case of new or renovation construction, metal conduit must be used from point to point (ex. from an AV rack closet to speaker, microphone and display locations).

1. Conduits shall be sized appropriately to avoid over filling, based on National Electrical Code requirements.
2. Flexible conduit, whether metal or plastic, is not approved.
3. Conduit is required above any ceiling spaces that are not accessible after construction to enable expansion in the future.
4. Conduit riser diagrams shall be developed by the AV designer/consultant and included on the electrical drawings for construction.
5. Conduit must be used for microphone or speaker wiring, to protect them from electromagnetic interference, hums and buzzes in the audio systems. Other system wiring may also require conduit for similar reasons.
6. At a minimum, 1 inch diameter conduit should be provided for small systems. A series of 1-1/2 inch or larger diameter conduits may be required for more complex systems.
7. AV system wiring should not share conduit with other low voltage services, without prior consent from both MIT Audiovisual Services and the other responsible party. For example, consent from MIT Audiovisual Services as well as MIT IS&T would be required for AV and networking cabling to be run in the same conduit or share structured cabling pathways
8. All conduits shall be provided with pull strings to enable cable pulls.
9. In some cases, conduits can be run up walls of a space and stub up above the ceiling if the

room ceiling is accessible, usually with a ceiling grid system. Stub-up conduit shall have plastic bushings placed on them to prevent cables from being damaged.

10. In more basic AV systems, typically in offices or small conference rooms, the use of “ring and string” approaches to AV wiring is sufficient or even preferred. This method uses an electrical mud ring device that allows the inserting of AV connection devices. A variety of manufacturers make options that can be considered.
11. If in-wall boxes are to be provided for AV connection points, they should be specified to be 2 1/8” deep, or more, to allow adequate space for AV devices. The AV design process will determine the proper depth of the box based on the device planned.
12. If custom stainless-steel plates are used, the conduit runs for these custom plate locations are stubbed and bushed behind the wall without a back-box. The low voltage devices secure to the back of the plate on the provided threaded stud and the plate is secured to the wall, either screwed into the millwork or anchored into the drywall. Plates should be designed to fit flush to the wall. Please coordinate exact cut-out size and location with AV integrator to ensure proper fit and placement.
13. In plenum ceilings, the use of plenum rated low voltage AV cabling is specified. Cable suspension J-hooks can be used similar to:
 - a. Datacomm J-Hooks <https://www.platt.com/platt-electric-supply/Datacomm-Its-Wide-J-Hooks-Angle-Bracket-Hammer-On-Or-Screw-Assembly/Erico-Caddy/CAT32HP/product.aspx?zpid=742841>.

2. DISPLAY SYSTEMS

Display technologies are updated on a regular basis. The AV system design process will help determine the correct display technology for each location.

The lowest supported resolution on campus is 1080p. Systems should be designed with the infrastructure to handle 4K resolution content or greater.

2.1 Projection Technology

Recent developments in laser based light sources for projectors make these an attractive option over the traditional lamp-based projectors commonly used in the past. There are no lamps to purchase during the life of the projectors (rated at 20, 000 hours) and no hazardous mercury-based lamps for disposal. As laser projectors continue to improve and gain a larger market share of the projector industry, they will be specified in increasing numbers for projects at MIT.

Laser projectors are currently being recommended and installed in a variety of locations at MIT. These projectors range in price from under \$2,000-40,000, depending on the brightness, lenses and capabilities of each display.

Refer to Appendix A for the MIT Supported Audiovisual Equipment Policy (4/21) which includes the Supported/Serviceable Equipment List, Unsupported Equipment Announcement Period, Options for Unsupported Equipment, Common List of Unsupported Items and Approved Manufacturers.

2.2 Projection Screen Systems

1. For systems that require projection screens, MIT has used Da-lite and Stewart Filmscreen solutions.
2. Projection screen aspect ratio shall be 16:9 for most applications.
3. For most flat floor classroom and conference room environments that call for a wall or ceiling mounted screen, the Da-Lite Contour Electrol is preferred.
4. For ceiling recessed screens, the Da-Lite Advantage Electrol is preferred. The Advantage line of screens allow for recessing in either drop or hard ceiling systems, with the ability to install the screen housing during the rough-in phase of construction, followed by the screen fabric and motor once the room is in a cleaner condition.
5. In most classrooms and lecture halls, tab-tensioned screens are not used. However, for larger screens (>133" diagonal) where edge curl-over of a large screen surface is a potential problem, a tab-tensioned screen may be specified.
6. In general, MIT uses the High Contrast Matte White projection surface in the Da-Lite line of non-tabbed screens, and the HD-Progressive surface for the tabbed-tensioned screens. Alternative screen surfaces can be selected depending on the requirements of the room environment.
7. To integrate the projection screen into an AV control system, the use of an internal low voltage controller (LVC) device is required.
8. In most AV systems, an electrically operated screen is recommended to assure that the screen always stops at the correct lower limit. In some cases, a manually operated screen is chosen. In these cases, the Da-Lite Model C with Controlled Screen Retraction (CSR) is preferred.
9. For rooms with recessed ceilings that require a manually operated screen, the Advantage Manual with CSR is preferred.

2.3 Flat Panel Display Technology

The widespread use of flat panel displays has, in some cases, enabled AV systems to become less complicated. This is due to the ability to use large (65-98" diagonal dimension) flat panel display in rooms that had traditionally been equipped with a projection screen and projector. It is possible to simplify cabling infrastructure for the room by using connection point(s) directly below the display with limited electronics.

In general, flat panels are chosen from a manufacturer's line of professional equipment. Commercial flat panel displays are recommended over any consumer displays. Commercial

displays usually have a full range of connection types, including RS-232 and ethernet control capability, which enables integration with other professional AV system components. These displays range from \$700-9,000+ depending on the size and native resolution of the display.

Though video wall systems are used in several locations on campus, MIT Audiovisual Services does not install these systems, though we can design, consult and support. Each system is uniquely designed with the end user's programmatic needs in mind. Specific equipment for video walls is developed during the design process. The budget for video walls should include at least one spare panel to enable quick swapping in case of equipment failure in the future and obsolescence in future panel models.

In general, products from the NEC Display Technologies line of video wall packages are specified. For further information, see <http://www.necdisplay.com/solutions/video-walls/60> for further information.

Refer to Appendix A for the MIT Supported Audiovisual Equipment Policy (4/21) which includes the Supported/Serviceable Equipment List, Unsupported Equipment Announcement Period, Options for Unsupported Equipment, Common List of Unsupported Items and Approved Manufacturers.

2.4 Display Installation Requirements

Flat Panel Display Installation Requirements (typical):

1. Bottom of display at 48 inches above finished floor.
2. AV, data and power behind display, in that order: Vertical center of these boxes shall be 3.5" below the top edge of the display; group of boxes shall be centered horizontally on the display; AV shall be at a minimum a 4 11/16" x 2-1/8" deep box with a 1-gang mud ring - 1" conduit minimum where applicable; data shall be a single drop with one active port; power shall be a quad receptacle; power shall be the same phase as the rest of the AV equipment in that system where applicable.
3. AV, data and power below the display, in that order, where applicable: Vertical center of these boxes shall be at receptacle height (18" AFF Typ.); these boxes shall line up vertically with their counterparts above, behind the display; AV shall be at a minimum a 4 11/16" x 2-1/8" deep box with a 2-gang mud ring unless otherwise specified, 1" conduit minimum where applicable; data - should be a single drop with one active port; power should be a single duplex receptacle.
4. Wall mount for display shall be installed centered horizontally and vertically on the display.
5. Display shall be of commercial/professional quality and built for the intended use specified by the end user/client. Approved and supported display manufacturers are NEC, Panasonic (Professional Displays), Sharp (Professional Displays), Samsung

(Professional Displays), LG (Professional Displays), MIT Audiovisual Services approved substitution. (See Appendix A)

6. Display mounts shall be of commercial/professional quality and built for the intended use specified by the end user/client, as well as designed to accommodate the specified display. Approved and supported display mount manufacturers are Chief Manufacturing, Peerless-AV, MIT Audiovisual Services approved substitution.

3. AUDIOVISUAL CONTROL SYSTEMS AND COMPONENTS

3.1 Preferred Manufacturers

MIT uses systems from: Crestron Electronics

<http://www.crestron.com/solutions/market/classroom-campus-room-building-automation-management-k-12-university>

MIT Audiovisual Services primarily integrates Crestron control environments to enable better long-term support of systems. Crestron offers its A+ program to higher education institutions like MIT. This provides the institute, extended warranties and advanced technical support, enabling quick repair times and reducing downtime of AV systems.

Crestron offers a full spectrum of technologies that enable the creation of very basic to very complex AV systems. Some of the key components currently in use on projects include:

1. Digital Media platform: <http://www.crestron.com/products/line/digitalmedia-4k-analog-digital-fiber-audio-video-av-distribution>
2. Touch Screen interface systems: <https://www.crestron.com/Products/Featured-Solutions/TSW-70-Series>
3. Control systems: <https://www.crestron.com/Products/Featured-Solutions/4-Series>
4. DMPS all-in-one systems: <http://www.crestron.com/products/line/digitalmedia-presentation-systems-dmps>

Current recent projects using Crestron equipment include:

- All Registrar classrooms upgraded 2019 and later.
- Math Department seminar rooms.
- Multi-function teaching spaces such as 26-152 TEAL I and 32-082 TEAL II.
- Large lecture halls such as 35-225, 1-190, 6-120.
- Koch Institute 76-156.
- Music and Theatre Arts classrooms, 4-156, 4-158, 4-126, 4-364 and 24-033i.
- 5-232 & 36-372 classrooms.
- NW23 Facilities headquarters conference rooms, offices, video wall.
- E14-Silverman Skyline video wall system.
- Samberg Conference Center E52-6th and 7th floors.

3.2 Audio System Components

Depending on the size of the AV system audio requirements range from basic to complex. Below are samples of commonly used audio components for different room types.

1. Speaker Systems and Related Components:
 - a. Small, flat floor classroom or conference room program audio:
 - i. QSC brand wall mounted AcousticDesign Series speakers. This series offers a selection of sizes for multiple applications to provide program audio playback through wall mounted speakers.
 - ii. Fulcrum Acoustic's TQ Install product line, provides a higher quality level than above, as well as offering many more options for various design scenarios including "acoustically challenged" spaces.
 - b. Ceiling mounted speakers for speech or program audio playback in a classroom or lecture hall:
 - i. Crestron Saros ceiling speakers. This series offers a selection of speaker sizes for different room configurations.
 - ii. QSC AcousticDesign ceiling speakers. This series offers a selection of speaker sizes for different room configurations.
 - c. Large lecture hall high quality program and speech audio speakers:
 - i. Fulcrum Acoustic, Meyer Sound, and D&B Audiotechnik speakers have been used in spaces such as Samberg Conference Center, 6-120, E14-Silverman Skyline, 26-100, 32-123, Wong Auditorium, and the Bartos Theater. Each system is configured to fit the space as part of the design by working directly with the speaker manufacturer and their audio engineers.
 - d. Audio Amplifiers:
 - i. Power amplifiers from Crestron, Powersoft, Linea Research, Extron (NetPA line) and QSC (as well as speaker brand specific amplifiers) have been used in recent projects. Specific models will be determined

during the design process.

e. Digital Signal Processing (DSP) Platform:

- i. Audio DSPs from Biamp Systems, QSC, Crestron (AVIA) and Shure have been the standard choices for any systems that may require management of multiple audio signals through the system. Proper design of the system is critical to correctly specify the components necessary and associated programming resources necessary to create the system.

Wireless microphone systems:

1. The purchase or use of any wireless microphone system on campus MUST be coordinated and approved through MIT Audiovisual Services. There are no exceptions to this rule, as wireless microphone systems are a critical teaching tool used throughout the campus. Careful considerations have been made to coordinate the 500 channels of wireless microphones that could be in use at any given time and MIT Audiovisual Services coordinates the FCC licenses to operate these microphones.
2. Shure Axient Digital microphones are specified for any new systems.
3. A frequency scan is required before adding any new wireless systems to assure no interference from surrounding systems is encountered with the new system.
4. See Appendix C for wireless microphone use and deployment on campus, as well as FCC laws and regulations.

Assistive Listening Systems:

1. A frequency scan is required before adding any new wireless systems to assure no interference from surrounding systems is encountered with the new system.
2. To ensure adherence to ADA laws and regulations, see Appendix B for MIT Assistive Listening System campus requirements.

3.3 Press Plate Connectivity

All classrooms, lecture halls, and event spaces on MIT's campus are multi-purpose and must be designed to support a variety of functions and activities. Providing and installing a "PRESS PLATE" or "TECHNICIAN PLATE" will allow temporary expansion of an installed AV system. These plates typically have accommodations for audio and video both into and out of the AV system, usually located toward the rear of the room, keeping the event tech and any additional equipment out of the way.

Typical video connections which shall be provided:

1. At least one HDMI input
2. (Large Lecture Hall / Event Spaces) At least one HDMI output per video display
 - a. Output resolution set to 1080P @ 60Hz

Typical audio connections which shall be provided with minimal dynamic or EQ processing, other than to prevent clipping:

3. In a system with separate speech and program reinforcement a single line level XLR input for each of the following signals routed respectively
 - a. Program Left and Right (stereo)
 - b. Speech (mono)
 - c. Mono-Mix
4. In a system with integrated speech and program reinforcement a single line level XLR input routed to all speakers and XLR line output with a mix of speech and program audio
 - a. In smaller systems, these connections can be with the input plates or contained within the AV rack on a custom plate
5. When applicable, discreet line level XLR audio output connections shall be provided for each of the following signals, routed respectively
 - a. Program Left and Right (stereo)
 - b. Speech (mono)
 - c. Mono-Mix
6. In addition to these AV connections a quad power outlet and standard data jack should also be near this connection plate

3.4 Press Plate Routing and Control

Press plate video routing and control:

1. Press plate video outputs shall mirror their respective video display's signal

2. The ability to disable HDCP compatibility shall be programmed in the system

- a. Accessible via “tech page” from the touch panel

Press plate audio routing and control:

1. Self-Help Mode outputs:

- a. Program left/right: This signal will consist of the actively selected Program Audio source feeding the Program Audio System as well as any signal feeding Program Audio System inputs. This signal will be Pre Fade and Post Mute, NOT reflecting any volume adjustments made via a touchpanel or other user interface, except by Muting, such that the source level will maintain relative unity with the Program Left/Right Output.
- b. Speech: This signal will consist of all installed Wired/Wireless microphones, microphone inputs (floorbox, wallplate, etc..) or Speech System inputs. This signal will be Post Fader and Post Mute, reflecting any volume adjustments made via a touchpanel or other user interface such that it will represent the perceptible mix heard within the listening environment.
- c. Mono-Mix: This signal will consist of all installed Wired/Wireless microphones, microphone inputs (floorbox, wallplate, etc..) and Speech System inputs mixed with the actively selected Program Audio source feeding the Program Audio System as well as any signal feeding Program Audio System inputs. This signal will be Post Fader and Post Mute, reflecting any volume adjustments made via a touchpanel or other user interface such that it will represent the perceptible mix heard within the listening environment.

2. Manual Mode outputs:

- a. Program Left/Right: A discrete mix Buss from the installed Mixing Console will feed the Program Left/Right Mix output.
- b. Speech: A discrete mix Buss from the installed Mixing Console will feed the Speech Mix output.
- c. Mono-Mix: A discrete mix Buss from the installed Mixing Console will feed the Mono Mix output.

3.5 Distance Learning Standards

All connectivity, routing and control standards for distance learning solutions shall be coordinated with MIT Open Learning (OL) openlearning@mit.edu

3.6 Additional Information

Additional dedicated video or audio signals requested for a recorder, teleconferencing or lecture capture system may require specifications not outlined in this document. The end user/department requesting the additional feature MUST be contacted for an explanation of needs, confirmation of proper implementation and final testing/approval.

3.7 AV / IP

MIT Audiovisual Services is currently unable to support AV/IP technologies on MIT's network infrastructure. We are working with IS&T to develop a process for deploying these types of system on campus. Closed network system can be deployed, but the passing of AV signals over MIT's network are yet to be supported.

4. APPENDIX A - MIT AUDIOVISUAL SUPPORTED EQUIPMENT POLICY

The MIT Audiovisual Services is committed to delivering innovative, effective technology solutions to our clients. As technologies evolve, we continue to proactively develop and shape our solution options. The resulting new solutions and feature modifications often lead to a need for discontinuing older hardware by both us and the original manufacturer of the equipment. MIT Supported Audiovisual Equipment Policy is described below.

SUPPORTED/SERVICEABLE EQUIPMENT LIST

Approved Manufacturers (Professional Grade Equipment):

- Video Projectors:
 - Panasonic, Sony, NEC, Epson
- Flat Panel Displays (TV's):
 - NEC, Panasonic, Sharp, Sony, Samsung
- Display Mounts (Video Projectors and Flat Panel Displays):
 - Chief (preferred), Peerless, Middle Atlantic, Premier
- Video Switching, System Control, Video Transmission:
 - Crestron, QSC
- Wireless Video Transmission:
 - Barco Clickshare
 - Panasonic PressIt
- Audio DSP:
 - Biamp, QSC, Shure, Crestron (AVIA)
- Wireless Microphones:

- Shure (ULX-D and Axient Digital) – *See important note below
- Audio Amplifiers:
 - QSC, Crestron, Linea Research, Powersoft Audio, Biamp, D&B Audiotechnik, Extron (NetPA Series), Crown
- Speakers:
 - QSC, Crestron, Fulcrum Acoustic, D&B Audiotechnik, Genelec, Meyer Sound
- Assistive Listening Systems:
 - Listen LT-800-072, Listen LR-4200-072 or LR-5200-072

Additional acceptable manufacturers include: Epiphan, Vaddio, Chief Manufacturing, Peerless-AV, Middle Atlantic, Denon Professional.

To inquire about any brands not on this list, please contact MIT Audiovisual Services mitav@mit.edu or by calling 617-253-2808

UNSUPPORTED EQUIPMENT ANNOUNCEMENT PERIOD

We will no longer be able to offer support for equipment on the Unsupported Equipment list below. If any equipment listed below was installed by MIT Audiovisual Services, we will continue to support it within the one-year warranty period. Some equipment is no longer supported by the manufacturers and some is no longer up to our standards as expected by end users and the institute.

Once a piece of equipment has been deemed “Unsupported” by MIT Audiovisual Services, we can no longer offer support of the device from either a hardware or software (programming) standpoint. This is typically a result of the original manufacturer no longer supporting the equipment. We will still be able to send equipment out for repair at the cost of the customer, but we cannot guarantee it will be repairable by the manufacturer. We also cannot guarantee that a temporary fix can be provided in the absence of the broken equipment. This could lead to rooms being non-operational for an indeterminate amount of time.

OPTIONS FOR UNSUPPORTED EQUIPMENT

Replace the Equipment: This can be the best option especially if the equipment is out of date. There are constant technological advances that may provide a better experience in your space(s) and many of these advances have become our standards on campus. But please note, most of the older equipment utilizes older infrastructure and that too may need to be updated.

Self-Maintain the Equipment: This is typically not a good idea. This method can be something much time and effort is wasted on and you may experience long periods of down time.

Third Party Maintenance/Service: MIT has a list of preferred vendors off-site that you are welcome to reach out to for equipment maintenance. Please be advised that this option will

remove any on-campus help from our group as an option. For a list of preferred vendors, please email mitav@mit.edu.

COMMON LIST OF UNSUPPORTED ITEMS

Unsupported Video Formats:

- Composite
- S-Video
- Component (RGB)
- 5 wire RGBHV
- VGA (effective summer 2023)

Unsupported Generic Equipment:

- Overhead transparency projectors
- VHS players
- Unsupported Media (Cassettes, Vinyl Records, VHS, Laser Discs, etc)
 - MIT Audiovisual Services offers digital media transfer services, please contact mitav@mit.edu

Unsupported Video/Control Equipment:

- Crestron 2 series (or earlier) processors (Pro2, CP2N, DMPS, etc)
- Crestron TPMC/TPS/V touch panels
- Crestron DGE 1 & 2 series graphic engine
- Extron Touchlink Systems
- Extron MLS switchers
- Extron MLCs
- Extron Crosspoint analog video switchers
- Extron video transmitters and receivers
- All projectors with a lower native resolution than WXGA (1280x800) and/or models that do not adhere to the MIT Audiovisual approved manufacturer list

Unsupported Audio Equipment:

- Shure SCM810 auto-mixer
- Shure SCM and M series mixers
- All Extron audio products including combiners and audio controllers (excluding amplifiers)
- Most other brands of audio DSP's including Peavey, Gentner, ASPI, Polycom, and BSS
- All brands of speakers that are damaged, where parts are no longer available or do not suit the installation
- ISDN audio installations (which are no longer being offered by AT&T and Verizon)
- Wireless microphones between 600MHz and 800MHz. *(See Below)

***Important Note Regarding 600Mhz – 800Mhz Wireless Microphone Operation**

The FCC has auctioned off large portions of frequencies that fall between 600Mhz – 800Mhz. As a result, legally, our group can no longer install or support any systems that fall in this range. In some cases, it's already a federal violation to operate these wireless microphones as these frequencies are dedicated to first-responder use.

Above is not a complete list. Exceptions can sometimes be made on a case-by-case basis. For any equipment older than four years that is not on this list, service is on a case-by-case basis. If you or your department have questions on the current support level of a piece of equipment, please feel free to reach out to us. Thank you.

5. APPENDIX B – ASSISTIVE LISTENING REQUIREMENTS

MIT Assistive Listening System Requirements:

MIT Audiovisual Services needs to be made aware of wireless RF transmitters installed or deployed in all MIT associated buildings. It is necessary for MIT Audiovisual Services to coordinate and document RF transmitter frequencies whether an Assistive Listening System is installed or a portable system is deployed.

MIT Audiovisual Services specifies LISTEN Technology Assistive Listening Systems to be our accepted standard for MIT Campus. All transmitters shall be operable in the 72MHz range. Transmission between the transmitter and receiver shall be uniform across the entire floorplan of the Classroom / Event Space, whether at seated or standing height. The receivers shall adhere to the audio specifications detailed in the Department Of Justice ADA Standards sec 706.4 through 706.6 (see below).

***706.4 Sound Pressure Level.** Assistive listening systems shall be capable of providing a sound pressure level of 110 dB minimum and 118 dB maximum with a dynamic range on the volume control of 50 dB.*

***706.5 Signal-to-Noise Ratio.** The signal-to-noise ratio for internally generated noise in assistive listening systems shall be 18 dB minimum.*

***706.6 Peak Clipping Level.** Peak clipping shall not exceed 18 dB of clipping relative to the peaks of speech.*

As such, MIT Audiovisual Services requires the following equipment be specified for new installations to ensure ADA Compliance and support from our department:

ALS Transmitter: Listen LT-803-072-01 3-Channel RF Transmitter (72MHz)

ALS Receiver: Listen LR-5200-072 Advanced iDSP RF Receiver (72MHz)

ALS Antenna: Listen LA-122 Universal Antenna Kit (72MHz)

Classrooms / Event Spaces consisting of a seated capacity of 49 or less WITHOUT a Speech Lift System will require a mono XLR Assistive Listening System Mix Output to be installed. This ALS Mix Output shall be accessible in the respective room, closet or AV equipment rack in order for MIT Audiovisual Services to maintain/test functionality or, upon request from an end-user, deploy a portable ALS system.

The ALS Mix Output shall receive an audio signal reflecting the relative levels of that which is reproduced through the Program Audio System present in the room.

Classrooms / Event Spaces consisting of a seated capacity of 49 or less WITH a Speech Lift System will require a full Assistive Listening System to be installed. This system will consist of an audio transmitter, a minimum number of receivers with earpieces and hearing-aid compatible receivers in accordance with the Department of Justice ADA Standards sec. 219.3 (chart). These receivers shall be stored in the respective room, closet or AV equipment rack and be accessible by MIT Audiovisual Services for maintenance or deployment upon request from an end-user.

The ALS system shall receive an audio signal reflecting the relative levels of that which is reproduced through the Program Audio and/or Speech Lift System present in the room.

Classrooms / Event Spaces consisting of a seated capacity of 50 or more will require a full Assistive Listening System to be installed. This system will consist of an audio transmitter, a minimum number of receivers with earpieces and hearing-aid compatible receivers in accordance with the Department Of Justice ADA Standards sec. 219.3 (see chart). These receivers shall be stored in the respective room, closet or AV equipment rack and be accessible by MIT Audiovisual Services for maintenance or deployment upon request from an end-user.

The ALS system shall receive an audio signal reflecting the relative levels of that which is reproduced through the Program Audio and/or Speech Lift System present in the room.

Table 219.3 Receivers for Assistive Listening Systems - As of Sept 2010 per D.O.J.

Capacity of Seating in Assembly Area	Minimum Number of Receivers Required	Minimum Number of Required Receivers Required to be Hearing-aid Compatible
50 or less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats	2
201 to 500	2, plus 1 per 25 seats over 50 seats	1 per 4 receivers
501 to 1000	20, plus 1 per 33 seats over 500 seats	1 per 4 receivers
1001 to 2000	35, plus 1 per 50 seats over 1000 seats	1 per 4 receivers
2001 and over	55 plus 1 per 100 seats over 2000 seats	1 per 4 receivers

6. APPENDIX C - MIT WIRELESS MICROPHONE (FCC) REQ.

The FCC has auctioned off large portions of frequencies that fall between 600Mhz – 800Mhz. As a result, MIT Audiovisual Services can no longer support or install any systems that fall in this range. In some cases, it’s already a federal violation to operate these wireless microphones as the frequencies are now dedicated to first-responder use. Please contact MIT Audiovisual Services immediately for consultation regarding changing frequencies of your department-owned wireless microphone system, or removal and replacement of your department-owned microphone systems.

Due to the FCC auction, MIT Audiovisual Services has replaced the on-campus microphone systems with updated digital infrastructure and hardware. These new wireless microphone systems solve many of the problems caused by both the FCC auction and the general oversaturation of radio frequency interference in the Cambridge and Boston areas.

In addition, MIT Audiovisual Services is in the process of securing a FCC Part 74 license. This license will allow MIT Audiovisual Services to register wireless microphone systems owned and operated by MIT Audiovisual Services and other MIT Departments, Labs, and Centers with the FCC. By registering microphone frequencies with the FCC, we can coordinate frequencies of wireless microphones owned by MIT DLC’s and outside vendors to ensure proper function of all wireless microphone systems operation in campus. The use of wireless microphones on campus by outside vendors will require coordination through the MIT Audiovisual Services department to ensure both the vendor’s and campus microphones are free of problems during their time of use.

FAQ’s

Q: My department has our own portable or installed wireless microphone. What should I do?

A: Please contact MIT Audiovisual Services using mitav@mit.edu to have your frequencies coordinated and logged.

Q: What happens if I continue to use my wireless microphone without coordinating frequencies with MIT Audiovisual Services?

A: If the frequencies are under the umbrella of the FCC auction, you stand to receive fines and legal action. On campus, you stand to have RF interference causing your system unintelligible at times, or unusable. You may additionally pickup unwanted audio from outside RF systems.

Q: I don't know if my department owned portable or installed microphone is operating on an illegal channel. What should I do?

A: Please contact MIT Audiovisual Services using mitav@mit.edu to have your system assessed and documented. Further instruction can be given after this process.

Pertinent FCC Technical Information:

<https://www.fcc.gov/consumers/guides/operation-wireless-microphones>

https://www.fcc.gov/sites/default/files/operation_of_wireless_microphones.pdf

<https://www.fcc.gov/wireless/bureau-divisions/mobility-division/wireless-microphones>

7. APPENDIX D – DIGITAL SIGNAGE

The MIT campus-wide Digital Signage system is built on the Visix Hardware and Software Platform and is operated and supported by MIT Audiovisual Services.

MIT Digital Signage Features Include:

- Emergency notifications (MIT Alerts)
- Connectivity to MIT data sources to provide content e.g., EMS
- Connectivity to IPTV Feeds, Social Media Sources, and MIT Data Sources e.g., EMS
- News, weather, and stock market tickers

MIT Audiovisual Services Provides Infrastructure, Staff, and Support Including:

- Prompt response to inquiries and other communications
- System training via online library and one-on-one support
- Support services via MIT Audiovisual technical staff
- System operations and network connections
- Channel player monitoring with automated system alerts

- Continuous effort to develop and improve services

Participation in the MIT Digital Signage system requires an annual Service Level Agreement with MIT Audiovisual Services. Annual SLA costs will vary depending on number of players and service level requested).

Digital Signage Installation Requirements:

Infrastructure - In addition to any infrastructure needs for Digital Signage displays (see details included in the “[2.4 Display Installation Requirements](#)” section of this document) Digital Signage players will require: One 2-gang data receptacle, One 2-gang AC Power receptacle, installed at the installed Digital Signage player location.

Display Recommendations - Approved displays for Digital Signage Players, display installation details, and other information can be found in the “[APPENDIX A](#)” section of this document. 4K-resolution displays with 60Hz refresh rates are recommended for all digital signage installations.

Installation - Installation of Digital Signage players, displays, and other details are included in the “[2.4 Display Installation Requirements](#)” section of this document. Use of MIT Audiovisual Services for installation of Digital Signage players and associated hardware and displays is not required, but is highly recommended. MIT Facilities Project Manager and outside audiovisual contractors must contact MIT Audiovisual Services to inform them of any new Digital Signage players being installed on campus as player configuration and setup is necessary for the players to work with to the campus digital Signage service network. It is highly recommended, but not required, that all Digital Signage players be purchased through MIT Audiovisual Services.

MIT Audiovisual Service Installation team will:

- Identify and approve display(s) for purchase that can be integrated with the campus infrastructure
- Provide cost estimate of hardware and installation
- Establish installation timeline
- Purchase, install, configure, and maintain all digital signage components
- Arrange installation of digital signage components (including network and electrical)
- Deliver a functioning digital signage system per customer requirements
- Identify staff training needs and arrange for training

Digital Signage Player hardware - The Digital Signage player approved for use with the MIT Digital Signage service is the Visix 4K Player providing resolutions up to 3840×2160. The 4K Player specifications:

4K Media Player
Part Number: VX-S-CPZ
Dimensions: 7.5”w x 4.3”d x 1.73”h
Weight: 4 lbs.

Max Power: 33 watts
Processor: Intel i5-7300, 2.6GHz
Memory: 8GB DDR4 2133MHz
Hard Drive: 256GB M.2 SSD
OS: Windows 10 IoT Enterprise LTSC 2019
Network: 10/100/1000 Ethernet, optional wireless card
AV Outputs: HDMI 2.0a
AV Inputs: optional HDMI input card

Included: Power cord, VESA wall mount with 75 mm x 75 mm and 100 mm x 100 mm pattern sizes

Player Warranty - 2 Year Limited Warranty with Advanced Replacement during first year (3rd year optional for addition costs at time of purchase) with Advanced Replacement during first year

Bandwidth Utilization: This varies based on the selected content, but is generally equivalent to email traffic. Content is cached on players, not streamed, to reduce bandwidth utilization.

Digital Signage Player Software - The Digital Signage player software approved for use with the MIT Digital Signage service is Visix AxisTV-SignageSuite. Training for Visix AxisTV-SignageSuite is provided through Visix CMS, or by making a request for training by contacting MIT Audiovisual Services.

Digital Signage Service Support - MIT Audiovisual Services will provide assistance in:

- Adding or removing Digital Signage user accounts
- Resetting Digital Signage software user passwords
- Creating and adding playlist(s) to the user account
- Creating a custom Digital Signage layout template
- Create and schedule Digital Signage layout (PowerPoint slides, pictures, and videos)
- Troubleshooting and maintenance, both on-site and remote
- Replacing or updating Digital Signage hardware and software
- Training on Digital Signage Software

Infinite Display - Infinite Display Digital Signage at MIT enables the MIT community to promote events and publicize messages using digital displays located around campus. If you'd like to reach a large audience quickly and efficiently, Infinite Display is the best way to do it. For more information on Infinite Display Digital Signage at MIT please visit <https://copytech.mit.edu/infinite-display-digital-signage>.

For more information regarding the MIT Digital Signage service, please visit <https://studentlife.mit.edu/av/services-0/digital-signage> or email DigitalSignage@mit.edu.

END OF DOCUMENT