TN | Department of
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UNIFIED COMMUNICATIONS & COLLABORATION

Guidelines and Best Practices for Audiovisual Third-Party Providers

Tennessee Department of Finance & Administration | Guidebook | November 2023

Contents

Version History			
Version	**Description of Change**	**Author**	**Effective Date**
1.0	Initial Release	L. Houk	9/15/2023
2.0	Updated Content and Formatting	L. Houk	10/5/2023
2.1	Updated Content	M. Stanford	10/16/2023
2.2	Updated Content	M. Stanford	10/31/2023
2.3	Updated Vendor Information	M. Stanford	11/09/2023

Overview

This guide is intended to help state agencies and third-party providers of audiovisual systems implement functional and efficient systems to the state architecture. Updates will be made to this document as needed to answer questions and increase clarity. The layout of this guide is primarily alphabetical by subject to make it easier to lookup specific situations or concerns. A thorough knowledge of complex audio video systems is necessary for the proper implementation of these guidelines and best practices.

Project Purpose/Justification

Starting in October 2023 the Unified Communications and Collaboration (UCC) team narrowed its focus to provide video conferencing solutions. UCC realizes that some departments will still want to equip some of their meeting spaces with audiovisual equipment that it can no longer provide. This document is intended to be shared with third-party providers to assist them in deploying audiovisual equipment into State facilities.

This guide is intended as a living document and will be updated in response to the evolving nature of technology, the needs of the state, and to answer any frequently asked questions. This guide is not intended to replace the services of a professional, trained, and competent audiovisual company and should not be used to deploy systems without professional assistance.

These guidelines will evolve over time as we continue to improve our guidelines and best practices. If you have any suggestions or questions about the guidelines and best practices, please contact the UCC team. Errors that occur in this document may exist due to changes in state naming, policy, procedure, or restrictions. Updates will be made to correct any errors found in a timely manner.

Business Need

Currently UCC provides small, medium, and large video conferencing packages. A list of components and features that UCC does not currently provide may be found below. The agencies of the state may

have business use cases that the UCC video conferencing packages do not satisfy. To satisfy those business needs a third-party provider may be engaged directly by the agency.

Notice of Non-Support

UCC is not able to support any system deployed by a third-party provider. This limitation encompasses but is not limited to any design, implementation, programming, installation, troubleshooting, and repair. UCC strongly suggests using a competent third-party provider and making sure that a maintenance agreement for the expected life of the system is entered into with that company.

General

Archives and Deliverables (Files)

Upon completion of installation, programming and training a single .zip file must be provided to the Agency prior to system sign-off. This .zip must contain all applicable files from the following non-exhaustive list:

a. Completed touch panel user interface archive files and all associated assets.

b. Archived control processor program including all modules used in the program. All files must be editable for future program changes.

c. A list of IP assignments for networked devices, including MAC addresses when applicable / required for installation.

d. Serial numbers for all electronic devices.

e. Biamp DSP configuration files.

f. As-built drawings including cable numbers.

g. Training documentation.

The aforementioned .zip file is required for project sign-off.

Audio, including Digital Signal Processors (DSP)

Acoustic Echo Cancellation

Echo cancellation reference signal(s) will be a discreet output of the audio DSP internal matrix. If a system has voice lift and ceiling mics, multiple AEC references will need to be used. These discreet matrix output(s) will be routed to the proper reference point in the DSP.

Audio Level Controls

a. Level controls in the DSP should be controlled pre-matrix. Cascading level controls should not be used.

b. Post-matrix user controls:

1. Room Mute

2. Privacy Mute: far end feeds (Video Conferencing, Audio Conferencing, Streaming etc.)

3. Pre-matrix user controls:

- Program volume

- Microphone volumes (for voice lift/close mics only)
- Conference Receive(s)

Digital Signal Processors (DSP)

a. The majority of the current state audiovisual systems with DSP(s) have been deployed using Biamp Tesira Forte VT and/or Server IO audio DSP systems.

b. In integrated AV systems, audio power amplifiers will be set to 0dB/unity gain to prevent user tampering as well as for easy level recall during service and amplifier replacement. The DSP output to the amplifier will need to be adjusted to an appropriate level at the DSP output.

Microphones

a. All podiums will be outfitted with a podium microphone unless specified otherwise.

b. Wireless microphone transmitters and receivers will be deployed on a 1:1 basis. No combo systems where bodypack/hand-held transmitters use the same RF receiver/channel will be allowed.

c. Any conferencing system that includes a podium shall include a podium microphone as well.

d. Boundary microphones shall not be used for voice lift.

e. Ceiling microphones shall be used for conferencing or recording; they shall not be used for voice lift in the room.

Speakers

Typically, the JBL Control 26CT has been used as the default speaker in most designs due to its proven longevity and acceptable response ranges for conference and training room needs.

Video Conferencing and Software Based Conferencing

a. Selecting Video Conferencing (VC) on a touch panel should also enable the correct audio for a videoconference. A volume control for incoming audio should be included with the VC controls. Transmit levels will be preset to nominal and should not be accessible by the end-user.

b. VC systems are typically deployed as a single monitor system.

c. Program audio shall not be routed to the codec over HDMI from the video switch. Program audio shall be sent from the conferencing DSP. This will allow the user to have discreet volume control over far-end and program volume.

d. A privacy mute should be provided. This control should also mute other far-end audio feeds (i.e., MediaSite, VoIP etc.).

Branding

Vendor information shall be limited to required documentation and paperwork. No aspect of the deployed system shall contain any vendor branding or contact information. This includes but is not limited to:

a. Touch panel interfaces

b. Training Documentation

c. Rack Deployment

Control Systems

Audio Conferencing Integration

a. Selection of Audio Conferencing should bring up the dialer controls as well as volume control for incoming audio and it should also enable the correct audio for an AC.

b. The transmit level will be preset to an optimal level and should not be accessible by the end-user.

c. A privacy mute should be provided.

d. Once a call is connected, the dialer buttons will send DTMF.

Auto System Off

All systems should be programmed to use the processor's internal clock (set to NTP) to power themselves off at 1:00 AM. The only exceptions would be emergency operations centers or 24-hour helpdesk type systems.

Control Methods

Infrared (IR)

a. IR control should not be used.

b. In the event it is required, the IR emitters should be affixed with a strong but non-permanent adhesive that will not damage the equipment.

c. Any adhesive used should be rated for the local environmental conditions including heat and humidity.

Serial (RS-232)

a. RS232 is considered the most stable and durable control platform for devices such as codecs, displays, and other equipment that has an off state available when fully powered.

Consumer Electronics Control

a. CEC is typically not approved as a control mechanism except in dedicated Cisco/LG/Lightware integrations.

b. As CEC has mixed implementation between products and manufacturers it is considered to be unreliable absent rigorous use case testing with exact equipment to be used.

Ethernet (IP)

a. Problems have been noted in some IP based control deployments, and thus it is often not recommended.

b. If IP is the only control mechanism available then rigorous testing should be performed to ensure desired functionality including ability to boot from a cold start.

Wireless (Wi-Fi, Bluetooth, etc.)

Wireless signals for control, including Wi-Fi, Bluetooth, and RF remotes are highly discouraged.

User Interfaces, including Touch panels and Remotes

a. A setting page should be included on all touch panels. This will provide access to display status, power, screen up/down, lamp hours (for lamped projectors), VC custom URL setup. This settings page should have a documented passcode to prevent accidental access.

b. Handheld wireless remotes, or wireless touch panels are not to be deployed as the only means of control. All control systems must include a hardwired touch panel.

Video Conference Integration

a. Dialers will contain a standard 12-button dialer with a QWERTY keyboard subpage for URI dialing. Dial Buffers must be at least 64 characters to accommodate MS Teams, Webex, and other forms of URI dialing.

b. Two custom dialer buttons should be added to the VC dialer. These buttons will append a dial string with a URL that will be user definable on the Settings Page. This will allow users to

enter the meeting number and then press one of these buttons to complete the dial string to connect to Web Collaboration platforms.

c. Once a call is connected, the dialer buttons will send DTMF.

Virtual and Cloud Processors

No system should utilize virtual processors or cloud processing for room control.

Design

A star topology should be the default in all systems. This will apply to network, audio, and video systems.

Divide/Combine Spaces

In spaces where partitions are used to divide a large meeting space into smaller spaces, the control system should receive feedback on the state of the wall(s). This is typically done with a Crestron partition sensor (GLS-PART) or equivalent. The state of the wall sensor(s) will manage the divide/combine state of the control system and peripherals. Users shall not be required to input room divide/combine status.

Lifespan of System

Any system deployed should have an expected lifespan detailed in the scope of work. Typically, these sorts of systems are expected to have a five-to-seven-year lifespan.

Maintenance & Support Contract

a. Audiovisual systems not purchased through the Strategic Technology Solutions (STS) Unified Communication & Collaboration (UCC) team will not be supported by STS-UCC as per current policy.

b. Agencies purchasing non-STS supported audiovisual systems are strongly encouraged to purchase on-going maintenance support from the company the equipment is purchased from.

Networking

IP Addressing

IP Range

In a /24 Subnet, IP addressing of equipment should begin at .20 to avoid IP conflicts with network hardware. Subnets other than /24 will be dealt with on a case-by-case basis.

Static IP

All AV hardware should be assigned a static IP address from a subnet provided for each system by the State (with the exception of VoIP uplinks and MediaSite encoders which will operate in DHCP).

DHCP

DHCP is not appropriate or reliable for controlled devices in the current State network architecture.

DHCP with Reservation

DHCP with Reservation is not currently used by STS-UCC in deployment of Audio Video Systems. This is due to the complexities of the State network and current protocols. The feasibility of future use of DHCP with Reservation is under evaluation with no current change date.

Switches

All networked devices should be connected directly to a network switch provided by the State of Tennessee. Any special purpose switch, ex. AVB switch, must be approved by the State and meet State deployment guidelines.

Networked Digital Audio (AES67 / AVB / CobraNet / Dante / etc.)

UCC has seen a great deal of diversity in the implementation of networked digital audio depending on the manufacturer. It is recommended that the installation vendor follow the manufacturers recommendations. All networked digital audio must be deployed using a dedicated switch.

Topology

A star topology should be the default in all systems.

Power

Auto-Power

When a user connects their presentation device to a system the system will start in presentation mode. When the user disconnects a 2-minute timer will begin to countdown to system shut-down. The auto-off timer is intended for conference rooms and is not recommended in training rooms or extra-large meeting rooms.

Power Loss

All integrated AV systems must be able to cold boot from a power failure into an operational state. This must be tested and validated by agency prior to signoff.

Surge Protection

All equipment should be appropriately surge protected according to industry best practices.

Remote Access

Any remote support access must comply with current State Network Security guidelines and Best Practices. Any questions regarding this should be asked of the appropriate networking team.

Training

Third Party Providers should provide training on operations and troubleshooting to Agency support staff.

Troubleshooting Guide

Third Party Providers should create and furnish a quick reference troubleshooting guide for common problems including but not limited to:

     a. Touchscreen not responding.

     b. Video not showing.

     c. Audio not playing.

Used Equipment

No used equipment may be included in systems.

Video, including AV over IP

a. AV over IP has unique challenges inside the state network.

b. All AV over IP deployments should use a dedicated switch for AV over IP traffic.

c. All video switches with subnet capability should be set to sub-address in Private Network Mode so that they will only require one IP address.

d. If offered by manufacturer all video matrices should be quoted using redundant power supply models.

e. All inputs and outputs of the switcher should be labeled with logical names for remote support. The output slot being used for program audio needs to be indicated in the labeling as well.

f. HDCP support should be addressed in the scope of work and all training documentation. Whether it is enabled or disabled, the end user will need to be taught about blanking. If the system includes non-HDCP compliant syncs such as video conferencing, streaming capture, or recording equipment, then HDCP will need to be disabled and the users educated about why they can't share protected content.

g. All display and capture devices should receive a discreet output from the video matrix. This will provide better HDCP management and remote support. The use of HDMI distribution amplifiers is heavily discouraged.

h. All video presentation systems will provide user input to support a BYOD environment in the form of an HDMI connection(s).

i. Projectors and displays should be connected using scaled HDMI outputs and controlled by RS-232 by default. Direct HDBT connections to projectors and displays should be avoided.

j. If the video switch is supporting multiple video capture devices (i.e., video conference and live streaming), the camera/content selections should work in unison for all capture devices.

Video Conferencing Equipment

a. Agencies purchasing non-STS supported audiovisual systems that include hardware-based videoconferencing, must engage the STS-UCC team prior to the purchase.

b. The video conference system will need to be connected to the State network in accordance with STS policy.

c. Videoconference call admission and control service must be provided by STS to facilitate firewall traversal.

d. STS will provide current video conferencing CODEC requirements upon request.

e. The purchasing Agency will be responsible for purchasing and maintaining maintenance coverage for the CODEC and VC peripherals.

f. There is a monthly service fee associated with STS video conferencing service.

Brand Specific Information

Barco (Clickshare)

a. The Clickshare base unit will be deployed off-network in a stand-alone environment.

b. The pucks will be paired and labeled for users to associate the puck with the correct system/room.

c. If the Clickshare is deployed into an auto-switching or auto-power presentation system, some settings must be changed for desired behavior:

"Show the wallpaper when no one is sharing their screen" must be unchecked. **This will allow the video input to receive rising/falling edge video sync logic on the Clickshare HDMI output.**

Energy Savers:

1. Must be in "ECO mode."

2. "standby after" should be set to "never."

Crestron

Processors

a. All newly deployed systems must use a minimum of Series 4 hardware-based processors.

b. Virtual Processors are not permissible.

RoomView/Fusion

RoomView and Fusion are considered legacy products and should not be used for system functions, monitoring, or support.

Security

All capable equipment should use Crestron best practices for security including password protection.

Agency must be given the passwords.

User Interfaces, including Touch panels and Remotes

a. All touch panels should use the Black Glass graphics library.

b. An Xpanel matching the touch panel design shall be included for emergency operations and remote support.

c. In Crestron integrated systems, the Cisco Navigator interface should be configured for remote pairing and used in service scenarios as a backup control. A touchscreen of comparable size will be deployed in its place and programmed to provide an emulated Navigator experience during a video conference. At the time of this writing, the RoomOS 11 user interface should be emulated.

MediaSite Live Streaming

MediaSite Recorders

a. Rooms equipped for live streaming will utilize a password protected master control panel. In addition to master system control, this panel will be capable of displaying graphic previews of up to two sources including cameras and the recorder's user interface.

b. A rack mounted keyboard and mouse will be provided for control of the streaming recorder.

c. The control system will be programmed to control the basic transport functions of the recorder over RS-232 with device feedback. Additionally, the following commands should be included:

    1. Go Live/Record

    2. Pause

d. Agencies will need to submit a Streaming Portal ServiceNow request to have a Portal created or to add a new recorder to their existing Portal.

Guide to State Network Requests

Cabling (Voice and Data CAT cables, Fiber Runs, etc.)

Cabling for voice and data drops should be requested in ServiceNow.

> **Keywords: Cabling Services.**

Facility Work (Including Construction, Electrical, Blocking, etc.)

Facility work must be approved and completed by the Department of General Services, the local facility management, or STREAM.

Network Connectivity Requests

Network connectivity requests should be made in ServiceNow.

> **Keywords: Network Data Jack Connectivity.**

Network Security Approval

Security approval for any equipment that will be connected to the State network that is not listed in this document should be directed to STS Security. Requests should be made in Service Now.

> **Keywords: Security Assessment.**

Network Switches

Network switches not provided by the State will not be allowed to connect to the state network without a firewall in place. Requests for firewall connectivity should be made in ServiceNow.

> **Keyword: Firewall**

Equipment Manufacturers in Use

- *1 Beyond* (Now part of Crestron)
- *AKG*
- AMX
- Audio Video Furniture International (AVFI)
- Barco
- Clickshare
- Biamp
- Chief
- Cisco
- Crown
- Dalite
- Extron
- Harmon
- JBL
- Lab Gruppen
- Legrand
- LG Commercial
- Lightware
- MediaSite
- Middle Atlantic
- NEC
- Panasonic
- Planar
- QSC
- Shure
- Vaddio

Current Third-Party Providers of Audio Video Systems

This list is not intended to be exhaustive or exclusive, and companies are organized alphabetically. Agencies may work with other providers as their own guidelines and rules allow. Inclusion on this list is not endorsement of any company or the quality of their work. This list is limited to organizations known to be able to handle typical requests of the sorts of systems covered in this guide.

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