

PRACTICE EXAM 9: CTS-D

SIMULATION (110 QUESTIONS)

Time Limit: 180 minutes | Passing Score: 70%

1. A commercial AV system shows intermittent audio artifacts only when the refrigerator cycles on. The root cause investigation should start with:

- A. Microphone replacement
- B. DSP firmware update
- C. Amplifier failure
- D. Ground loop analysis and electrical circuit separation

2. A 4K video wall shows a 3-pixel vertical line on one panel that doesn't appear on source content. The likely cause is:

- A. HDCP handshake failure
- B. Dead or stuck pixel in the display panel
- C. HDMI cable failure
- D. Source configuration error

3. A broadcast facility's SMPTE ST 2110 timing offset exceeds 2 microseconds intermittently. The most likely cause is:

- A. PTP grandmaster instability or network path congestion
- B. Media device firmware issue

- C. Cable length
- D. VLAN configuration

4. A conference room reports that remote participants sound "robotic" during calls. The most likely cause is:

- A. Audio codec quality setting
- B. Microphone sensitivity
- C. Network packet loss or jitter affecting audio streams
- D. DSP configuration

5. A Dante audio network shows synchronous audio on 90% of devices but one amplifier is 0.5 ms late. The cause is likely:

- A. Cable run length
- B. PTP clock synchronization offset on that specific device
- C. DSP processing
- D. Amplifier hardware

6. A ceiling-mounted projector loses image sync for 5-10 seconds after room lighting turns on. The issue is:

- A. Projector warm-up
- B. Power supply sag
- C. HDMI cable
- D. EMI from lighting control system coupling through power or cable pathway

7. A stadium PA system produces inadequate low-frequency response in certain seating areas. The acoustic phenomenon is:

- A. Room modes and low-frequency cancellation from coverage geometry
- B. Amplifier clipping
- C. Subwoofer placement
- D. Loudspeaker phasing

8. A broadcast control surface produces intermittent button failures. Preliminary diagnosis should check:

- A. User training
- B. Software version
- C. USB/network cable connectivity and hub power supply
- D. Programming logic

9. A venue's line array produces audible distortion at high SPL. The primary investigation is:

- A. Loudspeaker damage
- B. Amplifier clipping due to insufficient headroom
- C. Cable shielding
- D. Network interference

10. An AV-over-IP encoder shows sudden video freezing at irregular intervals. The most common cause is:

- A. Encoder firmware bug
- B. HDMI source issue
- C. Cable degradation

D. Multicast group timeout or IGMP state aging

11. A video conference room's far-end participants report hearing echo of their own voice. The issue is:

A. Acoustic echo cancellation (AEC) inadequately configured or insufficient processing tail length

B. Microphone gain

C. Loudspeaker output level

D. Camera positioning

12. A digital signage display shows correct content but blue tint across all imagery. The likely cause is:

A. HDCP configuration

B. Video codec

C. Display color temperature misconfiguration or panel failure

D. Source color settings

13. A ceiling speaker shows significant reduction in high-frequency response after 2 years of operation. The cause is likely:

A. Amplifier failure

B. Cable degradation

C. EQ settings

D. Speaker component aging or diaphragm/surround deterioration

14. A 70V paging system intermittently stops covering one zone. The investigation priority is:

A. Speaker tap settings

- B. Zone amplifier failure or interruption in that zone's distribution loop
- C. Source routing
- D. Microphone gating

15. A corporate video conferencing system's image appears oversaturated on camera. The cause is:

- A. Camera white balance setting mismatched to room lighting conditions
- B. HDMI conversion
- C. Network codec
- D. Display calibration

16. A hospital telemedicine studio shows audio latency over 200 ms during peak hours. The systemic cause is:

- A. DSP processing delay
- B. Network latency during congestion
- C. Video codec buffer accumulation or network congestion affecting streams
- D. Camera framerate

17. An acoustic treatment specification identifies RT60 of 1.2 seconds in a classroom meeting specifications. Post-installation measures 1.8 seconds. The investigation path is:

- A. Student opinion
- B. Acoustic treatment installation verification—coverage, placement, and material compliance with specifications
- C. Room dimension confirmation
- D. RT60 measurement methodology

18. A multi-room AV-over-IP system shows jitter affecting lip-sync. The network coordination is:

- A. Replace switches
- B. Add more bandwidth
- C. Upgrade firmware
- D. QoS policy review and packet prioritization for AV traffic with dedicated bandwidth reservation

19. A loudspeaker cluster produces frequency cancellation at certain listener positions. The acoustic cause is:

- A. Room mode interactions or speaker interference patterns at specific frequencies
- B. Amplifier issue
- C. Cable problem
- D. Source level

20. A matrix switcher produces flickering video on one of its outputs intermittently. The coordination is:

- A. Matrix replacement
- B. Switch firmware upgrade
- C. HDMI cable and connector inspection at the affected output
- D. Source device

21. A broadcast facility's graphics playout produces sync drift with video. The coordination is:

- A. Graphics software update
- B. Genlock or PTP synchronization between graphics and video systems
- C. Playback workflow

D. File format

22. A performing arts center's stage microphones produce high-pitched squealing at certain frequencies. The investigation:

A. Microphone replacement

B. Amplifier clipping

C. DSP processing

D. Feedback—analyze PAG geometry and implement frequency-specific EQ notching

23. A 4K display shows smooth gradients but obvious color banding. The cause is:

A. 8-bit color depth insufficient for HDR content; 10-bit or higher required

B. HDMI cable

C. Panel manufacturing

D. Source format

24. A ceiling cluster of 4 speakers produces coverage with one "dead" spot. The investigation:

A. Speaker replacement

B. Cable check

C. Speaker placement geometry—coverage angle overlap calculation at listener height

D. Amplifier verification

25. A video streaming system produces inconsistent quality across bit rates. The root cause is:

A. Encoder hardware

- B. Network congestion during streaming
- C. Source quality
- D. Adaptive bit rate algorithm matching codec to available bandwidth

26. A conference room table microphone picks up excessive paper-shuffling noise. The solution approach is:

- A. Microphone position adjustment
- B. Microphone element or shock mount—switch to dynamic pattern or boundary-type
- C. Gating threshold
- D. DSP filtering

27. A 24-port network switch shows port saturation when 4 AV-over-IP streams are active. The network coordination is:

- A. Upgrade to 10 Gbps uplink or higher to eliminate switch port saturation
- B. Reduce stream count
- C. Reduce quality
- D. Switch replacement

28. A broadcast facility specifies 99.99% uptime. Realistic downtime allowance is:

- A. 10 minutes per year
- B. 5 hours per year
- C. 20 hours per year
- D. Approximately 52 minutes per year

29. A television broadcast audio surveillance shows RMS level within tolerance but peak excursions to 10 dB above. The cause is:

- A. Audio compression not applied
- B. Microphone sensitivity
- C. Transient content requiring dynamic compression before broadcast transmission
- D. Preamp gain

30. An HDMI 2.0 system shows sporadic audio dropouts on one receiver. The diagnostic is:

- A. Source device
- B. HDMI/HDCP handshake intermittent with receiver—check EDID negotiation and cable integrity
- C. Display setting
- D. Amplifier

31. A conference room's projection system produces blurry images only at maximum projection distance. The cause is:

- A. Projector motor failure
- B. Image processing
- C. Manufacturing defect
- D. Projector throw range exceeded—lens shift/zoom insufficient for installation distance

32. A ceiling microphone array shows poor speech pickup quality from the back of the room. The design issue:

- A. Microphone array coverage pattern mismatch with room dimensions
- B. Microphone sensitivity

- C. DSP gain
- D. Room acoustics

33. A corporate AV-over-IP system shows image tearing on one display. The cause:

- A. Display refresh rate
- B. Network latency
- C. Decoder clock sync issue between encoder/decoder pair
- D. Source format

34. A broadcast facility's time-of-day automation fails to trigger on Monday mornings. The programming issue:

- A. Daylight Savings Time transition not handled in automation scheduling
- B. Power failure
- C. Schedule corruption
- D. Manual intervention

35. A conference room hybrid call produces distortion on remote participant speech. The issue:

- A. Remote participant's microphone gain or network codec quality at their location
- B. Local audio processing
- C. Network latency
- D. Echo cancellation

36. A large conference venue produces intelligibility loss at the rear of the room. The design issue:

- A. STI below target for that location
- B. Microphone position
- C. Amplifier power
- D. Delay-fill loudspeakers missing or mistimed for rear sections

37. A 4K projection system produces vertical banding patterns on dark content. The cause:

- A. Projector lamp aging
- B. Image source processing
- C. LED illumination uniformity issue in projector or HDMI source format mismatch
- D. Room ambient light

38. A corporate AV system shows system lockup after firmware update. The recovery:

- A. Rollback to previous firmware version documented in integrator configuration management
- B. Factory reset
- C. Hardware replacement
- D. Service call

39. A performance venue's wireless microphone system produces interference after a new system was added to the building. The root cause:

- A. Wireless microphone failure
- B. Cable issue
- C. Network problem

D. Frequency coordination and RF interference from the new system

40. A hospital patient room display shows pixelation during IPTV streaming. The cause:

A. Display failure

B. Network congestion during streaming affecting IPTV multicast or unicast

C. HDMI cable

D. Source format

41. A performing arts center's intercom system produces static on one headset position. The investigation:

A. Intercom amplifier

B. Cable routing to that specific position

C. Loose cable connection or cable degradation at that specific position

D. Headset replacement

42. A broadcast studio's camera control panel shows delayed response to operator commands. The cause:

A. Network latency between control panel and camera control unit exceeding operator tolerance

B. Panel hardware

C. Software update needed

D. USB connection

43. A videoconference picture-in-picture feature produces out-of-sync audio/video. The cause:

A. Audio/video routing

B. Display processing

- C. Network latency
- D. Codec processing chain introducing different delays for audio and video

44. A 4K source distributed to 20 displays via HDMI distribution amplifier shows inconsistent HDCP behavior. The cause:

- A. Source configuration
- B. Distribution amplifier HDCP 2.2 compliance partial—some ports may not meet full HDCP 2.2 requirements
- C. Display compatibility
- D. HDMI cable quality

45. A conference room's motorized screen produces intermittent positioning errors. The diagnostic:

- A. Motor replacement
- B. Control cable routing
- C. Limit switch calibration or control signal issue
- D. User error

46. A data center operations dashboard shows incorrect data for 15 minutes each day. The cause:

- A. Scheduled backup/maintenance consuming data processing capacity during specific window
- B. Software bug
- C. Network issue
- D. Display issue

47. A broadcast live audio mix shows dead air between elements transitioning. The cause:

- A. Audio source failure
- B. Audio mixer programming
- C. DSP routing
- D. Automation playlist gap or cross-fade timing misconfigured in automation system

48. A conference room audio produces excessive background noise only when HVAC operates. The coordination:

- A. Room ventilation
- B. HVAC diffuser placement or DSP noise reduction or room acoustic treatment
- C. Amplifier hum
- D. Microphone quality

49. A 4K projector shows artifacts when content resolution matches source (native 1080p). The cause:

- A. Projector hardware
- B. Source quality
- C. Scaling introduction—projector scaling non-native content produces processing artifacts
- D. HDMI cable

50. A control system touch panel shows flickering during normal operation. The cause:

- A. Panel firmware issue or power supply instability from network switch PoE budget
- B. Network latency
- C. Integrator programming

D. Manufacturer defect

51. A performing arts center's orchestra pit monitor system shows musician dissatisfaction with cue mixes. The investigation:

A. Conductor preference

B. System failure

C. Cable quality

D. Individual cue-mix routing may require tailoring per musician position and instrument

52. A broadcast facility's slow-motion replay system shows image jitter at playback. The cause:

A. Playback buffer size

B. Frame-rate conversion without frame-rate-matching or interpolation

C. Hardware failure

D. Storage speed

53. A conference center shows image ghosting during display-to-display switching. The cause:

A. HDMI source settling time or matrix switcher HDCP 2.2 handshake latency

B. Display response time

C. Cable quality

D. Source format

54. A hotel ballroom's zoned audio produces cross-talk between zones during loud events. The cause:

A. Amplifier design

- B. Speaker placement
- C. Zone amplifier isolation or crosstalk between zones at the DSP matrix level
- D. Cable interference

55. A conference room system produces high-pitched whine during video calls but not during presentation mode. The cause:

- A. Speaker resonance
- B. AEC processing producing residual audio artifact in specific scenarios
- C. DSP firmware
- D. Network codec

56. A broadcast surveillance system shows pixelated footage from one camera during peak traffic. The cause:

- A. Camera failure
- B. Display failure
- C. Cable issue
- D. Network congestion affecting that specific camera's IP stream

57. An AV equipment room's cooling system shows elevated temperature during summer months. The investigation priority:

- A. Cooling capacity matched to AV heat load with appropriate derating for summer conditions
- B. Equipment failure
- C. Scheduling
- D. Insufficient cooling

58. A sports venue's outdoor amphitheater shows inadequate coverage at the rear. The investigation:

- A. Amplifier power
- B. Source volume
- C. Outdoor coverage pattern with weather-rated equipment and appropriate delay fill at rear positions
- D. Speaker placement

59. A control system integration fails to properly synchronize with the lighting system. The root cause:

- A. Lighting system issue
- B. Protocol mismatch between AV control and lighting—API version or message format incompatibility
- C. Programming error
- D. Network problem

60. A conference room's camera tracking system produces erratic movement during presentations. The cause:

- A. Software bug
- B. Camera mechanical issue
- C. Network latency
- D. Speaker-tracking algorithm confusion from multiple overlapping speakers or loud background noise

61. A digital cinema projection shows subtle color shifts between theaters. The cause:

- A. Colorimeter calibration drift between theaters—regular recalibration per DCI standards required
- B. Source mastering
- C. Audio issue

D. Screen material

62. A corporate lobby video wall shows lag between content updates across panels. The cause:

A. Panel response time

B. Cable length

C. CMS synchronization across panels—time-synchronized update mechanism required

D. Network bandwidth

63. A hospital operating room AV system shows display artifacts during surgical procedures. The root cause:

A. Medical device interference

B. DICOM calibration drift

C. Room lighting interference

D. Medical device electromagnetic interference in AV signal pathway

64. A performing arts center's orchestra pit audio produces audible phase cancellation with sanctuary delay fills. The cause:

A. Speaker placement

B. Delay timing between pit monitor and delay fills producing destructive interference

C. Amplifier polarity

D. Cable wiring

65. A corporate videoconferencing room shows image tearing when the IT team updates the network. The cause:

- A. Network topology change affecting AV-over-IP multicast routing temporarily
- B. Update quality
- C. Software bug
- D. Equipment failure

66. A corporate R&D demonstration space produces audio dropout during complex system demonstrations. The cause:

- A. Demo software
- B. Visitor audio
- C. DSP overload from simultaneous processing of multiple audio sources
- D. Speaker capacity

67. A live streaming system produces quality variations across viewers. The cause:

- A. Encoder settings
- B. Viewer network connection variability affecting adaptive bit rate streaming
- C. Source quality
- D. CDN performance

68. A convention center exhibition hall reports audio bleed between nearby booths. The cause:

- A. Booth speaker placement
- B. Room acoustics
- C. Booth amplifier settings

D. Inadequate acoustic separation between booth coverage areas

69. A conference room's touch panel produces non-responsive zones. The cause:

A. Touch screen calibration or electrical interference affecting capacitive touch detection

B. Software issue

C. Hardware failure

D. User training

70. A corporate event production truck's audio produces intermittent hum on one channel. The diagnostic:

A. Cable quality

B. Amplifier hum

C. Ground loop between truck electrical system and venue power

D. Microphone quality

71. A sports venue's public address produces unintelligible speech during peak crowd noise. The cause:

A. STI below 0.60 for that zone at peak ambient noise level

B. Amplifier power inadequate

C. Microphone placement

D. Speaker placement

72. A corporate videoconferencing system produces excessive compression artifacts during daily all-hands calls. The cause:

A. Equipment failure

- B. Camera issue
- C. Codec quality
- D. Network bandwidth contention during peak collaboration hours

73. A broadcast master control room's automation produces 30-second audio dropouts between programs. The cause:

- A. Audio source switching timing or audio chain routing in automation system
- B. Hardware failure
- C. Network issue
- D. Cable problem

74. A convention center's multi-zone audio produces audible zone boundaries. The cause:

- A. Speaker type mismatch between zones
- B. Amplifier levels
- C. DSP matrix routing producing hard zone transitions rather than acoustic overlap
- D. Cable quality

75. A sports venue's broadcast facility shows audio sync drift across multiple camera feeds. The cause:

- A. Camera audio
- B. Broadcast mixer
- C. Cable lengths
- D. Video/audio sync protocol not implemented across cameras (genlock/audio delay)

76. A conference room system produces a low-frequency rumble during playback. The cause:

- A. Amplifier issue
- B. HVAC or mechanical vibration coupling through structure to speaker
- C. Source quality
- D. DSP configuration

77. A broadcast news studio's telepresenter teleprompter produces scroll lag. The cause:

- A. Teleprompter network communication latency or scroll buffer overflow
- B. Teleprompter hardware
- C. Software bug
- D. Control panel

78. A corporate cafeteria's menu board content fails to update on Sundays. The cause:

- A. Scheduling issue
- B. Automation bug
- C. Scheduled maintenance window consuming CMS processing during specific time
- D. Network issue

79. A digital signage network shows some displays stuck on old content. The cause:

- A. Update check interval too long for content refresh or network connectivity lost at specific displays
- B. Content server failure
- C. Display issue
- D. CDN failure

80. A hospital operating room DICOM display shows slight green cast. The cause:

- A. Display calibration drift requiring recalibration per DICOM Grayscale Standard Display Function
- B. Panel aging
- C. Room lighting
- D. Source mastering

81. A convention center's main ballroom uses 12 microphones in active use. The PAG impact:

- A. No impact
- B. 6 dB reduction
- C. 9 dB reduction
- D. Significant reduction requiring automatic mixer

82. A performing arts center's main hall produces acoustic interference between primary and delay-fill loudspeaker systems. The cause:

- A. System failure
- B. Cable issue
- C. Delay timing misconfiguration between primary and delay systems producing Haas-violating conditions
- D. Amplifier problem

83. A broadcast facility's fiber optic link shows intermittent signal loss. The cause:

- A. Cable damage
- B. Fiber connector degradation, bending beyond specification, or cable damage at a specific location
- C. Network switch failure

D. Source quality

84. A 4K video conference shows intermittent audio dropouts only when the cleaning staff uses certain equipment. The cause:

A. Scheduling

B. Room occupancy

C. Cleaning noise pickup

D. Electromagnetic interference from cleaning equipment (vacuum, buffing machine)

85. A conference room's motorized window shade operates inconsistently with AV scenes. The cause:

A. Control system integration programming for shade timing mismatched with scene triggers

B. Motor failure

C. Cable routing

D. User error

86. A broadcast studio's lighting control produces AV interference during color changes. The cause:

A. Lighting fixture specification

B. Control protocol

C. Dimmer or LED driver electronic emissions coupling to AV cable pathway

D. Power issue

87. A corporate meeting room's microphone arrangement produces hearing-impaired meetings reporting difficulty. The cause:

A. Induction loop system absent or misconfigured

- B. ADA compliance requirement—induction loop or alternate hearing-impaired accommodation required
- C. Volume level
- D. Room acoustics

88. A corporate AV system's HDMI audio return channel (ARC) produces intermittent audio from display to soundbar. The cause:

- A. HDMI cable quality
- B. Display settings
- C. Soundbar configuration
- D. eARC/ARC compatibility between display and soundbar—HDMI 2.1 ARC protocol support required

89. A performing arts center's upstage monitor position produces delayed audio. The cause:

- A. Cable length
- B. Routing issue
- C. Speaker placement
- D. Delay misconfiguration for that specific monitor zone in relation to stage/conductor

90. A broadcast video production control room's multiviewer produces intermittent black flashes. The cause:

- A. Multiviewer firmware issue
- B. Video signal sync mismatch between input sources or conversion issues
- C. Cable quality
- D. Power issue

91. A large corporate meeting room's ceiling microphone array produces poor pickup at the ends of a 40-foot table. The cause:

- A. Microphone element sensitivity
- B. Array coverage pattern designed for shorter room
- C. Array coverage geometry—beamforming pattern may need adjustment for extended table
- D. DSP gain

92. A digital cinema projector shows subtle image quality changes across morning to evening shows. The cause:

- A. Lamp aging during operation producing gradual brightness/color variation
- B. Source quality
- C. Room temperature
- D. Audience

93. A corporate campus' outdoor amphitheater's audio produces audible echoes from adjacent buildings. The cause:

- A. Microphone placement
- B. Amplifier power
- C. Speaker positioning
- D. Acoustic reflections from building facades requiring speaker directivity and placement coordination

94. A broadcast news studio's confidence monitor produces perceivable latency to talent. The cause:

- A. Display latency or signal processing chain introducing delay between source and monitor
- B. Camera processing

- C. Network latency
- D. Teleprompter

95. A corporate system's network-attached amplifier produces high CPU usage affecting responsiveness. The cause:

- A. DSP processing load at amplifier exceeding configured capability
- B. Network issue
- C. Firmware bug
- D. Hardware failure

96. A performing arts center's orchestra pit specifications call for measured audio. The primary measurement consideration:

- A. Orchestra volume
- B. Conductor preference
- C. SPL measurement position matching musician ear height and relevant instrument placement
- D. Room acoustics

97. A convention center's distributed paging system produces audible level differences between zones. The cause:

- A. Speaker quality
- B. Amplifier selection
- C. Cable issue
- D. Zone amplifier calibration or 70V tap setting inconsistency between zones

98. A corporate retreat facility shows AV system failure during actual use but works during commissioning. The cause:

- A. Environmental conditions during actual use (temperature, humidity, occupancy) differing from commissioning conditions
- B. User error
- C. Integration error
- D. Equipment failure

99. A broadcast truck parked outdoors produces equipment failure during storms. The cause:

- A. Truck power
- B. Grounding inadequate—lightning or electrical storm induced transients requiring isolation/surge protection
- C. Cable quality
- D. Equipment age

100. A sports venue's pitch-mounted displays produce glare onto spectators from sun angle. The design consideration:

- A. Screen brightness
- B. Spectator positioning
- C. Display angle, sun angle analysis, and anti-glare treatment for outdoor/stadium environments
- D. Content brightness

101. A corporate lobby AV system shows DCI-compliant content but different colors than expected. The cause:

- A. Display not calibrated to DCI-P3 color space—calibration required

- B. Source format
- C. HDMI cable
- D. Video codec

102. A broadcast production shows skin tones varying between cameras. The cause:

- A. Camera quality
- B. White balance matching
- C. Lighting consistency
- D. Color correction between cameras required—white balance, gain, and color matrix alignment

103. A corporate meeting room's video conference shows inconsistent framing quality. The cause:

- A. Camera positioning
- B. Framing algorithm performance across different meeting scenarios—participant counts, positions, activity levels
- C. Room lighting
- D. Camera PTZ specification

104. A convention center's audio delivers but includes background hum. The cause:

- A. Speaker defect
- B. Amplifier issue
- C. Ground loop between amplifier and preamp or facility electrical system
- D. Cable quality

105. A performing arts center's main hall specification requires 0.8 seconds RT60 at 500 Hz. Measured RT60 is 1.2 seconds. The remediation:

- A. Additional acoustic absorption at 500 Hz requiring frequency-specific treatment materials
- B. Speaker placement
- C. Amplifier EQ
- D. Architectural modification

106. A corporate event production requires multi-camera simultaneous broadcast. The priority specification:

- A. Consumer setup
- B. Single camera adequate
- C. Professional multi-camera switcher with frame-accurate switching
- D. Synchronized multi-camera capture with genlock, frame-accurate switcher, and broadcast-grade audio infrastructure

107. A broadcast facility's playout server shows mass file corruption. The recovery:

- A. Manual rebuild
- B. Restore from redundant backup or redundant playout system during incident response
- C. Vendor support
- D. System replacement

108. A sports venue's end-zone dvLED shows image failures affecting critical in-game display. The cause:

- A. Single module failure in tile requiring hot-swap replacement per dvLED serviceability design
- B. Source failure
- C. Control signal
- D. Power supply

109. A conference room's camera tracking system fails to recognize active speakers. The cause:

- A. Camera lens quality
- B. Network latency
- C. Speaker tracking algorithm confidence threshold or acoustic localization sensitivity tuning
- D. DSP configuration

110. A broadcast lighting production shows flickering on camera during certain LED fixtures. The cause:

- A. Camera shutter speed
- B. LED dimming quality
- C. Camera frame rate
- D. LED fixture PWM frequency mismatch with camera shutter producing banding and flicker artifacts

PRACTICE EXAM 9: ANSWER KEY AND EXPLANATIONS

1. D — Ground loop analysis and electrical circuit separation. Refrigerator compressor cycling produces ground-plane voltage transients that couple into audio signal paths. Separation of AV and appliance circuits, along with proper single-point grounding, is the systematic remediation.
2. B — Dead or stuck pixel in the display panel. Persistent line artifacts independent of source content indicate panel-level failure. Other causes would show content-dependent behavior, not consistent display artifacts.
3. A — PTP grandmaster instability or network path congestion. ST 2110 requires sub-microsecond PTP synchronization. Intermittent offsets beyond specification trace to grandmaster or network conditions affecting timing distribution.
4. C — Network packet loss or jitter affecting audio streams. Robotic audio is characteristic of codec response to packet loss and jitter. Network QoS and path analysis address the root cause.
5. B — PTP clock synchronization offset on that specific device. One device out of sync indicates device-specific PTP issue. Cable length, DSP, and amplifier hardware wouldn't produce precise 0.5 ms offset.
6. D — EMI from lighting control system coupling through power or cable pathway. Power dimmers and LED drivers produce electromagnetic emissions that couple into AV signal paths. Separation, shielding, and filtering address this coupling.
7. A — Room modes and low-frequency cancellation from coverage geometry. Large venues exhibit acoustic interference at specific positions where sound waves interact. Bass management and coverage geometry design address this phenomenon.
8. C — USB/network cable connectivity and hub power supply. Control surface button failures frequently trace to connection issues rather than programming or software, especially intermittent patterns.
9. B — Amplifier clipping due to insufficient headroom. High-SPL distortion typically indicates amplifier running at or beyond rated output. Adequate amplifier sizing with appropriate headroom prevents this audible degradation.
10. D — Multicast group timeout or IGMP state aging. AV-over-IP streams depend on multicast group membership maintained through IGMP. Irregular freezing indicates multicast state issues rather than equipment failure.

11. A — AEC inadequately configured or insufficient processing tail length. Remote participants hearing their own voice echoed back indicates inadequate echo cancellation, typically requiring DSP reconfiguration.
12. C — Display color temperature misconfiguration or panel failure. Blue tint across all content indicates display-level color issue, not source or format problems.
13. D — Speaker component aging or diaphragm/surround deterioration. High-frequency response loss over years of operation typically indicates physical speaker component degradation, not amplifier or cable issues.
14. B — Zone amplifier failure or interruption in that zone's distribution loop. Intermittent zone coverage loss localizes the problem to the specific zone's equipment or loop path.
15. A — Camera white balance mismatched to room lighting. Oversaturated image typically indicates white balance misconfiguration between camera and ambient lighting color temperature.
16. C — Video codec buffer accumulation or network congestion affecting streams. 200+ ms latency indicates network/codec issues; DSP processing alone rarely produces this magnitude.
17. D — Acoustic treatment installation verification. Discrepancy between specified and measured RT60 requires verification that treatment was installed per specifications—coverage, placement, and materials.
18. D — QoS policy review and packet prioritization for AV traffic. Jitter affecting lip-sync indicates insufficient QoS for AV streams. Bandwidth reservation and priority queuing address this.
19. A — Room mode interactions or speaker interference patterns. Frequency cancellation at specific positions is characteristic of acoustic interference phenomena, not equipment failure.
20. C — HDMI cable and connector inspection at the affected output. Output-specific flickering typically traces to cable/connector issues on that specific path, not switcher or source.
21. B — Genlock or PTP synchronization between graphics and video systems. Broadcast graphics and video must share timing reference to prevent drift. Unlocked systems drift at natural clock rates.
22. D — Feedback—analyze PAG geometry and implement frequency-specific EQ notching. High-pitched squealing is classic feedback, addressed through professional diagnosis rather than equipment replacement.
23. A — 8-bit color depth insufficient for HDR content; 10-bit or higher required. Banding in smooth gradients indicates insufficient bit depth, particularly with HDR content requiring 10+ bit precision.
24. C — Speaker placement geometry—coverage angle overlap at listener height. Dead spots indicate coverage gaps requiring geometric analysis of loudspeaker placement versus listener positions.

25. D — Adaptive bit rate algorithm matching codec to available bandwidth. Streaming quality variations typically reflect adaptive bitrate response to network conditions, not equipment or source issues.
26. B — Microphone element or shock mount. Paper-shuffling noise suggests mechanical vibration coupling; dynamic mics or shock mounts reduce this mechanical pickup.
27. A — Upgrade to 10 Gbps uplink or higher. 4 AV-over-IP streams saturating a Gigabit uplink requires upgrading to higher bandwidth uplink capacity.
28. D — Approximately 52 minutes per year. 99.99% uptime allows 0.01% downtime = 52.6 minutes per year ($8,760 \text{ hours} \times 0.0001 \times 60 \text{ minutes}$).
29. C — Transient content requiring dynamic compression. Peak-to-RMS disparity suggests transients not managed through compression before broadcast transmission.
30. B — HDMI/HDCP handshake intermittent. Sporadic audio dropouts on HDMI typically indicate handshake issues requiring EDID and HDCP diagnosis.
31. D — Projector throw range exceeded. Maximum-distance blurring indicates the projector's zoom range is inadequate for the installation distance, exceeding its optical range.
32. A — Microphone array coverage pattern mismatch with room dimensions. Poor back-of-room pickup indicates coverage geometry doesn't serve the full room extent.
33. C — Decoder clock sync issue between encoder/decoder pair. Image tearing in AV-over-IP typically indicates clock synchronization issues between encoder and decoder at a specific display.
34. B — Daylight Savings Time transition not handled in automation. Monday morning failures tied to DST indicates scheduling system not accounting for time zone changes.
35. A — Remote participant's microphone gain or codec quality at their location. Speech distortion from one participant originates at their location, not in local processing.
36. D — Delay-fill loudspeakers missing or mistimed. Rear-of-room intelligibility loss typically indicates inadequate or misconfigured delay-fill coverage.
37. C — LED illumination uniformity issue in projector or HDMI source format mismatch. Banding on dark content indicates illumination variation or format mismatch producing processing artifacts.
38. A — Rollback to previous firmware version. Firmware update causing lockup requires rollback through integrator-maintained configuration management.
39. D — Frequency coordination and RF interference from the new system. RF interference when a new system was added indicates frequency coordination issue.
40. B — Network congestion during streaming. IPTV pixelation typically indicates insufficient bandwidth or QoS for the multicast/unicast streams during peak periods.

41. C — Loose cable connection or cable degradation at that specific position. Position-specific static localizes the problem to that specific headset cable or connector.
42. A — Network latency between control panel and CCU exceeding operator tolerance. Broadcast control latency must be below operator perception threshold for command response.
43. D — Codec processing chain introducing different delays for audio and video. PIP audio/video sync issues typically arise from different processing paths having different latencies.
44. B — Distribution amplifier HDCP 2.2 compliance partial. Inconsistent HDCP behavior across distributed outputs indicates some ports not meeting HDCP 2.2 requirements.
45. C — Limit switch calibration or control signal issue. Intermittent positioning errors indicate control system or limit switch calibration issues.
46. A — Scheduled backup/maintenance consuming data processing capacity. Consistent 15-minute daily issue indicates scheduled system activity impacting data availability.
47. D — Automation playlist gap or cross-fade timing misconfigured. Dead air between programs indicates automation playlist issues rather than equipment.
48. B — HVAC diffuser placement or DSP noise reduction or room acoustic treatment. HVAC-correlated noise indicates diffuser placement, absorption, or processing are inadequate.
49. C — Scaling introduction—projector scaling non-native content. 1080p content on 4K projector requires scaling, which can introduce artifacts if processing is poor.
50. A — Panel firmware issue or power supply instability from network switch PoE budget. Touch panel flickering often traces to power supply instability through network infrastructure.
51. D — Individual cue-mix routing may require tailoring. Orchestra musician satisfaction varies; individual cue mixes tailored to musician position and instrument are often required.
52. B — Frame-rate conversion without frame-rate-matching or interpolation. Slow-motion jitter indicates improper frame-rate handling between capture and playback.
53. A — HDMI source settling time or HDCP 2.2 handshake latency. Ghosting during source switching indicates handshake or settling time issues.
54. C — Zone amplifier isolation or crosstalk at DSP matrix level. Zone crosstalk during loud events indicates isolation failure at the amplifier or DSP routing level.
55. B — AEC processing producing residual audio artifact. Video call-specific whine suggests AEC is processing audio in a way that generates residual artifacts.
56. D — Network congestion affecting that specific camera's IP stream. Pixelated footage from one specific camera indicates network path issue to that camera.

57. A — Cooling capacity matched to AV heat load with summer derating. Summer temperature elevation indicates cooling system sizing didn't account for seasonal conditions.
58. C — Outdoor coverage pattern with weather-rated equipment and appropriate delay fill. Outdoor rear coverage requires proper pattern, equipment ratings, and delay fill.
59. B — Protocol mismatch between AV control and lighting. Control integration failure typically traces to protocol compatibility issues between AV and lighting systems.
60. D — Speaker-tracking algorithm confusion from multiple overlapping speakers or noise. Erratic PTZ tracking often reflects algorithm challenges with complex acoustic environments.
61. A — Colorimeter calibration drift requiring recalibration. Color shifts between theaters indicate calibration maintenance is needed per DCI standards.
62. C — CMS synchronization across panels. Video wall update lag indicates CMS-level synchronization mechanism needs improvement for simultaneous updates.
63. D — Medical device EMI in AV signal pathway. Operating room AV artifacts during procedures typically indicate electromagnetic interference from medical devices coupling into AV.
64. B — Delay timing between pit monitor and delay fills producing destructive interference. Phase cancellation indicates Haas-violating timing between systems requiring delay correction.
65. A — Network topology change affecting AV-over-IP multicast routing. IT network changes during updates can temporarily disrupt multicast routing in AV systems.
66. C — DSP overload from simultaneous audio processing. Complex demonstrations with multiple simultaneous sources can exceed DSP processing capacity.
67. B — Viewer network connection variability. Streaming quality across viewers reflects individual network variability, not system-wide issues.
68. D — Inadequate acoustic separation between booth coverage areas. Booth audio bleed indicates coverage pattern mismatch and insufficient acoustic isolation.
69. A — Touch screen calibration or electrical interference. Non-responsive touch zones typically trace to calibration issues or capacitive interference.
70. C — Ground loop between truck electrical system and venue power. Production truck hum on one channel typically indicates ground loop from connection to venue power.
71. B — Amplifier power inadequate. While STI below 0.60 is the outcome, the design issue producing that outcome in high-ambient environments typically traces to coverage geometry, delay fill, and amplifier capacity matching actual SPL requirements over ambient.
72. D — Network bandwidth contention during peak collaboration hours. Daily all-hands call artifacts indicate network-wide bandwidth contention during business peak.

73. A — Audio source switching timing in automation system. Dropouts during program transitions indicate automation audio routing timing issues.
74. C — DSP matrix routing producing hard zone transitions. Audible zone boundaries indicate DSP matrix creates hard transitions rather than acoustic overlap between zones.
75. D — Video/audio sync protocol not implemented across cameras. Multi-camera audio sync drift indicates inadequate synchronization infrastructure.
76. B — HVAC or mechanical vibration coupling through structure. Low-frequency rumble typically indicates mechanical vibration transmitting through building structure to speakers.
77. A — Teleprompter network communication latency or buffer overflow. Scroll lag in teleprompter indicates communication path issues between control and display.
78. C — Scheduled maintenance window consuming CMS processing. Consistent day-of-week issues indicate regular scheduling activity impacting content delivery.
79. B — Update check interval too long or connectivity lost at specific displays. Some displays stuck on old content indicates update distribution problem at those specific endpoints.
80. A — Display calibration drift requiring recalibration. DICOM standard compliance requires regular calibration; drift produces color cast issues.
81. D — Significant reduction requiring automatic mixer. 12 open microphones creates 11 dB NOM penalty (calculated as $10 \times \log_{10}(12)$), requiring automatic mic mixing to maintain system gain.
82. C — Delay timing misconfiguration producing Haas-violating conditions. Acoustic interference between primary and delay systems indicates timing between them violates the Haas effect window.
83. B — Fiber connector degradation, bending beyond specification, or cable damage. Intermittent signal loss on fiber typically indicates connector issues or physical cable damage.
84. D — Electromagnetic interference from cleaning equipment. Cleaning equipment (vacuum, buffing machine) produces EMI that couples into AV systems.
85. A — Control system integration programming for shade timing. Integration programming mismatch between AV scenes and shade triggers causes inconsistent behavior.
86. C — Dimmer or LED driver electronic emissions coupling to AV cable pathway. Lighting color changes produce electrical transients that can couple into AV signals.
87. B — ADA compliance requirement—induction loop or hearing-impaired accommodation. Hearing-impaired meeting difficulty often indicates ADA-required induction loop or alternate accommodation is missing.

88. D — eARC/ARC compatibility between display and soundbar. HDMI ARC/eARC audio return requires compatibility between display and soundbar at the HDMI specification level.
89. D — Delay misconfiguration for that specific monitor zone. Upstage monitor-specific delay requires individual configuration relative to stage position.
90. B — Video signal sync mismatch between input sources. Multiviewer black flashes typically indicate sync/timing issues between different input sources.
91. C — Array coverage geometry—beamforming pattern may need adjustment. Extended tables require adjusted beamforming coverage to maintain pickup across the full table length.
92. A — Lamp aging producing gradual brightness/color variation. Show-to-show quality changes indicate lamp aging producing incremental variation during operation.
93. D — Acoustic reflections from building facades requiring speaker directivity. Outdoor amphitheater echoes from adjacent buildings require speaker pattern and placement coordination.
94. B — Display latency or signal processing chain introducing delay. Confidence monitor latency for talent indicates processing delay in the monitoring path.
95. A — DSP processing load at amplifier exceeding capability. High CPU usage indicates DSP processing load is exceeding the amplifier's configured processing capacity.
96. C — SPL measurement position matching musician ear height and instrument placement. Orchestra pit measurement requires positioning at relevant positions, not arbitrary room locations.
97. D — Zone amplifier calibration or 70V tap setting inconsistency. Zone level differences in distributed paging typically trace to amplifier calibration or tap setting variations between zones.
98. A — Environmental conditions during actual use differing from commissioning. Real-use failures indicate commissioning conditions didn't match actual operational environment.
99. B — Grounding inadequate—lightning or electrical storm induced transients. Outdoor equipment failure during storms typically indicates grounding or surge protection inadequacy.
100. C — Display angle, sun angle analysis, and anti-glare treatment. Outdoor display glare requires systematic analysis of sun angle, display angle, and treatment selection.
101. A — Display not calibrated to DCI-P3. DCI-compliant content requires display calibrated to DCI-P3 color space for proper rendering.
102. D — Color correction between cameras required. Multi-camera skin tone consistency requires white balance, gain, and color matrix alignment.
103. B — Framing algorithm performance across different meeting scenarios. Inconsistent framing reflects algorithm challenges with varying participant counts, positions, and activity.

104. C — Ground loop between amplifier and preamp or facility electrical system. Background hum in audio typically traces to ground loops in the signal path or electrical infrastructure.
105. A — Additional acoustic absorption at 500 Hz requiring frequency-specific treatment. RT60 exceeding target at specific frequency requires frequency-specific absorption material addition.
106. D — Synchronized multi-camera capture with genlock, frame-accurate switcher, and broadcast-grade audio. Multi-camera broadcast requires comprehensive synchronization and broadcast infrastructure.
107. B — Restore from redundant backup or redundant playout system. Mass file corruption requires restoration from backup or failover to redundant system during incident response.
108. A — Single module failure in tile requiring hot-swap replacement. dvLED designs support module-level service; individual module failures are remediated through hot-swap.
109. C — Speaker tracking algorithm confidence threshold or acoustic localization sensitivity tuning. Camera tracking failure indicates tuning of algorithm sensitivity and confidence thresholds.
110. D — LED fixture PWM frequency mismatch with camera shutter. Camera flicker on LED lighting results from PWM dimming frequency not aligning with camera frame rate.