FACT SHEET

Courtroom Technology Management System (CTMS) Features and Description

Fairfax County Courthouse, Virginia

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INTRODUCTION

The Fairfax County Courtroom Technology Management System (CTMS) provides centralized and standardized courtroom automation throughout the court system to include the Circuit Court, General District Court, Juvenile and Domestic Relations District Court. Substantial opportunities exist by centralizing courtroom technology between the three courts by sharing resources and infrastructure.

The CTMS resides on separate Audio Video and high speed data networks distributed through a Master Control Room (MCR) on a centralized system infrastructure

Within the courtroom, the CTMS provides four major functions discussed in more detail below:

A. Control System
B. Audio Control Systems
C. Evidence Presentation
D. Audio and Video Conferencing

Each of these functions has multiple features and settings. All of the functions are controlled through touch panels with a graphical user interface located at the judge, clerk and attorney podiums. The judge and clerk control panels offer complete control for all courtroom technology functionality while the attorney control panel includes only limited functionality.

Master Control Room (MCR)

A Master Control Room (MCR) serves as a centralized hub to enable the advanced conferencing features, and it also provides courtroom monitoring, test and measurement, system configuration and control. This system is powered by the main courthouse data center UPS, and operates within the cooling management system of the data center.

The CTMS provides centralized services that include overflow monitoring to allow one courtroom to observe what is happening in another courtroom. To ensure the privacy and integrity of the courtroom, this function must be enabled by the judge or clerk in the courtroom being observed. This function is beneficial for events or high profile cases where spectators may exceed the capacity in the courtroom. Conference services and Adult Detention Center (ADC) advisories also occur as a result of centralization. All of the CTMS video teleconferencing equipment is located in the MCR.

Two channels of video (component RGBHV and composite NTSC) are provided in each direction from the courtroom to the MCR and from the MCR to the courtroom. RGBHV video originates from evidence sources

such as laptops and document cameras, while NTSC video originates from video cameras. A single channel of composite video transmits between the ADC and MCR

Web page interfaces to the CTMS are accessible from the MCR to allow for remote system control of any courtroom and the ADC system, and are primarily useful for setup and testing of system wide changes from a central location.

System Infrastructure

Within the courtroom, the CTMS is connected via copper wiring from all audio and video sources and destinations to the courtrooms Audio Video (AV) rack.

Twelve strands of fiber between each courtroom's AV rack and the MCR carry the high speed data (Gig-E) network for system communications, bi-directional RGBHV video and bi-directional camera video and audio. Spare fibers provide expansion capability for future services.

CONTROL SYSTEM

The Control System is comprised of the system processor, touch panels, judge and clerk control panels and attorney control panels within the courtrooms.

System Processor

A Crestron Pro2, located in the courtrooms adjacent AV room's AV rack, contains the source code for processing commands and communications with the evidence RGBHV router, the video camera router, as well as communications to the audio system and other connected equipment in the courtroom AV rack and the podium. Internal courtroom communications between equipment is a mix of serial communications (RS232), network communications (TCP/IP) and manufacturer exclusive (CrestNet). All of the commands to the Centralized system are over TCP/IP.

A Crestron Pro2 also resides in the MCR, and it communicates directly with all of the CTMS systems in the network and the local MCR equipment including all Video Teleconferencing (VTC) equipment and a format independent digital router which controls the source and destinations of all conferencing video within the CTMS network. This router is referred to as a Fiber router as it takes direct fiber connections, converts the optical signal to an electrical signal, makes the necessary source and destination routes, and then re-modulates the electrical as optical light for re-distribution to and from the courtrooms and ADC over fiber.

Touch Panels

Each touch panel is an ELO model 1715L. This is a 17" diagonal 4:3 touch panel. The touch panels are connected to Crestron Touch Panel Interfaces (TPI) in the courtrooms' AV rack. The TPIs contain the graphical user interface displayed on the touch panel, and provide the touch coordinates to the Crestron Pro2 for processing the selected function.

Judge and Clerk Control Panels

The judge or clerk has complete system control from their respective touch panel. The judge, clerk or attorneys can select the various courtroom evidence sources from the various identified evidence locations. The control

panels default to an evidence selection page or a conference selection page. A third page contains the audio level adjustments.

Two 1/6 size video preview windows exist on both the judge and clerk control panel. The video windows display the selected evidence, a remote witness, or both. Either video preview window can be enlarged to full screen. The selected evidence or remote witness, as seen in the video preview windows, is also seen at the other courtroom preview monitors, which includes the podium, the attorney tables and the court reporter table.

Above the video preview windows are "Publish" buttons. These buttons provide the choice of publishing the previewed video to one of four locations; Witness, Jury, Gallery or the Large Screen Remote Witness video screen located behind the witness stand. Remote destinations will receive the same video as published to the witness: Remote witnesses are extensions of the courtroom witness. Overflow monitoring courtrooms will receive the same video as published to the gallery: the overflow is considered an extension of the gallery. Evidence is published at the discretion of the judge to these various locations.

An optional saved setting offering "Auto Publish" will allow a newly selected evidence source to remain published to the current locations. The default is to un-publish evidence on an evidence source selection change. Circuit Court generally prefers this to be off, while General District Court prefers it to be on.

A status area is provided for quick reference for system settings such as "Auto Publish", "Camera Tracking" and the selected "Conference" mode among others.

The STOP button, also referred to as "KILL" switch, provides the means for the courtroom to immediately and automatically mute all microphones, stop all presented audio and video from being heard and seen, and prevent audio and video from leaving the courtroom. The STOP button flashes on and off in red when activated. One use may be to quickly stop a feedback situation that has created a howling sound in the courtroom speaker system due to misadjusted microphone levels. Another use may be if evidence is prematurely or inadvertently published.

Attorney Control Panels

The attorney control panel connects wirelessly to the control system using a Wireless Access Point (WAP) with WPA2 encryption. A charging station is provided at the podium. The wireless control panel contains its own operating system (Windows CE), and communicates with the processor in the AV rack.

The attorney control panel allows selection of all evidence sources except Conference modes, and the judge and clerk PCs. A row of indicators provide attorneys with knowledge of what evidence has been published and to what location. The panel also provides a volume control for evidence sources, but no other interaction with system settings. The attorney control panel does not provide the capability to print displayed evidence: The user must request the judge or clerk to do so.

AUDIO CONTROL SYSTEMS

The Audio Control Systems are comprised of the microphones, audio level control and muting, an Infra-Red audio system for English assistive listening and interpreting and sound re-enforcement through the courtroom speaker system,

Microphones

Microphones are located at all podiums, including attorney tables, judge, clerk, witness and jury box. A wireless microphone is provided as well.

All of the desktop attorney table microphones are **latching** mute on/off. This provides the user with the ability to mute and unmute the microphone. A green light LED indicator on the microphone alerts the user that the microphone is "live or unmuted" or "not live or muted". The podium microphone is always "live" and can only be muted or un-muted by the judge or clerk control panel.

A sidebar microphone is located at the judge's bench which, when activated through the control system, will allow the court reporter to hear the sidebar conversation through the court reporting equipment. The sidebar microphone audio is not sent to any other destination. Sidebar conversations can be masked with "white noise" which is created by a generator within the BiAmp equipment. The white noise is heard throughout the courtroom speaker system. The judge can choose to select a sidebar with or without white noise. When the sidebar has been selected, all courtroom microphones are muted as well as the courtroom audio output to other destinations.

Microphones and other audio sources are connected to a BiAmp AudiaFlex audio matrix switcher and digital signal processor. This hardware device resides in the courtroom AV rack, and is configured for 28 inputs, 18 outputs and 2 telephone interfaces. This equipment processes all courtroom audio through internal digital signal processors (DSPs). The processing provides various audio mixes to various locations, provides echo cancellation, equalization, and provides logic state outputs to be processed by the Control System, among other things.

Audio Level Control and Microphone Muting

The Control System communicates with the BiAmp AudiaFlex to provide audio level control and muting of microphones. Additionally, logic is applied that synchronizes the physical LED on the microphones with the mute button state on the Control System's control panel.

The BiAmp AudiaFlex is configured to provide the audio outputs to the amplifier for the speaker system, and the mixes of audio to the court reporter table and other locations. The court reporter location is provided a full mix of all audio and sub-mixes of the main audio on four separate audio lines. A playback connection to the audio system is also provided at the court reporter location. The mixes are:

- Full Mix
- Judge, Sidebar
- Attorneys and Podium
- Witnesses

An amplifier located in the AV rack adjacent to the courtroom takes input from the BiAmp AudiaFlex and has four outputs. The amplified audio is distributed to four speaker zones within the courtroom. The zones are identified as Gallery, Well, Bench and Jury. Microphones located within a particular zone are "mix-minused" from that zone to aid in feedback prevention.

Audio leaves the courtroom through the BiAmp AudiaFlex, and is combined with the video to be sent out over fiber to the centralized routing system in the MCR for distribution in conferencing modes.

Infra-Red (IR) Audio System for English Assistive Listening and Interpreting

Infra-Red (IR) is deployed in the courtroom for English assistive listening and interpreting. The use of IR eliminates radio frequency (RF) channel allocation issues between adjoining courtrooms. This system is directly connected to the BiAmp AudiaFlex.

IR emitters are attached to the walls in the courtroom. Users wear IR receivers to pick up the transmissions from the IR emitters, and select Channel 1 to listen to the English audio or Channel 2 for the interpretation of the proceedings.

An interpreter wears a single muff headset with a boom microphone. The ear muff is connected to the Full Mix audio output of the BiAmp AudiaFlex. The interpreter's microphone is connected to Channel 2 of the IR system to be heard by the foreign language recipients wearing IR headsets set to channel 2. Interpreters are provided multiple locations within the courtroom in order to connect the interpreting headset.

EVIDENCE PRESENTATION

Evidence presentation is facilitated with the use of technology podiums, video monitors, user connections and evidence routers located within the courtrooms.

User connections are located at the attorney tables, witness and podium. These locations have laptop video (RGBHV) connections to display computer documents, videos or other images as evidence. These same locations are equipped with a 17" touch panel for evidence preview and annotation. Annotation provides users the ability to markup documents or images displayed as evidence. The judge or clerk can print any annotated evidence source to a color laser printer from the CTMS control panel. Additionally, the judge and clerk PCs are connected to the evidence system as sources. This can be useful for training, or display of traffic intersections from Google Earth or other web pages. Judges have also used this feature for display of court orders to obtain agreement on accuracy, before printing and signing the order.

Technology Podiums

A technology podium located in the center of the courtroom contains communications equipment, the wireless control panel, a document camera and a DVD player. Each of these is controlled by the CTMS allowing users to interact with the equipment through the control system. Other source connections such as DVD, Laptop Video and multiple audio sources are selectable from the control panel as evidence sources. Peripheral equipment can be connected here as well. One example is an "Eye" camera. This camera is used to show large printed documents, such as construction blue prints, that are too large to fit on the document camera. The other evidence locations can be used for this purpose as well.

All of the podium video sources are routed from the podium to the courtroom by a switcher/scaler located in the podium. The switcher selects the user's video or audio choice made at the control panel, and the scaler ensures that regardless of the connected equipment resolution and scan rate, the video output will match the system specification for resolution and scan rate; therefore, the video will always be stable when presented from the podium.

Video Monitors

Large screen monitors are located in the gallery and behind the witness stand. These monitors range in size from 42” to 60”. Video monitors are also provided in the jury box. Each juror monitor is recessed into the modesty panels of the jury box. An ideal ratio is one monitor per two jurors. However, spacing and aesthetics may reduce this ratio to one monitor per three jurors. The court reporter is also provided a video monitor which provides visual context of the electronic evidence or remote witness.

The jury box monitors are powered through a CTMS integrated power relay. This relay, an AMX UPC20+, turns the jury monitors on and off at system startup and shutdown. The judge can also choose to power the monitors on or off through direct interaction with the CTMS control panel. This feature is also enabled for the gallery monitors and remote witness large screen monitor as they serially communicate with the CTMS.

User Connections

User connections are located at the attorney tables, witness and podium. The locations have laptop video (RGBHV) connections to display computer documents, videos, or other images as evidence.

Evidence Routers

A Crestron RGBHV Router (16 Inputs X 16 Outputs) provides all evidence routing within the courtroom, and to and from remote destinations. The evidence router is located in the AV rack.

AUDIO AND VIDEO CONFERENCING

The CTMS provides several conferencing modes and features including:

- Telephone Conferencing
- Video Teleconferencing
    - Secluded Witness (JDRDC)
    - Adult Detention Center (ADC)
- Closed Circuit Video Conferencing
    - Secluded Witness (Circuit Court)
    - Adult Detention Center (ADC)
    - Courtroom Overflow Monitoring
- Conferencing Setup and Control

Backup methods in place for the closed circuit system include standard video teleconferencing and a separately installed direct fiber connection to the ADC which resides outside of the CTMS network.

All courtroom cameras (excluding security cameras) are connected to a 16 X 16 port video router in the AV rack. Up to six courtroom cameras designated as Judge, Clerk, Witness, Defense, Plaintiff, and Podium provide all of the viewing angles needed for the remote side to see the party speaking. Six Presets per camera allow for different fields of view per camera. Cameras can be manually selected as the speaking party changes from the judge to attorney or witness. A camera tracking system is also employed that automatically changes the selected courtroom camera when triggered by voice activation of specific microphones.

Echo cancellation, which is the process of removing echo from a voice communication in order to improve voice quality, is enabled for all conferencing methods.

Telephone Conferencing

Each courtroom has a fully integrated telephone within the CTMS. Callers into the courtroom can hear the audio from any un-muted microphone in the courtroom, and the caller will be heard in the courtroom through the CTMS speaker system.

A call can originate from outside the courtroom or from within the courtroom. Typically, an external caller to the courtroom will call chambers, and the call is transferred to the courtroom. The Court can continue proceedings while waiting for the call. A popup window on the Judge and Clerk control panels announces the call visually, but quietly, and the call can be answered or refused.

All incoming calls are ignored until the Phone Conferencing method has been selected.

Video Teleconferencing

Each court has one dedicated Video Teleconferencing (VTC) system, or Codec, assigned to their specific court. A reservation system is in place that assures a courtroom will have a VTC system for that day's teleconference.

A reservation made by a courtroom within a specific court automatically selects that court's Codec/VTC system. Should another courtroom try to use a reserved Codec, the request automatically rolls over to a Codec farm or pool of shared VTC systems. The pool of shared, or auxiliary, VTC systems is capable of scaling to meet demand over time. A manual method to override the automatic reservation method is provided to address equipment failure issues and fulfill reservations. The reservation system is allocated day to day, and does not involve calendars or special entries. It is handled directly through the CTMS by the courtroom.

Any CTMS courtroom can make video conferencing calls to external locations via secure ISDN connections. Any courtroom can simultaneously maintain a reservation to a Codec, and wait for an incoming ISDN video conferencing call from an external location. This is usually coordinated between the parties, and the reservation reserves the use of the VTC system for that courtroom.

The selection of the VTC Teleconferencing mode with a reservation enables the control system to accept external calls. A popup window on the Judge and Clerk control panels alerts them to the incoming conference call visually, but quietly, and the call can be answered or refused.

External calls are automatically ignored by the CTMS system if the VTC Teleconferencing mode was not selected, and a reservation was not created.

Video Teleconferencing: Secluded Witness (JDRDC)

The Juvenile and Domestic Relations Court is provided a method from the CTMS to conduct secluded witness testimony through the use of the Video Teleconferencing System over ISDN. The Secluded witness can be located anywhere there is a video conferencing system. The JDRDC has set aside a conference room in close proximity to all of the JDRDC courtrooms for this purpose.

The secluded witness location contains a VTC system, video monitor, camera, microphone and a separate dedicated phone line to each specific JDRDC courtroom. Direct and private telephone connections to each courtroom allow for contemporaneous and secure communications for the Defense Attorney in the secluded witness location and the client in the courtroom. Users only need to connect the telephones and pick up the handset: no dialing required.

Video Teleconferencing: Adult Detention Center (ADC)

The Adult Detention Center (ADC) has one specific cell set aside for Video Teleconferencing. The ADC participates in the CTMS VTC reservation system and acquires use of a VTC system in the same way the courtrooms do. The ADC uses the VTC system in order for outside jurisdictions to conduct advisories with Fairfax ADC inmates. Use of Video Teleconferencing for this purpose saves considerable amount of money in inmate transportation and reduces the risks associated with inmate transport

Closed Circuit Video Conferencing

Closed Circuit Video Conferencing is confined within the Fairfax County Courthouse and the adjacent Adult Detention Center and facilitated through the centralization aspects of the CTMS or in point to point applications such as the Circuit Court secluded witness function via the CTMS.

Use of the closed circuit system is advantageous as it is a one-button selection, and does not tie up the VTC system or incur the costs of an ISDN video teleconference (VTC) for a local conference.

Closed Circuit Video Conferencing: Secluded Witness

Two separate courtrooms within Circuit Court are provided point to point closed circuit conferencing capability for the purpose conducting secluded witness testimony between the courtroom and an adjacent conference room. The secluded witness location contains a video monitor, camera, microphone and dedicated phone line to the courtroom. Direct and private telephone connections to each courtroom allow for contemporaneous and secure communications for the Defense Attorney in the secluded witness location and the client in the courtroom. Users only need to connect the telephones and pick up the handset: no dialing required.

The camera, microphone and telephone are only installed in the adjacent conference room when needed for the secluded witness testimony,

Closed Circuit Video Conferencing: Adult Detention Center (ADC)

Any CTMS courtroom can conduct advisories or bond motions over the closed circuit video conferencing system with the ADC. As a backup, Fairfax courts can choose to use the ISDN Video Teleconferencing method to conduct these conferences…

The ADC arraignment room contains a control system integrated with the courts control system consisting of a touch panel with a graphical user interface to allow interaction with the CTMS. The selection of any of the CTMS enabled courtrooms by the ADC and the selection of the ADC by that same courtroom creates a closed circuit, two-way conference between the ADC and that courtroom. Once the conference is established, the courtroom can control the camera in the ADC. Other Fairfax courtrooms can monitor audio and video from the ADC conference, but are not able to interact with the ADC until the ADC has selected that courtroom.

The General District Court (GDC) conducts advisories between 8:30 a.m. and 9:00 a.m. daily. The Juvenile and Domestic Relations District Court (JDRDC) conducts their advisories immediately afterward. The JDRDC can monitor the end of the GDC advisories, and immediately begin their advisories once the ADC has selected that specific JDRDC courtroom through the CTMS. This then initiates a new two-way conference session with camera control.

Significant security and safety improvements are realized as deputies are no longer required to escort prisoners to courtrooms for advisories. Specifically, gang affiliation separation and male-female issues are

reduced as a result of the CTMS closed circuit conferencing system with the ADC. Inmates also realize a reduction in stress as they are not escorted in chain gang style to the courtroom.

Additionally, the original prototype for technology enhanced courtrooms (Courtroom 5E) is maintained as a separate and direct closed circuit conferencing system direct to the Adult Detention Center. This provides an additional backup method for conducting ADC advisories as it resides as a separate network harnessing the endpoint equipment but not residing on the CTMS network.

Closed Circuit Video Conferencing: Courtroom Overflow Monitoring

Each courtroom within the CTMS can choose to allow its camera video and digital evidence presentations to be viewed by other courtrooms. A judge can choose to allow or deny overflow monitoring. When a courtroom allows monitoring, any other courtroom can select that courtroom to monitor the proceedings. Overflow monitoring is seen as an extension of the gallery. The monitoring courtroom sees the selected camera video of the first courtroom until an evidence source is published to the gallery at which time the monitoring courtroom then sees the published evidence.

Conferencing Setup and Control

Users can navigate the VTC equipment menus through the CTMS interface, and access system settings and address books among other features and functions provided by the Codec.

Dual Mode, as provided by Tandberg Codecs, is available and offers a method of conferencing that enables either the near end or the far end to simultaneously provide RGB evidence and camera video. This feature is accessible through a single-button in the CTMS interface, and enables courtrooms with a remote witness monitor to view the remote witness on the remote witness monitor and any evidentiary materials, including documents or images, on the evidence monitors.

OTHER SYSTEM FEATURES

- Selected Courtroom Camera as evidence
  - Publish the selected courtroom camera to the courtroom
  - Useful for showing gallery spectators the front view of the presenter at the podium.

- Optional Setup features
  - Automatic Timed Shutdown allows that court to select the time for the Control System to automatically shut down at night

- Auto Publish
  - Turn on or off a future that allows source evidence changes to remain “Published” when the source has changed. General District Court prefers this feature to be turned “On” while Circuit Court does not.

- Technical Access
  - Access VTC reservation system for manual reservations or system overrides
  - Route any individual video source or RGBHV source to any individual location
  - Control Panel Interface configuration

- Real Time Text Network

- AN RS-232 network is provided between the attorney tables, witness, judge and gallery locations. This network can be used by PCs or laptops for speech to text applications for the deaf.

- Television Access (infrastructure only)
  - The courtroom audio, as determined by the system control state of the audio sources, is provided as an output for a television camera recording the proceedings. The only audio allowed to leave the courtroom is the audio that is provided from under the judge's control through the CTMS.
  - A video input connection is provided for transport of the news camera video output to the Master Control room.
  - The Master control room can then route that video and audio to a designated outdoors pedestal.
  - These connections are located at the rear of some courtrooms and on the same side as the jury box to lessen the chance of inadvertently "airing" the jury members.

Additional Courtroom AV Rack Equipment

- Video Scaler
  - Provides a method to show NTSC formatted video on RGBHV video monitors

- Video distribution amplifiers (vDA)
  - vDAs distribute a single video source to multiple locations. Typical to the CTMS are 1X4 Das and 1X6 DAs
  - DAs distribute the video to the Attorney tables, jury box and the gallery monitors. This arrangement is determined by the rules of publishing and video preview.

- UPS
  - Each AV rack contains one 20amp UPS capable of running approximately twenty minutes on loss of power. As most outages are sporadic and short in duration, the UPS simply prevents loss of the current system configuration for a particular case and more importantly it filters the unwanted spikes and frequency variations in the source power.

- Annotation
  - A Boeckeler Pointmaker PVI-91X is located in each AV rack to provide the annotation overlays on the selected video source.

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