

**Digital Audio/Visual Recording Technology
(DART) Committee**

Final Report & Findings

Submitted to the Iowa Judicial Council

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DART Committee: Final Report and Findings*
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* This report, the appendices, and additional materials considered by the DART Committee are available on the Iowa Judicial Branch website at:

DART Committee: Final Report and Findings

Executive Summary

In May 2009, the Iowa Judicial Council appointed the Digital Audio/Visual Recording Technology (DART) Committee to investigate and assess:

- ❖ The reliability of DART
- ❖ Its ability to produce accurate records of court proceedings, and
- ❖ The costs of installing, maintaining, and managing DART in Iowa's courts

The committee met six times in Des Moines between May and December 2009 and engaged in the following information-gathering activities:

- A. Obtained general background information on the status of DART in state and federal courts through internet research, phone contacts, and a national court administration list-serve survey.
- B. Obtained information on DART costs from 11 DART vendors through a Request for Information (RFI).
- C. Four DART vendors conducted presentations at the second committee meeting
- D. Five key stakeholder groups (Iowa Court Reporters Association, Iowa Judges Association, Iowa Public Defenders Association, Iowa State Bar Association, and the American Institute of Business) made presentations at the third committee meeting.
- E. Groups of four to six committee members conducted site visits to six jurisdictions that have been using DART for five to 10 years. One committee member conducted a site visit to a seventh jurisdiction. In each location, committee members talked with judges, court staff, and attorneys about their DART system.
- F. Some judges, attorneys, and court staff in most site visit locations completed standard surveys to provide their views on the reliability of DART, accuracy of the transcripts obtained from digital recordings, and the costs associated with DART.
- G. Four DART vendors provided equipment and software so five Iowa courtrooms could test their systems for six to eight weeks; judges and court staff from each test court shared their views about the DART system during the fifth committee meeting.
- H. All committee members were asked to listen to five digital recordings of court proceedings – one from each of the five DART test courtrooms – to assess the clarity of the recordings.
- I. All committee members were asked to evaluate the accuracy of two transcripts for at least one of the five digital recordings from the test courtrooms: one transcript from the court reporter and one transcript from an independent transcription company based solely on the digital recording. These evaluations were discussed at the fifth meeting.

The committee considered and thoroughly discussed the information from all these sources and unanimously concluded the following:

Reliability of digital recording technology: Digital recording technology can reliably record the words spoken during court proceedings if the court utilizes a high quality multi-track digital recording system that has been professionally installed and is operated by a qualified, trained, and certified courtroom recording monitor/manager (CRM).

Accuracy of records produced from digital recordings: Accurate transcripts of court proceedings can be obtained from digital recordings if a trained and certified CRM manages the system in the courtroom and qualified, trained, and certified transcribers produce the transcripts from the digital recordings.

Statewide costs for the DART systems plus technical support staff: Estimates of the statewide costs for purchasing, installing, maintaining, periodically updating digital recording hardware and software – and for employing four technical support staff – are shown in Tables 4 and 5 (section II.I.6).

Statewide costs for staff to monitor and manage the DART system in the courtroom: Estimates of the statewide costs for trained and certified CRMs to assist with the digital recording system in all court proceedings are shown in Table 6 (section II.I.6).

Glossary of Terms

Abbreviations used in this report:

A-V: Audio/video

CRs: Court reporters (certified stenographic reporters)

DART: Digital audio/video recording technology. Some DART systems record only audio, while others record both audio and video (A-V).

ERs: Electronic reporters – manage the DART system in the courtroom and typically produce the written transcripts of proceedings in which they manage the DART system.

I.T.: Information technology

PACER: Public Access to Court Electronic Records. This is the online court case information system used by the federal courts.

Confidence monitoring: Listening to a recording as it is being recorded to ensure that the audio recording has been captured and saved. A courtroom DART system should allow for confidence monitoring by a support staff person with headphones. What the staff person hears is the recording that has already been saved to the hard drive (or other initial storage device). There is typically a 1 or 2 second delay between the spoken words in court and what the person monitoring the recording hears on the headphones.

Court recording monitor/manager (CRM): This is a qualified and trained court employee who is assigned the responsibility to monitor and manage the DART system in the courtroom and enter log notes in accordance with established guidelines. (See section II.1.6, page 33.)
Note: The committee recommends that, if the Iowa courts implement DART, the CRMs should be certified according to standards established by the judicial branch.

DART vendors: Companies that develop and provide digital recording systems; abbreviations for the DART vendors mentioned in this report include:

- **FTR:** For the Record, Inc.
- **JAVS:** Jefferson Audio/Video Systems, Inc.
- **VIQ:** Voice IQ Solutions, Inc.

Digital vs. Analog Recordings (from: www.electronics.howstuffworks.com/question7.htm):

In **analog** technology, a wave is recorded or used in its original form. So, for example, in an analog tape recorder, a signal is taken straight from the microphone and laid onto tape. The wave from the microphone is an analog wave, and therefore the wave on the tape is analog as well. That wave on the tape can be read, amplified and sent to a speaker to produce the sound.

In **digital** technology, the analog wave is sampled at some interval, and then turned into numbers that are stored in the digital device. On a CD, the sampling rate is 44,000 samples per second. So on a CD, there are 44,000 numbers stored per second of music.

Advantages of digital recordings:

1. The recording does not deteriorate over time. As long as the numbers can be read, you will always get exactly the same wave.
2. The recordings can often be compressed, which can help save storage space.

Digital recording system vs. Voice recognition software: Digital recording systems record only the sounds (voices) – and video (if applicable) of a court proceeding. To obtain a written version of the proceeding (i.e., transcript), the recording would have to be delivered to a transcriber, who would produce the transcript. Voice recognition software (e.g., Dragon Naturally Speaking) converts voice into written text as the words are being spoken. Voice recognition software is not sufficiently advanced to allow its use for producing the official written record of court proceedings.

Log notes: These are notes entered by the CRM to indicate essential information about the hearing while it is in progress (e.g., case number; case title, judge’s name, names of attorneys and witnesses; name of the person speaking at a given time, etc.). When a log note is entered, it is automatically time stamped. The log notes can be attached to the recording to assist the listener (e.g., transcriber) to know who was speaking at a given time. Most DART management software that includes the log notes utility allows listeners to click on a log note (or the time noted next to it), and the recording begins playing at that point in the recording. At additional cost, the software can be upgraded to also allow the judge to keep separate log notes that would not be included with the digital recording sent to transcribers or others.

T-1 data line: A general term for a digital carrier circuit capable of transmitting electronic information at 1.544 megabytes per second, which is 20 to 30 times faster than standard phone lines that typically transmit data at 56 kilobytes per second. [A kilobyte = 1024 bytes; a megabyte = 1024 kilobytes.] A T-1 line is typically leased from a local or long-distance phone provider.

Tracks: DART allows for recording on a single track (sometimes called a channel) or up to 12 tracks. Each microphone can be recorded on its own individual track, or multiple microphones can be recorded on a single track. Using an appropriate digital recording player (typically provided by the DART vendor), one can listen to all tracks simultaneously, or listen to just a selected track or tracks.

DART Committee: Final Report and Findings

I. Introduction

The Iowa Judicial Council appointed the Digital Audio-Video Recording Technology (DART) Committee in May 2009 to thoroughly and deliberately study this technology and its use in courts.¹ The committee included 18 members: a court of appeals judge, three chief district judges, two district judges, two district associate judges, two district court administrators, a former official court reporter, three private attorneys, a public defender, a county attorney, an assistant attorney general, and an assistant state appellate defender. According to the Judicial Council's order, the committee was established to assess the:

- (1) Reliability of DART,
- (2) Accuracy of the record made with this technology, and
- (3) Costs of acquiring, installing, operating, and maintaining the technology.²

Organization of this report

Section II of this report describes the process employed by the committee to examine the three key issues: reliability of the technology, accuracy of the recordings and transcripts, and costs. Section III summarizes the committee's findings on these three key issues.

II. The Committee's Information Gathering Process

The committee met six times in Des Moines between May 25 and December 11, 2009, to discuss information obtained from a variety of sources.³ During the first meeting, the chief justice of the Iowa Supreme Court, who chairs the Judicial Council, explained the Judicial Council's rationale for exploring the use of DART in Iowa's district courts and the charge to the committee. In addition, the committee reviewed background information provided by committee staff (see section A., below) and discussed the tasks that it would need to perform to thoroughly examine each of the three main issues: reliability, accuracy, and costs. Through discussions at the first two meetings, and with the help of recommendations

¹See **Appendix 1**: Judicial Council of Iowa, In the Matter of the Appointment of the Digital Audio Recording Technology Committee, Order (May 7, 2009); the Order includes the list of DART Committee members.

² See **Appendix 1**.

³ See **Appendix 2**: DART Committee Schedule for Meetings and Tasks; see also **Appendix 3**: Notes from Each DART Committee meeting; and **Appendix 4**: List of documents provided to committee members at each of the six committee meetings. All these documents are available on the judicial branch website at:

www.iowacourts.gov/Advisory_Committees/Digital_Audio_Recording_Technology/Information/

from the Evaluation Subcommittee,⁴ the committee adopted the information-gathering strategies described below.

A. Information obtained by committee staff on DART in other jurisdictions⁵

At its first meeting, the committee reviewed a set of materials that provided background information about the use of DART in state and federal courts. The materials included a summary of a 1999 report on an evaluation of digital recording systems in 12 federal courts, which found that digital audio recording technology can provide a reliable, accurate record of court proceedings and the basis for accurate, timely transcript delivery.⁶ Based on that study, Judicial Conference of the United States approved digital audio recording technology as a method of taking the official record in the federal courts.⁷ The committee also reviewed a summary of findings on the use of digital recording systems in state and federal courts. The materials indicated that the trial courts in five states – Alaska, Kentucky, New Hampshire, Utah, and Vermont – are already using electronic recording systems for capturing the verbatim record in all court proceedings, and many other state and federal courts are using digital recording systems for some of their cases.⁸ The materials also included a report from the California Official Court Reporters Association, which delineates arguments against the use of electronic recording systems in lieu of court reporters.⁹

B. Information obtained from DART vendors

During its first meeting, the committee approved the dissemination of a Request for Information (RFI) that had been drafted by committee staff. The day after the first meeting, committee staff emailed the RFI to several well-known vendors of digital audio-video (A-V) recording systems for use in courts, and also posted the RFI on the judicial branch's website. Vendors were given two weeks to submit written responses to the state court

⁴ The Evaluation Subcommittee included: District Judge Bill Pattinson, District Associate Judge Lucy Gamon, Attorney Guy Cook, Attorney Mary Tabor, Attorney Martha Lucey, County Attorney Darin Raymond, Court Reporter Gerald Olson, District Court Administrator Scott Hand, and Scott Ruhnke, Senior Manager for the Iowa Judicial Branch's Information Technology (I.T.) Services division. The group met twice via telephone conference call and developed a set of 10 general and specific recommendations (see Appendix 3, under the 3rd committee meeting).

⁵ See **Appendix 4** for a complete list of the materials reviewed and discussed at the first meeting.

⁶ See Steenstra, Donna, et al. (1999), *Digital Audio Recording Technology: A Report on a Pilot Project in 12 Federal Courts*. Washington, D.C.: Federal Judicial Center, p. 4.

⁷ See *Report of the Proceedings of the Judicial Conference of the United States* (Washington, D.C.: U.S. Administrative Office of the Courts, September 15, 1999), p. 57.

⁸ See **Appendix 5**: States That Use Electronic Recording Technology for Trial Court Proceedings.

⁹ See California Official Court Reporters Association (2009), *Preserving Access to Justice Task Force Report – Updated February 2009*. Sacramento, CA: California Official Court Reporters Association.

administrator's office. Eleven vendors and resellers submitted responses. The responses included very useful information on the features, costs, and warranties of their products – plus information on jurisdictions that have implemented and used their systems. The responses were forwarded to the RFI Subcommittee.¹⁰ Each subcommittee member reviewed and scored the responses using a 10-point score sheet, then met via conference call to discuss the responses. Based on the subcommittee's recommendations, committee staff contacted four of the DART vendors to invite them to make a presentation and conduct a demonstration of their systems before the committee at the next meeting. Each of the vendors had installed systems in at least several hundred courtrooms in the U.S. The four vendors included:

- ❖ CourtSmart Digital Systems, Inc.
- ❖ For the Record, Inc. (FTR)
- ❖ High Criteria, Inc.
- ❖ Jefferson Audio/Visual Systems (JAVS)

During the second committee meeting, each of the four vendors conducted a 90-minute presentation, which provided the committee with an overview of the features, costs, operation, and management of their DART systems. It also gave the committee an opportunity to ask questions about each system and the vendors' experiences in other jurisdictions. The committee subsequently invited each vendor to install one of their DART systems in a courtroom in Iowa (see section II.E., below).

C. Presentations by representatives of major stakeholder groups

The third committee meeting was devoted to presentations by representatives of some of the key stakeholder groups with an interest in the use of DART in Iowa's courts. The groups and presenters included:

- ❖ Iowa Court Reporters Association (ICRA: President Sheryl Culver and Immediate Past President Karen Teig)
- ❖ Iowa Judges Association (IJA: District Judge Robert Blink, 5th Judicial District)
- ❖ American Institute of Business (AIB: Board of Trustees Chair Jane Weingart and President Nancy Williams)¹¹
- ❖ Public Defenders Association of Iowa (PDAI: President Stephan Japuntich)
- ❖ Iowa State Bar Association (ISBA: Attorney Robert Waterman)
- ❖ Iowa Dept of Inspections and Appeals (Jeff Farrell, Assistant Chief Administrative Law Judge)¹²

¹⁰ The RFI Subcommittee included: Court of Appeals Judge Amanda Potterfield, District Judge Bill Pattinson, District Court Administrator Beth Baldwin, Attorney Esther Dean, and Scott Ruhnke, Senior Judicial Branch I.T. Manager.

¹¹ The American Institute of Business (AIB) is a college in Des Moines, IA, that offers a degree in court reporting.

Presenters from the first four organizations (above) opposed the use of DART in lieu of court reporters and provided supporting materials to explain or support their positions.¹³ The representative from the Iowa State Bar Association (ISBA) indicated that his organization had not taken a position on the issue, but would await further information from the DART Committee and the ISBA's own deliberations on this issue. Each presentation was followed by a dialogue between the presenter and committee members. One of the key issues emphasized by the representatives from the ICRA and IJA was the wide range of duties performed by rural court reporters in Iowa, in addition to keeping the stenographic record of court proceedings.¹⁴

D. Site visits to seven jurisdictions that use DART

Background

The committee determined that one of the most valid and reliable means for obtaining information on the key issues would be to talk with judges, attorneys, and court staff who have used and managed DART systems in their jurisdictions for at least several years. **Table 1** shows information on the site visit teams and locations. In preparation for the site visits, committee staff contacted the court administrator in each court and asked that their staff make arrangements for the Iowa site visit team to:

Meet with:

- At least one court manager or supervisor and a tech staff member who are very knowledgeable about the digital recording system.
- Two judges who are very knowledgeable about the digital recording system, the history of how it was implemented, the courtroom protocol where proceedings are being digitally recorded, and the quality of transcripts produced from digital recordings.
- A prosecuting attorney, criminal defense attorney, and a private attorney with a civil practice who are very knowledgeable about the digital recording system, the protocol in courtrooms that use a digital recording system and the quality of transcripts produced from digital recordings.
- At least two court reporters – and/or persons who monitor the recording equipment – who are very familiar with the digital recording system.

¹² The administrative law judges in the Dept of Inspections and Appeals have used hand-held digital recorders to record their hearings for at least the past three years. Mr. Farrell was asked to appear at the committee meeting to offer observations about the reliability of the recorders and the clarity and completeness of the recordings.

¹³ The text of the presentation from – and supporting materials provided by -- each group, except the Iowa State Bar Association, are available on the judicial branch website (see footnote 4). See also **Appendix 5** for a list of the documents distributed to committee members at or before each meeting (see list under the 3rd meeting).

¹⁴ See **Appendix 6: Duties of Rural Court Reporters in Iowa**

Observe:

- At least one court proceeding where the court is relying on the digital recording system to create the record.
- A demonstration of the computer software used to monitor and manage the digital audio recording system in your courtrooms.

Table 1
DART Committee Site Visit Locations, Teams, and Dates

Date	Location (Vendor)	Team members (all are committee members unless noted)
Aug. 18	Lincoln & Omaha, NE (Voice IQ) Federal Courts ¹ Audio only	Chief Judge Charles Smith John French, Attorney Darin Raymond, County Attorney John Goerd, Dep. State Court Administrator ² Terri O’Grady, Court Reporter ³ Kent Wirth, 4 th District Court Administrator ³
Aug. 21	Salt Lake City, UT (FTR) Audio & video	Chief Judge Charles Smith Judge Monica Ackley Mary Tabor, Attorney Beth Baldwin, 5 th District Court Administrator
Sept. 2	Rochester, MN (FTR) Audio only	Judge Bill Pattinson Judge Lucy Gamon
Sept. 3	Minneapolis, MN (Court Smart) Central monitoring Audio only	Kelly Moore, Court Reporter ³ Scott Hand, 2 nd District Court Administrator Scott Ruhnke, Sr. Mgr., Jud. Branch I.T. Services ²
Sept. 4	Anchorage, Alaska (CourtSmart) ⁴ Audio only	Chief Judge Charles Smith ⁴
Sept. 10	Wheaton, IL (Court Smart) Central monitoring Audio only	Court of Appeals Judge Amanda Potterfield Chief Judge Bobbi Alpers Esther Dean, Attorney Martha Lucey, Attorney Gerry Olson, Court Reporter Scott Ruhnke, Sr. Mgr., Jud. Branch I.T. Services ²
Sept. 23	Willmar, MN (High Criteria) Audio only	Judge David Larson Darin Raymond, County Attorney Mark Sturgeon, Court Reporter ³ Sheryl Culver, Court Reporter ³ Karen Teig, Court Reporter ³ Leesa McNeil, 3 rd District Court Administrator ³

¹ The courts in Omaha and Lincoln, NE, were Federal District Courts; all other locations were state trial courts.

² Not a member of the DART Committee, but provided staff support to the committee throughout the process.

³ Not a member or staff of the DART Committee

⁴ Judge Smith traveled to Anchorage at his own expense to attend the wedding of his niece. He arranged (prior to his trip) to visit the court in Anchorage the day before the wedding – without cost to the state of Iowa.

The staff and judges in the host sites were generally very cooperative and helpful in complying with this requested format for the site visits. This format allowed the site visit teams to hear from judges, attorneys, and court staff who have had significant experience with DART and to ask questions about the key issues of concern to the committee.

After each site visit, at least one member of the team produced a written report on the site visit location and its DART system. All site visit reports are included in Appendix 4. There was also a discussion of the site visits during the fourth DART Committee meeting. Those discussions are summarized in the meeting notes, which are available in Appendix 7.¹⁵

Findings regarding judicial support staff

One of the notable findings from the site visits was that the level of support staff for judges in these jurisdictions significantly exceeds the level of support provided for judges in Iowa. Table 2 shows the number of different types of support staff provided to the general jurisdiction judges in each location and the support staff provided to district court judges in Iowa.

Table 2
Support Staff Per General Jurisdiction Judge in Site Visit Locations

Site Visit Jurisdictions	Certified steno reporter	Ctroom recrdng mgr ^b	Ctroom clerk/ atndnt	Law clerk	Secre-tary	Deputy or Other	Total
Lincoln/Omaha, NE ^a							
• Art. III Judges		1		2	1	1	5
• Magistrate Judges		1		1	1		4
Anchorage, AK		1		1	1		3
Minneapolis, MN	1 or 1			1		1	3
Rochester, MN	1 or 1			1	1		3
Willmar, MN	1 or 1			1		1	3
Wheaton, IL	.55		1	.05	.33	1	2.96
Salt Lake City, UT		1		0.5		0.5	2.0
Iowa^c	.78		.44	.125			1.35

^a Federal district courts in Nebraska; all others are state courts.

^b Courtroom recording monitor/manager (CRM; see Glossary)

^c Iowa: 151 court reporters for 189 full-time judges = .80 full-time equivalent (FTE) court reporters per judge; the staffing for court attendants is now .44 per full-time equivalent judicial officer; the formula for law clerks is now 1 for 8 full-time judges – or .125 per judge

¹⁵ See **Appendix 7: DART Committee Site Visit Reports for All Seven Jurisdictions.**

Each of the site visit jurisdictions utilizes DART and, except for Salt Lake City, provides more than twice as much staff support as the courts in Iowa. Any initiative to implement DART in Iowa should deliberately address the support staff issue and should not result in further erosion of support staff.

Brief description of each site visit jurisdiction

The following are very brief summaries of the DART system and feedback from judges, attorneys, and staff in each of the site visit locations.

1. Anchorage, Alaska

- *DART software: CourtSmart*
- *Courtroom recording management: One person manages the system in each courtroom*

One of the committee's co-chairs, Chief Judge Charles Smith, visited the state court in Anchorage on the Friday before his niece's wedding in September. (Note: Since he was already going there, this site visit was conducted without cost the judicial branch or the state of Iowa.) He visited with trial judges, two court of appeals judges, and court managers during his visit. Alaska has never used court reporters due to the difficulty in finding qualified people. They used tape recording systems for about 40 years and moved to a digital recording system about 10 years ago. After using a system from FTR for several years, they switched to software from CourtSmart about two years ago to manage the audio recordings. Trial judges report that the digital recording systems are easy to use and very reliable. They also believe the recordings are of high quality.

The two court of appeals judges confirmed that the transcripts are very accurate and they never receive complaints from parties or attorneys about their accuracy. According to Chief Judge Smith's report on his conversation with the two Court of Appeals judges:

"In fact, both of them actually preferred the record from a digital audio source since a dispute by attorneys as to the accuracy of a record made by a court reporter often can only be resolved by trusting that the reporter accurately took down the testimony, even though one or even both attorneys disagreed with that record. They both noted that the audio record is always available to resolve the dispute by having the Court listen to the actual recording."¹⁶

One of the court managers also provided a spreadsheet that shows a detailed list of the equipment and software that they purchase and install in each courtroom – and the cost for each item. The total cost per courtroom is about \$23,400.¹⁷

¹⁶ See **Appendix 7**: Site Visit Report for Anchorage (by Judge Charles Smith).

¹⁷ See **Appendix 10**: Cost of DART in Alaska courtrooms.

2. Lincoln and Omaha, NE (Federal District Courts)

- *DART software: VIQ Solutions*
- *Courtroom recording management: One person manages the system in each courtroom*

The site visit team met with a federal magistrate judge and an Article III judge, three attorneys, court reporters, and a courtroom clerk who manages the digital recording system in the courtroom, which is based on software from VIQ Solutions. Almost all magistrate judges in the federal courts use DART, rather than court reporters. The Article III judge in Lincoln also uses DART – though most Article III judges in the federal courts use court reporters.

Both judges and the three attorneys rated the reliability of their DART system as excellent. They also expressed great confidence in the accuracy of the transcripts obtained from the digital recordings. Attorneys especially liked the ability to retrieve and listen to the recording from a trial or hearing by 5:30 or 6:00 PM each day via the federal courts' online case records system (PACER: Public Access Court Electronic Records).

The courtroom clerk demonstrated the VIQ software, including the entry of log notes and the ability to rather quickly (less than a minute) play back a segment of a recorded proceeding if requested by a judge or attorney. The courtroom clerk thinks the system is very user friendly.

The federal courts have much more support staff per judge (a law clerk, secretary, and courtroom clerk) than Iowa judges. They also have two tech support staff that support the courthouses in Omaha and Lincoln. They believe the public address (PA) system is an important part of their digital recording system.

A district court administrator who was a member of the site visit team noted the key role of the courtroom clerk who managed the recording system in the courtroom:

“Probably more important is the staff in the courtroom necessary to monitor the equipment during the entire proceeding. This is not a task that can be done half heartedly and expect a viable product. The quality of the recordings will have a dramatic impact on the quality the final product. To insure a high quality transcript it will be necessary to have well trained personnel on hand for every hearing.”¹⁸

¹⁸ See **Appendix 7**, Site Visit Report for Lincoln and Omaha, NE (by Kent Wirth, District Court Administrator).

Three Minnesota Courts

The DART Committee conducted site visits to three jurisdictions in Minnesota. Almost all courts in Minnesota have installed digital recording systems, in part because it is becoming somewhat more difficult to find enough court reporters to fill all the vacancies. While they have installed DART systems throughout the state, they have not laid off any court reporters (CRs), nor have their salaries been cut. Instead, the Minnesota courts created a new position of electronic reporter (ER), who must obtain a certain level of training and certification in the management of the digital recording system. ERs receive the same salary and benefits as CRs.

3. Minneapolis, MN (Hennepin County)

- *DART software: CourtSmart*
- *Courtroom recording management: Centralized monitoring of DART in multiple courtrooms*

The district court in Minneapolis (Hennepin County) includes 62 general jurisdiction judges and 15 limited jurisdiction judges. Their DART system is by CourtSmart. It features a central monitoring room in the downtown courthouse where several court reporters monitor the proceedings and digital recording system in four courtrooms each. All courtrooms include a video camera for the purpose of monitoring the room from the central location; the video is not recorded. Judges and attorneys with whom the team members spoke gave the DART system high marks for reliability. They do not recall losing a single minute of any recorded court proceeding due to an equipment failure. They also believe the recordings are typically of very high quality.

The CRs are often allowed to decide whether they want to keep a steno record of a proceeding or simply rely on the digital recording. The CRs in Minneapolis report that they have experienced fewer health-related problems since moving to digital recording (e.g., less stress and carpal tunnel problems). Judges and court managers believe the DART system in Minneapolis has been successful not just because of the DART equipment or software, but because of their CRs and ERs who monitor the system and produce the transcripts.

According to the site visit report on Minneapolis:

“They [court reporters] too appreciate that the accuracy of the record can be double checked against the audio. [CRs] Believe that the record is accurate because the court reporter is involved and monitoring the equipment. A transcript is only as good as the reporter preparing it, and their reporters do an excellent job.”¹⁹

¹⁹ See **Appendix 7:** Site Visit Report for Minneapolis (by Judge Bill Pattinson).

In Minneapolis, digital recordings of court hearings are not typically available to parties or the public. A digital recording can be obtained only upon a showing of good cause. A written transcript is the official record.

4. Rochester, MN (Olmsted County)

- *DART software: For the Record (FTR)*
- *Courtroom recording management: One person manages the system in each courtroom*

In Minnesota, each judicial district has had the discretion to choose whichever DART system best suits the needs of the district and its budget. Unlike the district court in Minneapolis, which uses a CourtSmart system, the court in Rochester uses a system from FTR. The FTR system in Rochester involves a more traditional set-up, with a CR or ER monitoring the DART system in each courtroom. The person who monitors the recording system during a proceeding is typically the person who produces the transcript. Judges and attorneys in Rochester give very high marks to the reliability of their DART system and to the accuracy of the transcripts produced from the digital recordings. Judges and court managers in Rochester believe their DART system is successful because of the critical role played by the CRs and ERs in monitoring the system in each courtroom and producing the transcripts. According to the site visit report, a court reporter in Rochester explained:

“[DART is] Less taxing on the body; can listen to proceedings to prepare transcript over and over if want to; a different method of reporting the proceedings. If on medical leave, can usually come back to work quicker. The audio is available within seconds, and often-times eliminates the need for a transcript. If a court reporter retires or changes employment, there is no issue of interpreting other court reporters shorthand notes or abbreviations.”²⁰

Rochester differs from Minneapolis regarding the availability of the digital recording of a court proceeding. For at \$10 fee, attorneys or litigants can obtain a copy of the digital recording of their hearing(s) on a CD.²¹

5. Willmar, MN (Kandiyohi County)

- *DART software: High Criteria Inc.*
- *Courtroom recording management: One person manages the system in each courtroom*

²⁰ See **Appendix 7:** Site Visit Report for Rochester (by Scott Hand, District Court Administrator).

²¹ The CD is usually available to be picked up about three days after the request is submitted to the court administrator’s office.

Willmar is a town of about 18,000 people in west central Minnesota – an area that is similar to the rural districts in Iowa. It is the largest town in the judicial district that includes 13 counties. The district has 11 judges, two steno court reporters (CRs), and nine electronic reporters (ERs). All the courtrooms in this district use the Liberty Court Recorder program from High Criteria, Inc. Each courtroom includes eight microphones (two at each of the attorney tables, one for the judge, one for the witness, one at the jury railing, and one at the bench for side-bar discussions). The district chose the High Criteria system because it is very user-friendly and reliable, it produces high quality recordings, and it costs less than the systems by FTR or CourtSmart. They also like the customer service from High Criteria.

Judges, attorneys, CRs, ERs, and the court manager who met with the site visit team are all very happy with their DART system. As indicated earlier, it's very reliable and user-friendly. They all believe the recordings are clear and accurate. They also believe that the system works well because of the trained, skilled, and dedicated CRs and ERs who monitor the system, enter log notes, and produce the transcripts. According to the report on the site visit to Willmar:

“As used in Minnesota’s 8th Judicial District, the DART system is not a substitute for a court reporter. In essence, the DART system is being substituted for the steno machine as a different medium on which to capture the record.”²²

6. Salt Lake City, UT (Salt Lake County)

- *DART software: For the Record (FTR)*
- *Courtroom recording management: One person manages the system in each courtroom*

Salt Lake City has a population of 182,000, but Salt Lake County includes more than 1 million people. Utah is geographically about the same size as Iowa and the state's population (about 2.7 million) is also very similar to Iowa's. Utah was of particular interest to the DART Committee because in 2008 the state court system laid off its remaining 19 court reporters – after a two decade-long transition to recording systems in all the courtrooms in the state. All courts now rely on digital recording to obtain the verbatim record in all cases except capital murder (death penalty) trials, though attorneys can bring their own court reporters if they choose to do so in any case. Utah uses an FTR system for managing the digital recordings. The courts began several years ago by installing an FTR system that included both audio and video. Some persistent problems arose with the video recording system, so they stopped using video – but have continued to use the FTR audio recording system. Judges like the video system and hope to eventually return to video recording in all courtrooms.

²² See **Appendix 7:** Site Visit Report for Willmar, MN (by Judge David Larson).

Judges, attorneys, and court staff report that FTR's digital audio recording system is user-friendly and very reliable. A courtroom clerk oversees the FTR system in each courtroom. They have had a few human errors in operating the system, but nothing serious. For \$10, a party or attorney can obtain a CD with a copy of the digital recording of the hearing on the same day as the hearing.

Court managers report that a complete DART (audio only) installation costs about \$18,000 per courtroom. Adding video to the package (including four cameras) costs another \$4,000 per courtroom. They plan to replace the DART equipment every six to seven years.

Appellate court judges and attorneys also believe that the transcripts from digital recordings are comparable in quality to the transcripts from steno reporters. Utah has also developed an interesting online transcript ordering system. According to one of the members of the site visit team:

Utah recently implemented a centralized online ordering system for transcripts. It's operated by the Clerk of the Appellate Courts. Fees go to the courts to support court technology. When a transcript is ordered online, appellate court staff arranges to have the digital recording delivered to a transcriptionist via email. They have reduced the time from request for a transcript to the delivery of a transcript from 137 days to 11 days.²³

7. Wheaton, IL (DuPage County)

- *DART software: CourtSmart*
- *Courtroom recording management: Centralized monitoring of DART in multiple courtrooms*

DuPage County is an affluent suburban county immediately west of Cook County (Chicago). The courthouse is relatively new. They moved to digital recording because they were confronting a shortage of certified court reporters. For the past 10 years, the court has been using a CourtSmart digital recording system in 27 of the 39 courtrooms – with a central monitoring room (as in Minneapolis). Each court reporter in the central monitoring room monitors up to four courtrooms at a time. Court reporters always report felonies and juvenile cases.

A court manager who oversees the DART system claims they have never lost a single minute of recorded proceedings in 10 years. The judges, attorneys, and court manager who met with the DART Committee members reported that the DART system is very reliable. They were also satisfied with the accuracy of the transcripts. The court reporters with whom the members spoke were not enthusiastic about the DART system.

²³ See **Appendix 3**: the Notes from the DART Committee Meeting on October 9, 2009 (see the summary of the report by the team that visited Salt Lake City, UT).

The court in Wheaton has not laid off any court reporters. Judges and attorneys also believe (as in Minneapolis) that their CourtSmart system – with central monitoring of the recording system in each courtroom – has been successful because court reporters play a key role in overseeing the central monitoring and in producing the transcripts. However, some of the court reporters believe that, because of the central monitoring system, there are sometimes too few annotations with a digital recording of a proceeding, which makes production of the transcripts more difficult.

One important advantage for the courts in Wheaton is that judges have more support staff than judges in Iowa. Every judge has a bailiff and a clerk in the courtroom, access to a secretarial pool, and staff attorneys to assist with writing orders. For felony and juvenile cases, a court reporter is also in the courtroom. According to one of the members of the site visit team, the judges in Wheaton:

“...were amazed that Iowa judges have no support staff except for reporters and aghast that Iowa judges travel to rural courthouses without courtroom support staff [other than a court reporter].”²⁴

E. Surveys of judges, attorneys, and court managers in site visit locations

DART Committee members agreed that it would be useful to distribute standard questionnaires to judges, attorneys, and court managers in each jurisdiction where teams made site visits. The standard questionnaires used exactly the same questions – and the same response options – pertaining to: (1) the reliability of DART, (2) the clarity and completeness of digital recordings, (3) the accuracy of transcripts from digital recordings, and (4) whether they would recommend their DART systems. **Table 3** (below) provides a summary of the findings.

Committee staff asked the court administrator in each site visit location to distribute the questionnaires to judges, a few attorneys, and court staff involved in the management of the DART system. In most locations, only a small number of judges and attorneys responded, so the respondents do not represent a large or a random sample in any location.²⁵ The survey responses are consistent, however, with information obtained by the site visit teams from their conversations with judges, attorneys, and staff in each location.

Overall, the survey results in **Table 3** show that judges and attorneys who have used DART in their jurisdictions for several years give very high ratings to the reliability of their digital

²⁴ See **Appendix 7**: Site Visit Report for Wheaton, IL (by Court of Appeals Judge Amanda Potterfield).

²⁵ The committee received no survey responses from anyone in Wheaton, IL.

recording systems, the clarity and completeness of the digital recordings, and the accuracy of the written transcripts from those recordings.

Table 3
Responses to DART Survey Questions

Location	<u>Reliability</u> of DART system*	Clarity & Completeness of recordings*	Transcript accuracy*	Do DART <u>benefits</u> outweigh <u>problems</u> ?	Would you <u>recommend</u> your DART system?
Judges					
Rochester, MN	Excellent	Excellent	Excellent	Yes	Yes
Lincoln, NE	Excellent	Excellent	Excellent	Yes	Yes
Minneapolis (1)	Excellent	Excellent	Excellent	Yes	Yes
Salt Lake City**	Poor	Poor	Good	Yes	No
Willmar, MN (1)	Excellent	Excellent	Excellent	Yes	Yes
Willmar, MN(2)	Excellent	Excellent	Excellent	Yes	Yes
Willmar, MN (3)	Excellent	Excellent	Excellent	Yes	Yes
Willmar, MN (4)	Excellent	Excellent	Excellent	Yes	Yes
Minneapolis (2)	Excellent	Excellent	Excellent	Yes	Yes
Attorneys					
Rochester, MN	Excellent	Excellent	Excellent	Yes	Did not ask
Lincoln, NE (1)	Excellent	Excellent	Excellent	Yes	“
Lincoln, NE (2)	Excellent	Excellent	Excellent	Yes	“
Salt Lake City (1)	Excellent	Good	Good	Yes	“
Salt Lake City (2)	Good	Good	Good	Yes	“
Salt Lake City (3)	Excellent	Good	Good	Yes	“
Salt Lake City (4)	Excellent	Excellent	Excellent	Yes	“
Minneapolis, MN	Excellent	–	Excellent	Yes	“
Court Reporters/Recording Monitors					
Lincoln, NE	Excellent	Excellent	Excellent	Yes	Yes
Rochester, MN	Excellent	Excellent	Excellent	Yes	Yes
Salt Lake City	Good	Excellent	–	–	–
Salt Lake City	Excellent	–	Excellent	Yes	–
Salt Lake City	Good	Good	–	Yes	–
Willmar, MN (1)	Excellent	Excellent	Excellent	Yes	Yes
Willmar, MN (2)	Excellent	Excellent	Excellent	–	Yes
Willmar, MN (3)	Excellent	Excellent	Excellent	Yes	–
Willmar, MN (4)	Excellent	Excellent	Excellent	Yes	–
Minneapolis, MN	Excellent	Excellent	Excellent	Yes	Yes

* The response options were: 4=Excellent, 3=Good/Acceptable, 2=Poor/Unacceptable, 1=Terrible

**The site visit team spoke with this judge; he was more positive about their DART system in this personal conversation than on the survey. He primarily objected to courts’ loss of the video component of their DART system; they started with video, but moved to audio only due to problems with the video.

F. Test of DART systems in five Iowa courtrooms

Committee members determined early in the process that it would be important to conduct a test of DART systems in at least a few courtrooms in Iowa for six to eight weeks, so some judges, court staff, and attorneys could obtain some first-hand experience with the technology. After the four DART vendors conducted presentations/demonstrations before the committee in June, the committee agreed to invite the four vendors to loan and install – without cost to the Iowa courts – one of their DART systems in a courtroom in a county selected by the committee.²⁶ To ensure that the tests occurred in different types of settings, the committee selected the five locations, one in each of five judicial districts. The locations and DART vendor assigned to each location are shown here:

<u>Location</u>	<u>Vendor</u>
•Black Hawk County (felony trial courtroom)	Jefferson Audio/Video Systems*
•Dickinson County (district associate judge's courtroom)	High Criteria*
•District 8 (associate juvenile judge who travels to 5 counties)	For the Record (FTR) - portable
•Polk County (district associate judge's courtroom - criminal)	FTR*
•Story County (district judge's courtroom – civil and criminal)	Voice IQ (VIQ)*

*Included audio & video (District 8: included audio only)

The four DART vendors completed the installations from mid to late September. In four of the locations, excluding the portable system in District 8, the vendors were asked to install eight microphones:

- Two at each attorney table
- One at the bench for the judge
- One at the witness stand
- One at the jury railing (for voir dire; some used wireless microphones)
- One at the side of the judge's bench for side-bar discussions

The portable system used by the associate juvenile judge included six portable microphones and a digital audio mixer.

Each vendor also trained at least one court support staff member (e.g., a court attendant) on how to monitor the system and enter log notes for each case (e.g., case number and title,

²⁶CourtSmart declined the invitation to install equipment and software in one courtroom for the six to eight week test period. They believe that the test in a single courtroom would not allow them to demonstrate the strength of their system's design and features, which include the ability to centrally monitor multiple courtrooms from a single location. Consequently, the co-chairs decided to invite Voice IQ Solutions (VIQ) to be the fourth vendor for the test of DART in one Iowa courtroom. The state courts in North Dakota and the federal courts in Omaha and Lincoln use VIQ and staff or judges in those jurisdictions had previously reported satisfaction with the VIQ system.

attorney names). In Polk County, the associate judge decided that he would monitor the equipment himself – due to the support staff shortage in the courthouse and because he found it easy to do.²⁷

At the fifth committee meeting (in November), the judges who worked most (or solely) in each of the test courtrooms during the DART test period reported on their experiences with their respective DART systems.²⁸ The judges included: District Judge Bill Pattinson (Story County), District Associate Judge David Larson (Dickinson County), Associate Juvenile Judge Bill Owens (District 8), and District Associate Judge Gregory Brandt (Polk County). The court support staff member who monitored the equipment for the first three judges also reported on their experiences.

Each of these judges reported that: (1) the DART systems were user-friendly; (2) they had listened to multiple recordings of their hearings and found them to be very clear; and (3) the systems operated very reliably during the test period. A minor technical problem arose during the first one or two days in a couple locations, but the issues were quickly resolved by the vendors. The court support staff echoed their judge's views regarding the user-friendliness of the systems and the clarity of the recordings.

G. Evaluation of the clarity of the digital recordings from DART test courtrooms

Committee members decided it was important for them to listen to some of the recordings – and to review transcripts obtained from the recordings – from the DART test locations in Iowa. Therefore, after the test locations had been using the DART systems for about one month, committee staff contacted the judges in the test locations and requested that they select one recently recorded hearing of 15 to 30 minutes in length and to send the digital recording of that hearing to committee staff in Des Moines. Committee staff collected the digital recordings from each of the five locations and copied them onto a CD. Staff also obtained a copy of the digital recording player software from each of the four vendors and copied the software onto the same CD. Each vendor provides this software free of charge to users of their systems. The software allows listeners to: (1) isolate individual tracks (each

²⁷ The district associate judge reported handling 25 to 75 cases per day, mostly short plea or sentencing hearings.

²⁸ Several judges worked in the Black Hawk County courtroom during the test period. None were available to participate in the DART Committee meeting in November. Judge Thomas Bower, however, submitted an email with a brief assessment of the DART system. He found it to be reliable and the audio/video recordings appeared to be very clear.

microphone was recorded on a separate track)²⁹ to reduce background noise and (2) slow down the playback speed of the recording in case speaker was speaking too fast.

Committee staff sent each committee member a CD with the digital recordings from each DART test location and a copy of the software described above. They also received instructions on how to install and operate the software. The committee's co-chairs instructed committee members to listen to (and view, if the recording included video) all five recordings and to be prepared to discuss them at the meeting in November.

During the meeting in November, the committee discussed the quality of the digital recordings. Those who used headphones or ear-buds while listening to the recordings found the recordings to be very clear. Those who listened to the recordings through the speakers on their computer or laptop were more likely to report concerns about the clarity of the recordings. Committee members who used headphones and were able to isolate individual tracks and slow down the playback speed of the recordings gave very positive reviews on their ability to clearly and completely hear everything that was said during the hearings.³⁰

H. Evaluation of the accuracy of transcripts from digital recordings

Assessing the accuracy of the transcripts obtained from digital recordings was one of the committee's essential objectives. The committee assumed that, in general, a transcript produced by a certified stenographic court reporter is very accurate. There was a concern that the use of DART in lieu of court reporters would result in an overall decline in the accuracy of transcripts from court hearings. To conduct a valid and reliable study of the accuracy of court reporter transcripts compared to transcripts prepared solely from digital recordings would require a large random sample of court hearings and large samples of transcript pages from those hearings – plus evaluation of those pages by trained independent evaluators. Such a study was beyond the capability or resources available to this committee. Therefore, the committee relied on three less costly strategies for obtaining reliable information on the accuracy of transcripts obtained from digital recordings:

1. Feedback from judges and attorneys in the site visit locations

As indicated earlier in **Table 3** (above), the feedback from judges and attorneys was almost uniformly positive regarding the accuracy of transcripts obtained from digital recordings.

²⁹ DART systems vary on the number of separate tracks that are recorded; the minimum is typically four tracks. It's possible to record multiple microphones on a single track (e.g., both microphones at the defense attorneys' table). For the five DART test courts in Iowa, each microphone was recorded on its own track.

³⁰ Some committee members had problems installing the vendor's software on their computer and a few members were unable to isolate individual tracks on the recording(s).

The teams of committee members who traveled to Anchorage, Minneapolis, and Salt Lake City also had an opportunity to talk with appellate court judges – who uniformly reported that transcripts from digital recordings are very accurate and indistinguishable from transcripts based from steno court reporters.

2. Evaluation of transcripts from hearings in the DART test courtrooms

The committee believed it was important for members to personally evaluate the accuracy of transcripts obtained from at least one hearing in each of the DART test courtrooms. Therefore, committee staff contacted the court reporter in each of the five locations and asked that she or he produce a written transcript of the hearing the judge had selected for review by the committee, as described in section II.G (above).

Committee staff also selected a private company that specializes in the production of written transcripts from digital recordings and whose transcribers had been certified by the American Association of Electronic Reporters and Transcribers (AAERT).³¹ The company also had experience working with digital recordings from each of the four DART vendors involved in the DART test in Iowa. Staff delivered the five digital recordings from the DART test courtrooms to that company and ordered written transcripts for review by the committee.³² Four of the recordings included both audio and video, while one included only audio.³³ According to a manager at the transcription company, their transcribers routinely use the video portion of the recordings (if applicable) and find the video helpful for identifying the speakers in court. For audio-only recordings, the transcribers use log notes entered by court staff to identify the speakers.

After receiving the written transcripts from the court reporters and the independent transcription company, committee staff delivered all transcripts to each committee member via email (in a PDF format). Each committee member was assigned one hearing for which she or he would assess the accuracy of each transcript while listening to the digital recording. Using a standard evaluation form provided by committee staff, committee members recorded what they believed to be discrepancies between the recording and each transcript. Evaluation forms were submitted to committee staff at least one day before the meeting in November. Some committee members submitted evaluations of transcripts from

³¹ The selected company was AV Tranz, Inc., in Phoenix, AZ.

³² An AV Tranz, Inc., representative requested a copy of the Iowa Code and/or Iowa Court Rules governing the format and cost of court transcripts – plus an example of an actual transcript filed in Iowa's appellate courts. The company charged the same price per page as allowed under the Iowa Code and Court Rules and produced transcripts that comply with Iowa's transcript format requirements.

³³ Recordings from the portable DART system used by an associate juvenile judge in District 8 recorded audio only; the systems in the other four courtrooms recorded both audio and video.

multiple hearings. The evaluation forms were compiled and provided to all committee members at the meeting on November 18.³⁴

Committee members reviewed and discussed the transcript evaluations at the November meeting. There were minor errors in every transcript, but these errors would not have materially altered the essential meaning of the speaker, or the meaning was obvious in context. The committee concluded that, overall, there were no more errors in the transcripts from the transcription company than in those produced by court reporters; both were equally accurate.

3. Prior research on the accuracy of transcripts based on electronic recordings

During the first committee meeting in May, committee members wanted to know if there had ever been a systematic study of the accuracy of electronic recordings and the transcripts produced from them. Committee staff conducted a literature review on this issue and found a single well-designed study; it was conducted by the Federal Judicial Center (FJC) in 1983.³⁵ In the early 1980s, the federal courts began pilot tests of analog tape recording systems as a method for keeping the verbatim record of court proceedings. FJC researchers randomly sampled more than 2,400 pages of transcripts from proceedings in 11 federal district courts – and had teams of experts compare the steno court reporter's transcript to a transcript based solely on the tape recording of the proceeding. They noted discrepancies between the two transcripts and listened to the tape recording to determine which transcript was correct. In all instances where the recording could not resolve the dispute, the steno court reporter's version was assumed to be correct. With this adjustment, the researchers determined that when there were discrepancies between the two transcripts – the transcripts from tape recordings were accurate 58 percent of the time, while the steno reporters' transcripts were accurate 42 percent of the time. The difference was statistically significant.³⁶

The FJC's study was conducted 26 years ago. A-V recording technologies have significantly improved since then. Technologies employed by stenographic court reporters have also improved.³⁷ The committee briefly discussed recommending a new study of the type conducted by the FJC in 1983. However, the committee concluded such a study is not feasible given: (1) the solid research methodology employed by the FJC researchers in the 1983 study, (2) the substantial funding required to replicate such a study, (3) the general

³⁴See **Appendix 8**: Evaluations of Transcripts from Court Proceedings in DART Test Sites.

³⁵ See Greenwood, Michael, et al. (1983), *A Comparative Evaluation of Stenographic and Audiotape Methods for Federal District Court Reporting*. Washington, D.C.: Federal Judicial Center.

³⁶See previous footnote, Greenwood, et al. (1983), Table 5 on p. 41 and discussion on p. 42.

³⁷ See **Appendix 9**: Current Technology Used by Certified Stenographic Reporters.

perceptions of judges and attorneys in the site visit locations that the transcripts from digital recordings are accurate, and (4) the committee's own assessment of a few sets of transcripts from the DART test locations, which found the transcripts from digital recordings and the transcripts from the court reporters to be equally accurate.

I. Assessment of DART Costs

Before proceeding with the assessment of costs associated with DART systems, it is helpful to explain the basic components of these courtroom recording systems. A substantial majority of courtroom digital recording systems currently used in federal and state courts have certain basic hardware components – regardless of the software used to operate and manage the system (e.g., from CourtSmart, FTR, JAVS, High Criteria, or VIQ).

1. DART Hardware Components in the Courtroom

The hardware components are typically standard high quality equipment from name-brand manufacturers. Naturally, each component can vary in quality, features, and price.

a. Microphones – Each courtroom needs four to eight microphones strategically placed to meet the needs of a given courtroom. High quality microphones are critical to meeting the need for complete and clear recordings in court. Most courtrooms should have at least six microphones (one for the judge, one at the witness stand, two at each table for attorneys).³⁸

They cost from \$300 to \$450 each.³⁹

b. Cameras – Some courts use A-V recording systems for capturing the verbatim record. Some courts (e.g., Minneapolis, MN, and Wheaton, IL) install a single camera in each courtroom solely for the purpose of allowing court staff to monitor the activities in the courtroom while managing the recording of court proceedings from a central location. Most courts that use A-V recording install from one to four cameras in each courtroom. Cameras cost from \$600 to \$900 each (including power supply, lens, and stand or wall mount).

c. A-V mixer – The microphones are plugged into the mixer. The mixer determines how many inputs (e.g., microphones) can be accommodated and, therefore, how many “tracks” can be recorded (from four to 12). Some vendors use off-the-shelf mixers from well-known manufacturers. Others develop their own mixers, usually through a partnership with a well-known manufacturer (e.g., JAVS developed its own, which is manufactured by Marantz). Mixers range in cost from \$1,600 to \$4,000 each.

³⁸ Some courts mount a microphone on the railing in front of the jury box to help record voir dire and possibly one at the judge’s bench for sidebars.

³⁹ Estimates for microphones, cameras, and mixers include the cost of cabling/wiring. The estimates do not include potential discounts that would accompany a large order.

d. Computer, monitor and sound/video card – The mixer is plugged into a courtroom PC or laptop. This is typically industry standard equipment (e.g., HP, Dell, etc.) with a certain level of processor, hard drive, and a high quality sound and video card (if recording video). The computer (with monitor, keyboard, and mouse) costs from \$800 to \$1,000. A multi-channel sound card costs from \$200 to \$300. A video capture card costs from \$500 to \$600.

e. Recording storage media – In many or most courtroom systems, one copy of the recording of the courtroom proceedings goes onto the PC hard drive. It could also be directed to an external hard drive in the courtroom or someplace else in the courthouse, to a network drive, or to any two of these. In some places, court personnel download/backup the recordings to a CD/DVD at the end of each day or week. This can be avoided by backing up recordings to a central network storage unit.

2. DART management software

This is a key component that distinguishes the various DART software developers (e.g., FTR, JAVS, High Criteria, and VIQ). The software is typically installed on the courtroom PC or laptop into which the audio or A-V mixer is plugged. Costs per courtroom for the DART management software ranges from \$3,400 (High Criteria) to about \$8,800 (CourtSmart).

The A-V management software provides a visual indicator for each microphone or recording track – allowing support staff to know that each one is active (on). It also allows courtroom staff to conduct effective “confidence monitoring” to ensure that the session is actually being recorded and saved on the system.⁴⁰ The software also allows staff to set security parameters (e.g., to seal a recording), save recordings, and enter log notes or annotations (e.g., case number and title, start and end of hearing, and names of persons speaking at any given point).⁴¹ The log notes are linked to the time stamp on the recording and can be searched using keywords. Clicking on a particular log note will take the listener to that point on the recording.

The DART management software also plays an important role in determining how many tracks the DART system can record. As indicated earlier, most courts that use DART record on at least four tracks. As the technology has improved and become more affordable, courts appear to be moving toward DART systems that record on six to eight tracks: one track for

⁴⁰ A high quality DART system should allow for confidence monitoring by a support staff with headphones. What the staff person hears is the recording that has already been saved to the hard drive (or other initial storage device). There is typically a 1 or 2 second delay between the spoken words in court and what the CRM hears on the headphones used for confidence monitoring.

⁴¹ The log notes feature is typically a separate software utility that can be added to the courtroom management system on the PC in the courtroom.

each microphone in the courtroom. The committee believes recording each microphone to a separate track would be the best practice.⁴² Each track can be isolated during playback – by muting all other tracks – to reduce or eliminate background noise, which enhances the ability to hear voices clearly when producing a transcript.

Some DART software vendors also emphasize their ability to design a DART system that facilitates the monitoring of multiple courtrooms from a single central monitoring room, as in Minneapolis and Wheaton (discussed earlier). This “enterprise” level software and hardware solution can also facilitate the regional or statewide backup and archiving of digital recordings.

3. Central hardware costs for implementing DART statewide

If the judicial branch moves toward implementation of DART statewide, it would be administratively easier and more cost effective to manage the backup and archiving of digital recordings from a central location. Therefore, there would have to be high capacity media storage devices in a central location.⁴³ Depending on the type of recording system chosen (e.g., knowing that video recordings require substantially more storage space than audio recordings), some of the counties with larger caseloads might require an additional T-1 line to transport the digital recordings to the central backup location each night or weekend. These costs are estimated in part B. in **Tables 4** and **5**, below.

4. Ongoing costs for maintenance, tech support, and replacement of equipment

There would also be ongoing costs associated with maintaining a statewide DART system, including: (a) annual software support and upgrade fees, (b) additional I.T./DART support staff to provide on-site and help desk support, and (c) annual contributions to a fund for the periodic replacement of equipment about every five years. (See part D. in **Tables 4** and **5**.)

5. Cost Estimates for all hardware, software, and central tech support staff

The DART Committee obtained information on costs from the following sources:

- 11 vendors that responded to the committee’s Request for Information (RFI) in May
- Four vendors that did presentations for the DART Committee in June provided further details on their costs

⁴² Many courts continue to record onto four tracks and may include two microphones on a single track. For example, the two microphones at the plaintiffs’ table could be recorded onto one track; and the two microphones at the defendants’ table could be recorded to one track.

⁴³ The primary site currently used for backing up and managing the case-related information for district court cases in all 99 counties is at the Judicial Branch Building in Des Moines. The data maintained in the Judicial Branch Building is regularly backed up to a secure site at Camp Dodge in Johnston, IA.

- Surveys completed by court administration staff in the site visit jurisdictions
- Various jurisdictions that responded to questions from state court administration staff via telephone conversations

The cost to purchase and install a DART system in a single courtroom varies by vendor, the quality of the components, whether the system will record video or audio only, the number of cameras and microphones, the number of tracks to be recorded, and whether the recordings will be monitored and annotated in the courtroom or from a central location.

Table 4 (below) provides estimates in the mid-level range (average to a bit higher),⁴⁴ while **Table 5** provides somewhat higher-level cost estimates. Each table contains four sections:

- (A) Initial courtroom installation costs⁴⁵
- (B) Initial central/infrastructure installation costs
- (C) Total initial purchase and installation costs (A + B) and
- (D) Annual/ongoing central (I.T./DART) management and maintenance costs

The DART committee discussed and approved **Tables 4** and **5** as informed estimates of the costs for all courtroom hardware and software and for central I.T. hardware and staffing (for on-site support and help desk services) for all 316 courtrooms in the 99 counties. However, these tables do *not include estimates of the costs for support staff in the courtroom to monitor and manage the DART system*. Those costs are discussed in the next section and

Table 6.

Table 4 shows the total estimated mid-level costs to install DART systems in all 316 courtrooms, based on an estimated *average cost per courtroom* of \$20,000 for an audio-only system and \$25,000 for an A-V system. Rows 11 and 12 indicate that the total cost to install the systems would be about \$6,710,000 for audio-only systems (\$21,300 per courtroom) and about \$8,765,000 for video recording systems (\$27,700 per courtroom). Thereafter, the *annual ongoing costs* – as shown in rows 17 and 18 – would be \$1,363,000 (\$4,312 per courtroom) for audio-only systems and about \$1,979,000 (\$6,261 per courtroom).⁴⁶

⁴⁴ Although Table 4 is labeled as providing “mid-level” cost estimates, it is actually based on the high-end of the range of costs from the estimates provided by the four DART vendors who conducted presentations at the second committee meeting; see also the footnotes at the bottom of Tables 4 and 5 (CourtSmart’s estimate: \$18,000 to \$20,000 per courtroom). Court administrators in Salt Lake City report that their audio-only system from FTR costs \$18,000 per courtroom; adding video costs \$4,000 more per courtroom.

⁴⁵ A senior manager from the Judicial Branch’s Information Technology Services (ITS) division (Scott Ruhnke) assisted in the development of the cost estimates. The ITS division has substantial knowledge of the wide range of courtrooms and their characteristics in the 99 counties because they have installed and maintain the computers and I.T. network in all the courthouses. Ruhnke believes the estimates account for the variations in the difficulties that might be encountered in running wires or cables for DART systems, if they are installed statewide.

⁴⁶ For a detailed list of the costs for equipping a single courtroom in Alaska, see **Appendix 10**.

Table 4
Cost Estimates for Digital Audio/Video Recording Systems
(Mid-Level: \$20k audio-only / \$25k A-V per courtroom)

<i>Estimates are for all 316 courtrooms in the 99 counties</i>		Audio Only	Audio/Video
		\$20k/Ctrm	\$25k/Ctrm
A. Initial Courtroom Costs ^a			
1	Software: Digital records management (\$5,000/courtroom)	\$1,580,000	\$1,580,000
2	Hardware: Audio only (\$15,000/courtroom)	\$4,740,000	
3	Hardware: A-V recording (\$20,000/courtroom)		\$6,320,000
4	Subtotal: Courtroom Costs	\$6,320,000	\$7,900,000

B. Initial Central/Infrastructure Costs			
5	Primary statewide back-up/storage units (in Des Moines)	\$125,000	\$350,000
6	Disaster recovery facility (in Johnston)	\$125,000	\$350,000
7	DVD/Blu-Ray recorder/printer (for archiving)	\$40,000	\$40,000
8	Backup storage drive in each courthouse: @ \$1000/unit	\$100,000	\$100,000
9	Network Upgrades (25 new T1 data lines @ \$1000/line) ^b		\$25,000
10	Subtotal: Central Infrastructure Costs	\$390,000	\$865,000

C. Total Initial Installation Costs (A. + B.)			
11	Total Estimated Initial Installation Costs (rows 4 + 10)	\$6,710,000	\$8,765,000
12	Total Estimated Initial Costs per Courtroom (row 11/316)	\$21,234	\$27,737

D. Annual/Ongoing Maintenance Costs			
13	4 technical staff (salary & benefits)	\$225,000	\$225,000
14	Annual maintenance (12% of software cost in row 1)	\$189,600	\$189,600
15	5-year replacement contribution (20% of hardware cost in row 2 [audio] or row 3 [video])	\$948,000	\$1,264,000
16	Monthly fees on 25 new T1 lines: annual cost ^c		\$300,000
17	Total Est. Annual Maintenance Costs (rows 13 to 16)	\$1,362,600	\$1,978,600
18	Total Est. Annual Maintenance Cost per Courtroom	\$4,312	\$6,261

^a Estimates for total software & hardware costs per courtroom for a basic 4-track DART system:

High Criteria = \$7,500; FTR = \$8,000 to \$10,000; JAVS = \$14,000; CourtSmart = \$18,000 to \$20,000

Note: Alaska's actual costs per courtroom (using CourtSmart software) = \$23,400 (see Appendix 10)

^b Add a 2nd T1 data line in 25 of the busiest counties @ \$1000 each

^c \$1000 monthly fee for the 25 new T1 data lines (25 X 12 X \$1000= \$300,000)

Note: Tables 4 and 5 exclude the costs for equipping judges' chambers. If they are not equipped to record proceedings in chambers, a policy would have to be adopted requiring all proceedings that need to be recorded to be conducted in the courtroom.

Table 5
Cost Estimates for Digital Audio/Video Recording Systems
(High-End: \$25k audio-only / \$30k A-V per courtroom)

<i>Estimates are for all 316 courtrooms in the 99 counties</i>		Audio Only	Audio/Video
A. Initial Courtroom Costs ^a		\$25k/Ctrm	\$30k/Ctrm
1	Software: Digital records management (\$6,000/courtroom)	\$1,896,000	\$1,896,000
2	Hardware: Audio only (\$19,000/courtroom)	\$6,004,000	
3	Hardware: A-V recording (\$24,000/courtroom)		\$7,584,000
4	Subtotal: Courtroom Costs	\$7,900,000	\$9,480,000

B. Initial Central/Infrastructure Costs			
5	Primary statewide back-up/storage units (in Des Moines)	\$125,000	\$350,000
6	Disaster recovery facility (in Johnston)	\$125,000	\$350,000
7	DVD/Blu-Ray recorder/printer	\$40,000	\$40,000
8	Backup storage drive in each courthouse: @ \$1000/unit	\$100,000	\$100,000
9	Network Upgrades (25 new T1 data lines @ \$1000/line) ^b		\$25,000
10	Subtotal: Central Infrastructure Costs	\$390,000	\$865,000

C. Total Initial Installation Costs (A. + B.)			
11	Total Estimated Initial Installation Costs (rows 6 + 10)	\$8,290,000	\$10,345,000
12	Total Estimated Initial Costs per Courtroom (row 11/316)	\$26,234	\$32,737

D. Annual/Ongoing Maintenance Costs			
13	4 Technical staff (salary & benefits)	\$225,000	\$225,000
14	Annual maintenance (12% of software cost in row 1)	\$227,520	\$227,520
15	5-year replacement contribution (20% of hardware cost in row 2 [audio] or row 3 [video])	\$1,200,800	\$1,516,800
16	Monthly fees on 25 new T1 lines: annual cost ^c		\$300,000
17	Total Est. Annual Maintenance Costs (rows 13 to 16)	\$1,653,320	\$2,269,320
18	Total Est. Annual Maintenance Cost per Courtroom	\$5,232	\$7,181

^a Estimates for total software & hardware costs per courtroom for a basic 4-track DART system:

High Criteria = \$7,500; FTR = \$8,000 to \$10,000; JAVS = \$14,000; CourtSmart = \$18,000 to \$20,000

Note: Alaska's actual costs per courtroom (using CourtSmart software) = \$23,400 (see Appendix 10)

^b Add a 2nd T1 data line in 25 of the busiest counties @ \$1000 each

^c \$1000 monthly fee for the 25 new T1 data lines (25 X 12 X \$1000= \$300,000)

Note: Tables 4 and 5 exclude the costs for equipping judges' chambers. If they are not equipped to record proceedings in chambers, a policy would have to be adopted requiring all proceedings that need to be recorded to be conducted in the courtroom.

Table 5 shows the total estimated high-end costs to install DART systems in all 316 courtrooms, based on an estimated *average cost per courtroom* of \$25,000 for an audio-only system and \$30,000 for an A-V system. Rows 11 and 12 indicate that the total cost to install the systems would be about \$8,290,000 for audio-only systems (\$26,230 per courtroom) and about \$10,345,000 for video recording systems (\$32,740 per courtroom). Thereafter, the *annual ongoing costs* – as shown in rows 17 and 18 – would be \$1,653,000 (\$5,232 per courtroom) for audio-only systems and about \$2,269,300 (\$7,181 per courtroom).

A note on the cost of a public address (PA) system: Some jurisdictions visited by committee members consider the public address system in the courtroom to be an important component of the DART system. Many or most courtrooms in Iowa do not have a PA system. A PA system is used in many courtrooms so the public (and sometimes the courtroom participants) can hear what is being said in the courtroom. Some very large courtrooms with poor acoustic qualities may indeed require a good PA system to effectively conduct proceedings – with or without a DART system. A DART system is intended to record the words spoken by the judge, attorneys, and witnesses during a court proceeding. It does not require the voices to be amplified and continuously projected through speakers in the courtroom, which is the function of a PA system. There may be times when a playback from the DART system would be requested during a hearing. This can be accomplished with an amplified speaker that can be plugged into the computer where the recording of the court proceeding is saved. An amplified speaker (or speakers) would cost \$150 to \$200.

A note on the relationship between DART and the Electronic Document Management System (EDMS): A digital recording system can be operated separately from the EDMS system that the Iowa courts will begin implementing in early 2010. They are parallel systems that do not necessarily intersect. If DART is implemented statewide, it would be most efficient and secure to back-up the digital recordings each night or weekend to a central location – just as the case information system is backed-up each night to central data storage units in Des Moines. The one common element between the two systems would be that central I.T. staff would manage the backup for both DART and EDMS, but the data from each system would be stored on separate data storage units.

6. Estimated costs for courtroom support staff to manage the DART system

The committee understands that its charge does not include a recommendation regarding the ideal configuration and level of support staff for judges. However, the committee believes that having a trained and qualified person to manage the DART system in the courtroom is critical for the effective and reliable operation of the system. Thus, the committee concluded that the cost of courtroom support staff must be addressed in any assessment of the costs of operating a DART system.

Currently, district court judges in Iowa typically have a court reporter assigned to primarily assist them with official reporting. According to judicial branch staffing formulas, the district and district associate court judges should also have court attendant assistance during court sessions. This court attendant assistance is intended to provide litigant, attorney, and public customer support to facilitate courtroom management for the judge, and to perform a variety of administrative and clerical duties. This is especially needed for higher volume dockets. Until the budget and staff cuts in 2009, most district associate and associate juvenile judges also had a court reporter available to provide clerical support in addition to official reporting duties.

After the significant reductions of court staff in 2009, there are now approximately 151 court reporters for 189 full-time judges, or .80 full-time equivalent (FTE) court reporter positions per full-time judge. The judicial branch also currently provides just .44 FTE court attendants per FTE judicial officer, down from .75 FTE per full-time judicial officer in 2008.⁴⁷ In many instances, this court attendant assistance has further evolved into a clerk's office support function. Due to the recent staffing cuts in clerks' offices, they have even less time for the judicial support function.

Given the relatively meager level of support per judge in Iowa (as indicated in **Table 2**, above), court reporters have traditionally provided a wide range of administrative and clerical support for judges, especially in rural areas.⁴⁸ Consequently, the committee does not advise installation of DART systems in all courtrooms and the wholesale elimination of support staff positions. Any potential implementation must provide adequate support staff to monitor and manage the system in the courtroom and provide other critical administrative and clerical support that most court reporters currently provide to the judges. Therefore, the committee recommends that the judicial branch ensure an adequate number of trained and qualified support staff for judges. The question is: what type(s) of support staff would be needed to provide this range of critical administrative and clerical support services currently provided primarily by court reporters?

⁴⁷ Before the staff and budget cuts in 2009, the formula for court attendants was .75 FTE per FTE judicial officer in the judicial election district (i.e., all full-time judges plus the FTE demand for magistrates as determined by the weighted case formula for magistrates). The actual number of court attendant positions is now .44 FTE per judge.

⁴⁸ See **Appendix 6: Duties of a Rural Court Reporter in Iowa**. Currently in many rural counties in Iowa, a judge is unlikely to have both a court reporter and a court attendant in the courtroom when court is in session, but this situation varies across the state.

Duties of a courtroom recording monitor/manager (CRM)

The jurisdictions in Illinois and Minnesota visited by members of the committee employ certified stenographic court reporters or certified electronic reporters to monitor/manage the digital recording equipment, to be sure the log notes are accurate and sufficiently detailed to allow for an accurate transcription. Other jurisdictions visited by committee members, including federal magistrates in Omaha and Lincoln, NE, and the state courts in Alaska and Utah, do not employ certified stenographic reporters for this purpose. At a minimum, however, a CRM must:

- Effectively conduct confidence monitoring of the recording system;
- Know courtroom procedures, legal and other technical vocabulary;
- Enter log notes in accordance with guidelines established by the judicial branch as directed by the judicial officer;
- Protect the record under the direction of the judicial officer, which may include: instructing lawyers and litigants to speak into microphones and identify themselves; stopping conversations or other extraneous noise that might interfere with an accurate recording, and asking the judge to recess the proceedings when necessary to adjust or repair the recording system; and
- Have legal secretarial, writing, computer, grammatical and verbal skills necessary to assist trial judges to produce the technical and legal rulings, letters and orders essential to the effective functioning of the courts.

The judicial branch should consider adopting a policy that each CRM achieve certification (e.g., from the American Association of Electronic Reporters and Transcribers).

Providing adequate support staff to judges

As indicated earlier, since many judges in Iowa have only a court reporter as their courtroom support staff, it is not feasible to simply install DART equipment as a replacement for court reporters. A qualified, effectively trained, and certified court employee should be assigned to manage the DART system in the courtroom. Judges also need adequate, qualified support staff to provide the wide range of other clerical and administrative support currently provided by most court reporters.

Table 6 shows the current costs (salary and benefits) for court reporters and two additional types of support staff (Judicial Assistant and Court Attendant/Clerical) that, according to the job descriptions for the positions, are likely to have the skills and qualifications described above. For each support staff position, the table shows three levels of compensation (salary and benefits): maximum compensation for the position, the average for current staff of that type, and the minimum or entry-level compensation.

Table 6 also shows the costs to the judicial branch if it employed different numbers of each type of support staff to either maintain the current level of support per judge – after the 2009 budget cuts (column D) – or to achieve higher ratios of courtroom support staff per judge (columns E and F).

As indicated in **Table 6** (column A), the judicial branch currently employs 151 full-time equivalent court reporters to support 189 full-time judges, which is a ratio of .80 court reporters per full-time judge. The current total annual compensation for all 151 court reporters (column C) is about \$13,601,174.

Table 6
Costs for Three Types of Support Staff in Iowa District Courts

	A	B		C	D ^b	E	F
Staff type	Current # of FTE Staff	Level of Salary & Benefits per Full-time (FT) Staff		Current Total Jud. Branch Cost (A x B)	Cost to have <u>.80</u> FTE staff per FT Judge ^a (B X 151)	Cost to have <u>.90</u> FTE staff per FT Judge ^a (B X 170)	Cost to have <u>1.0</u> staff per FT Judge ^a (B x 189)
Court Reporters		Max\$	99,766		15,064,666	16,960,220	18,855,774
	151	Avg\$	90,074	13,601,174	13,601,174	15,312,580	17,023,986
		Min\$	70,921		10,709,071	12,056,570	13,404,069
Judicial Assistants ^c		Max\$	68,108		10,284,308	11,578,360	12,872,412
	27.63	Avg\$	58,701	1,621,909	8,863,851	9,979,170	11,094,489
		Min\$	52,375		7,908,625	8,903,750	9,898,875
Court Attendant /Clericals ^c		Max\$	61,696		9,316,096	10,488,320	11,660,544
	35.75	Avg\$	54,938	1,964,016	8,295,563	9,339,375	10,383,188
		Min\$	48,179		7,275,029	8,190,430	9,105,831

^a Currently: 189 full-time judge positions: 116 District Judges, 60 District Assoc. Judges, 12 Assoc. Juvenile Judges, 1 Assoc. Probate Judge.

^b 151 full-time equivalent court reporters for 189 full-time judges = .80 court reporters per full-time (FT) judge.

^c See **Appendix 11** for official job descriptions for these two support staff positions.

III. Committee's Findings on the Key Issues

After consideration of all the information from the many sources described in previous sections of this report, the committee unanimously reached the following conclusions on the primary issues before the committee:

Reliability of digital recording technology: Digital recording technology can reliably record the words spoken during court proceedings if the court utilizes a high quality multi-track digital recording system that has been professionally installed and is operated by a qualified, trained, and certified courtroom recording monitor/manager (CRM).

Accuracy of records produced from digital recordings: Accurate transcripts of court proceedings can be obtained from digital recordings if a trained and certified CRM manages the system in the courtroom and qualified, trained, and certified transcribers produce the transcripts from the digital recordings.

Statewide costs for the DART systems plus technical support staff: Estimates of the statewide costs for purchasing, installing, maintaining, periodically updating digital recording hardware and software – and for employing four technical support staff – are shown in Tables 4 and 5 (section II.I.6).

Statewide costs for staff to monitor and manage the DART system in the courtroom: Estimates of the statewide costs for trained and certified CRMs to assist with the digital recording system in all court proceedings are shown in Table 6 (section II.I.6).