

**DIGITAL AUDIO RECORDING TECHNOLOGY:
A REPORT ON A PILOT PROJECT IN 12 FEDERAL COURTS**

**Prepared for the Court Administration and Case Management Committee
of the Judicial Conference**

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I. THE QUESTION AND A SUMMARY OF FINDINGS

A. The Question Before the Committee

This report summarizes findings from a study of digital audio recording technology as it was used to take the record of court proceedings in six district and six bankruptcy courts.¹

The purpose of the study is to provide information to help the Judicial Conference's Court Administration and Case Management Committee answer the following question:

Should digital audio recording technology be an approved method for taking the official record of federal court proceedings?

B. Brief Statement of Findings

The evaluation plan for this study of digital recording systems had four primary tasks, as agreed to by the Administrative Office and the Center. We summarize our findings according to these four tasks. The detailed information on which these findings are based may be found in Section III.

Provide an Assessment of the Technology by Those Who Use It In Court

Interviews with judges, court recorders, court managers, and systems staff identified the following advantages and drawbacks to digital recording technology.

Advantages

- Relative to analog recording, digital recording offers advantages in storage, opportunities for integration with other digital systems, such as case documents, and ability to transmit the record electronically to other court offices and transcriptionists.
- Digital recording provides easier and faster access to the record for judges, court staff, attorneys, transcribers, and the public, in courtrooms, chambers, and elsewhere.
- The quality of digitally recorded sound can be higher than analog recorded sound, provided the court's sound equipment is good.
- The computer equipment for digital recording is robust and reliable.
- Typed log notes are easier to take and better than the handwritten log notes still produced in many courtrooms today. Users value the digital system's unique ability to provide log notes on screen synchronized to the audio record.

Drawbacks

- The current cost of digital recording software and equipment is higher than that of analog recording equipment, and the transition to digital recording imposes monetary and nonmonetary costs on the courts.

- The current generation of digital recording software is not tailored to federal courts. Future installations will require courts and vendors to work together to design systems that are more compatible with federal court cases and procedures.
- Current digital recording systems use a variety of formats, some proprietary, that offer no assurance of future accessibility. A further concern is that the media for digital recording, not unlike the media for analog recording, have an unknown life span.

The pilot courts' experiences with digital audio recording systems varied widely and by the end of the study ranged from a court that had only praise for digital recording to a court that had terminated its use of the system in deep frustration with the product. Nearly every court experienced some problems, at times quite disruptive ones, yet all the pilot courts, even the court that terminated its participation in the pilot, recommended that digital recording be approved as a method for taking the official record. [Emphasis added.]

Provide an Assessment of the Technology by Transcriptionists

Overall, the pilot courts had limited experience with transcription of the record, which is typically done by independent contractors, often in the home. Many were unwilling to buy the digital equipment and software without some assurance that the courts would ultimately change to digital recording. The three districts with a significant volume of transcripts were all using the same digital system. Transcriptionists working in these districts reported that, for the majority of transcripts, the sound quality of the record was very good. They also liked having log notes on screen and integrated into the audio record, while noting that the quality of the notes depends more on the court recorder than it does on the recording system. The courts reported that in nearly every instance in which a transcript was requested, the transcript quality was satisfactory or very good.

While the number of transcripts ordered and the range of experiences by transcribers were too limited to support any conclusions about the possible advantages or disadvantages of digital recording for transcription, the transcriptionists' experiences suggest that if transcripts continue to be important to the courts and the court community, how they are produced must be taken into account when digital systems are designed and purchased.

Compare Costs, Functionality, and Benefits of Digital and Analog Recording Systems

A new analog recording system, including a recording machine and a duplicator, costs approximately \$6,000 per courtroom. We estimate the cost of a new digital recording system, as implemented in the pilot courts, at approximately \$27,500 per courtroom.² This estimate is very imprecise because of conditions unique to the pilot courts (see Section I.D), because it includes upgrades the courts might have undertaken anyway, and because it excludes items discounted or provided by the vendors at no charge, which in some courts were substantial. Estimating future costs is even more difficult, because the technology is changing rapidly, economies of scale may have some effect, and we cannot predict how vendors will respond to

market conditions. These circumstances make it difficult to provide an objective assessment of benefits relative to costs in the pilot courts. It is clear, however, that digital recording systems are, at least at this time, significantly more costly than analog systems.

Collect Information to Assist the Administrative Office in Preparing Technical Specifications to Guide Future Purchases

During preparation of the evaluation plan, Administrative Office staff asked that no specific evaluations be made of vendor products and technical specifications. Instead, to provide the Administrative Office information that will aid in preparing specifications, we document in some detail the pilot courts' experiences with digital recording technology (see Part III) and identify areas in which the Administrative Office may wish to provide guidance to the courts (Section IV). We also provide, at Appendix 4, a detailed description of the features of a digital recording system, along with an assessment of whether each feature is required for taking a digital record.

C. Responses to Key Questions About Digital Audio Recording Technology and the Systems Used in the Pilot Courts

Below we set out a series of key questions about digital audio recording systems, along with answers based on our study in the pilot courts. These questions were developed by the Administrative Office, which has oversight of the digital audio recording pilot project and will prepare recommendations for the Committee on Court Administration and Case Management. The questions are divided into two types, those that focus on digital recording technology per se and those that focus on digital recording technology as it was provided by the three commercially available systems used in the pilot courts. This distinction recognizes that the underlying technology is different from the specific applications or packages put together by the vendors represented in this study and that the technology and the specific applications should be evaluated separately.

Findings About the Technology of Digital Audio Recording Systems

1. Is digital audio recording technology viable and relevant for use in the federal courts?

Each of the three commercially available systems used in the pilot project provides the core function of a digital system—i.e., the ability to convert speech into a digital record. To that extent, the technology is viable. The relevancy of digital recording for the federal courts, on the other hand, is best determined by the users of the systems. Based on their pilot experience, all eleven courts using commercial systems said the technology should be an approved method of taking the record. [Emphasis added.] Despite some problems with the applications currently available, the courts want a recording system that uses current—i.e., digital— technology, which will permit them to integrate their recording systems with other digital applications, such as case records and case management systems.

2. What was the cost of the digital recording systems? How do these costs compare to an analog recording system?

As detailed in the body of this report, the estimated average cost per courtroom for the pilot court digital recording systems is \$27,500. The cost for a new analog recording system, including the duplicator, is approximately \$6,000. Costs of digital systems very likely will change over time. Volume, growing manufacturer expertise, and new designs may lower costs. In addition, if vendors develop systems with a choice of components, courts may be able to control costs to a greater extent by selecting only those features they need. Further, some of the costs incurred by the pilot courts, such as network upgrades, purchase of computers for the judges' bench, and enhanced sound systems, were either unique to the pilot project or are likely to be standard in most courts in the near future. Nonetheless, the systems presently available are costly.

3. Do the potential benefits of digital recording technology outweigh the initial start-up costs and the continuing operation and maintenance costs?

This question is difficult to answer. First, many of the current or potential benefits of digital recording are nonmonetary—e.g., enabling judges and law clerks to listen to the record without having to rely on court recorders, reducing the physical discomfort of taking log notes by hand, and integrating recording and case management systems. These benefits cannot readily be converted into dollars and compared with the costs of digital systems. Second, the technology is changing rapidly, and any comparison using today's systems is unlikely to be valid next year. Third, we cannot predict what the vendors will do. Will they see the federal courts as a sufficiently profitable market to design technology suited to the federal courts? Given these unknowns, we cannot say whether digital's benefits outweigh its costs. We feel somewhat more comfortable predicting the development of systems with a range of components that will permit courts to buy only the functions they need.

4. Is the industry likely to respond to the needs of the federal courts by tailoring systems to the courts' needs and by lowering costs?

This, too, is a difficult question to answer, since the vendors' actions will to some extent be driven by market forces that we cannot predict. From the study, however, we know that one of the vendors' systems is already structured so courts can choose the components they want and that the vendor is moving even more in that direction. The vendors also made some changes or enhancements to the systems at the request of the courts (e.g., changing from a session-based to case-based structure and adding an editing capability). To the extent vendors see changes as useful in other venues, such as the state courts, they will be more likely to respond to requests for changes. Generally, vendors prefer to limit customization, unless it is for the federal courts as a whole or for large segments within the federal system such as the bankruptcy courts. Whether the vendors will lower costs is unknown, but requests for customization or special features are probably not compatible with lower costs. Lower costs might, however, be realized through negotiated GSA pricing and site licensing.

5. Is the technology ready to support the federal courts if it is approved as a method for taking the record?

The current technology can support the basic function required by the courts—the taking of a digital record. [Emphasis added.] The technology also provides additional functions—e.g., the ability to play back the record with ease, the ability to annotate the record, the ability to have the record transcribed—but some systems either do it better than others or in a way that is more compatible with the business of the federal courts. To use the technology effectively in the future, it will be important for the courts to define their requirements and then identify vendors who can meet them.

6. Does the technology permit efficient transcription of the record?

Overall, there was not enough experience with transcription to reach a conclusion about digital's effects on transcription. Of the eleven pilot courts using commercially available digital systems, seven had transcription companies that could produce transcripts from the digital record. In only three of these, all using the same vendor, were a significant number of transcripts produced. The transcriptionists in these three districts reported a positive experience, but generally the pilot courts' and transcriptionists' experience with digital transcription was quite limited. [Emphasis added.]

7. Is digital recording technology readily supportable by existing court personnel?

In general, digital systems contain both proprietary and non-proprietary components. Non-proprietary components (e.g., NT servers or networking software) are readily supportable by court staff who have been given appropriate training (or by others through standard maintenance agreements). Court staff's ability and opportunity to support proprietary hardware and software will vary depending on the intricacies of the component (e.g., specialized voice processing boards) and the amount of access the vendor allows (e.g., the vendor might provide user-maintainable mechanisms for making customizations to the user interface but might not allow access to the database schema).

With training, court personnel should be able to provide day-to-day and routine upgrade support and to do basic troubleshooting to identify the source of a problem. It is likely, however, that some issues will always need to be referred to the vendor.

8. Did the courts think it was worth their time and effort to participate in the pilot project?

Yes, in every court, including the court that withdrew from the project and two others with particularly difficult experiences, nearly all participants felt it was worth it to participate in the pilot project. First, the courts now have a much better idea of what the technology can do and what they want from a system. Second, they felt that by serving as pilot courts they were paving the way for other courts and helping them avoid problems in the future.

9. To what extent are the courts' interests in digital recording technology driven by the need to replace aging analog systems?

When asked why they became pilot courts, only one court said it had an interest in replacing aging analog equipment. Even in this court, old equipment was not the primary reason for participating in the pilot. Like the other courts, this court wanted the opportunity to acquire up-to-date technology that would be compatible with other digital systems and would provide such benefits as easier playback, smaller storage space, and electronic transmission of the record.

10. Will it be possible to acquire additional data about the costs and benefits of digital audio recording technology if the pilot project is extended?

Extending the pilot project very likely will not produce additional data about digital's costs and benefits. If approval and implementation of the technology remain uncertain, vendors are unlikely to develop systems specifically tailored to the federal courts and transcriptionists are unlikely to invest in digital equipment and will, in any case, receive only a small volume of transcript requests because of the limited number of courts using digital systems.

11. If digital technology is approved as a method of taking the record but no national-level funding is available, will the courts use their own funds to purchase the equipment?

Two courts are prepared to use their own funds to purchase digital recording systems as soon as the technology is approved. An additional court is exploring use of a centralized system for its magistrate judge courtrooms, and another four courts hope to expand their use of digital systems. Of these latter five courts, not all want to stay with the vendor they used during the pilot project, nor are they necessarily ready to commit their own funds, but all are eager to move forward on digital recording technology. The remaining four courts think the technology should be approved but are willing to proceed more slowly, waiting to see how the technology changes and improves.

Findings About Digital Audio Recording as Provided by the Three Commercially Available Systems Used in the Pilot Project

1. Are the three commercially available systems used by the pilot courts viable and relevant for use in the federal courts?

Once startup problems were resolved, two of the three systems have, for the most part, performed well in seven of the eight courts in which they were installed. In these seven courts, the court recorders have been using the digital systems to take the record in most court proceedings. The courts cite as benefits ease of taking the record and accessing it afterward, ease of making copies for transcriptionists, and reduced storage space. Several problems remain: cumbersome systems for note taking on the bench, limited access to transcriptionists, user interfaces that could be better tailored to the federal courts, and, related to the latter problem, difficulty in using the systems during fast-paced proceedings, such as motions days.

2. Did the technology perform at an acceptable level during the pilot project?

As noted above, by the conclusion of the pilot study, two of the three digital recording systems were, for the most part, performing well in seven of the eight courts in which they were installed. Some of the expected benefits had been realized, such as easier playback of the record and greater efficiencies in making copies of the record. Some benefits, however, remain promises only, such as note taking on the bench (though only a small number of judges were eager to have this capability) and integration of the recording system with, for example, the case management system. Although only seven of the eleven pilot courts experienced actual benefits during the pilot project, all eleven courts think digital recording technology should be approved as a method of taking the record because only a digital system can be integrated with other automated systems used by the courts.

3. If digital recording technology is approved as a method of taking the record, will the courts continue to use or expand their use of the current system?

Seven courts are interested in continuing or expanding their use of digital recording technology. Not all of these courts want to stay with the system they used during the pilot study, but two courts are ready to go forward with their present vendor. The remaining four of the eleven pilot courts think the technology should be approved but are willing to proceed more slowly, waiting to see how the technology changes and improves.

4. If digital recording technology is approved as a method of taking the record, would the courts recommend their current systems for use in other federal courts?

Two courts would recommend their current systems to other courts, while four courts would recommend that other courts avoid the systems used in these courts. The remaining five courts would give a limited endorsement of their systems because these systems, while reliable, either have some annoying problems or do not have some desirable features.

5. Were the digital recording systems used by the pilot courts more reliable than the courts' analog recording systems?

Once initial problems were resolved, the digital systems proved to be reliable in seven of the eleven courts (representing two out of three vendors) in which they were installed. In two courts, the court recorders said the digital system was more reliable than the analog system; in another court a judge reported using four analog systems in about the same number of years on the bench.

6. Did the digital recording systems installed in the pilot courts require modification or enhancement of the existing sound systems?

In nine of the eleven pilot courts, installation of the digital recording systems required modification or enhancement of existing sound systems. These changes were necessary

primarily because of the pilot project's recommendation that analog recording systems remain in use during the pilot period. This required that the sound signal coming from the microphones be split into two signals, one for the digital system and one for the analog system. Presumably, the need for two recording systems and the modified sound systems will not be necessary once the pilot project is over.

7. Did the digital recording systems installed in the pilot courts require modification or enhancement of the existing network?

In only one of the pilot courts was it necessary to do a major upgrade of the network to accommodate the digital recording system. One additional court created a separate segment on its network to run the digital system. Most courts had to run additional cable and add new network connections to bring courtroom computers and servers onto the network.

8. Did the digital recording systems installed in the pilot courts require significant changes to existing court or clerk's office procedures or processes?

In nearly all the courts, use of the digital recording systems required few or no changes in existing court or clerk's office procedures or processes. For the most part, existing court recording and systems staff continued in their roles with no change except for use of a different technology. Two court recorders found it difficult to make the change to digital technology, a problem that was solved by a shift in staff assignments. In two courts some tasks that had been shared by all court recorders became the responsibility of a single court recorder; production of CDs, for example, became the responsibility of the person whose workstation had the CD unit. In two courts, a staff member had substantial new responsibilities for assisting the court recorders, a situation due at least in part to inadequate training of the court recorders.

9. Did the digital recording systems installed in the pilot courts require more than routine system maintenance to operate effectively?

Once the installation was complete, systems staff in nearly all the courts had to give little attention to the digital systems. [Emphasis added.] In only one court, which eventually withdrew from the pilot project, were systems staff required to give substantial attention to the digital system.

10. Did the courts report disruptions in courtroom proceedings due to failure of or technical difficulties with the digital recording systems?

Failures of or difficulties with the digital recording systems generally did not disrupt proceedings in the courtroom. On the occasions when the system failed or had other problems, which usually occurred early in a court's use of the system, the problems were

usually not apparent to either the judge or the attorneys because the court recorders reverted to handwritten log notes and the backup analog recording system.

11. Were the digital recording systems used for all court proceedings by the end of the study?

For two of the three systems installed in the pilot courts, use of the systems had become routine in six of eight courts. In the seventh court, the system was used as a recording device only; no other functions, such as annotation, were used. In the eighth, the system was used only for longer proceedings. In the remaining three courts, which were served by the third system, use was intermittent because of on-going technical problems. In these courts, court recorders found it difficult to take log notes during fastpaced proceedings and therefore did not use the digital systems for such matters as motions hearings or status calls.

12. Did the digital recording systems installed in the pilot courts provide a net savings of staff time during the study?

For the seven courts in which the digital systems were reliable and were used for the functions intended, the answer is probably yes. We qualify the answer because we did not conduct time-and-motion studies and because the conclusion requires balancing court staff assessments of several separate functions. Across all seven courts, staff reported the following tasks to be easier under the digital recording systems: accessing and playing back the record, providing the record to the judge, and assembling materials for transcriptionists. Two tasks, on the other hand, can consume more time than in the past: editing the log notes and setting up the recording sessions. These problems were limited to a small number of the seven courts, however, with only one finding editing burdensome and three reporting frustration with the time required for setting up the recording sessions.

13. Did the courts require substantial modifications to the digital recording systems to make them work properly?

One of the digital recording systems did not work properly in a federal court setting, and, despite requests from the courts served by this system and efforts by the vendor to improve it, the system was not performing well by the end of the study. Whether further modifications would have solved the problems is unknown. The remaining two systems performed reliably in seven out of eight of the courts in which they were installed, and, while some modifications were made, the basic functions and reliability of the systems were not dependent on these modifications. One vendor's switch from a session-based to case-based structure and the other vendor's addition of an editing function made their systems easier to use but were not crucial to the systems' basic functioning.

14. Did the courts find the sound quality of the digital recording systems to be equivalent to the sound quality of the analog systems?

The courts had no complaints about the sound quality of the digital record, even in those courts where the systems did not perform reliably in many other ways. Most found the sound quality of the digital record at least equivalent to the analog record, and three courts said they found the sound quality better than the analog record. Transcriptionists on the whole found the sound quality to be better, but in two courts, both using the same vendor, there were problems through the entire pilot period with the sound quality of CDs prepared for transcriptionists.

15. Would the courts feel comfortable discontinuing their parallel analog backup systems?

Of the two courts that are ready to purchase digital systems for all their courtrooms, one has already discontinued use of the analog system and we expect the other will do so when the pilot period ends. The four courts that have not had reliable systems installed are obviously in no position to discontinue use of their analog systems. Of the remaining five courts, we think two might be ready to discontinue use of the analog backup systems.

16. Once installed, did it take more than a month for the system to operate successfully in all authorized courtrooms?

By the end of the pilot project, four courts did not yet have adequately functioning digital recording systems. For the remaining seven courts, the initial shakedown period varied from court to court, but all had reliably functioning systems within a few months of installation.

17. Has vendor support for the courts' current digital recording systems met the courts' expectations?

All the courts would like to have more support from the vendors, particularly in the form of on-site visits. Courts served by one of the vendors reported good support via telephone but, like the others, wanted more on-site support.

18. What are the benefits and drawbacks of the system developed by the Bankruptcy Court for the Eastern District of Washington?

A strength of the digital recording system developed by the Eastern District of Washington bankruptcy court is that it is built from off-the-shelf software and equipment. It is also programmed with modular coding to keep it open and compatible with other technologies. The purpose of these features is to make future modifications and upgrades easy and to keep costs down; a single system costs approximately \$8,800. The recording system can readily be linked to the court's calendaring systems so court recorders do not have to manually enter case data. The system also provides easy entry and retrieval of information through a user interface designed with the assistance of a court recorder. The template mechanism used to assign text to hot keys is very flexible, can be set up off-line before a session begins, and can be revised. Because the system is a stand-alone system, mounted on a movable cart, it can be used in any location. Its stand-alone design, however,

means it is not linked to other users; judges, for example, cannot take notes on the system.

At present there are also no separate client modules for playing back the record or for providing the record to transcriptionists, though the court is considering development of these capabilities. Finally, because the system was designed primarily to record conference calls, it does not provide isolated, four-track recording.

D. Conditions Unique to the Pilot Project: A Caution About the Findings

While the pilot courts' experiences with digital recording should be helpful in determining whether and how to proceed with this technology in the federal courts, some of the conditions they and the vendors faced are unique to the pilot experience and are unlikely to be repeated in more ordinary circumstances. The findings presented in this report should be understood within this context. Among the unique conditions of the pilot project are the following:

- Because the pilot courts were required to continue their use of analog tape recorders to provide a backup system to the experimental digital equipment, in most courts the vendors had to split the sound signal coming from the courts' microphones in order to provide sound to both the analog and digital recorders. In some courtrooms, splitting the signal caused problems—sometimes minor, sometimes severe—which may not occur if a digital system is the sole recording system. Splitting the signal also added cost to the digital systems.
- Because some of the digital systems were not available from the GSA schedule, at least at the project's outset, there was a cap of \$25,000 on the items that could be purchased from a single vendor. When the \$25,000 limit did not cover all necessary equipment, courts purchased equipment from other vendors, which in some instances resulted in incompatibilities and thus installation or operational difficulties.
- In some courts, the vendors provided a substantial amount of free equipment or software, presumably to ensure the pilot project's success but making it difficult to know how the courts might have fared had they been required to purchase every item or do without some of the items.
- The digital systems used in the pilot courts were completely integrated systems that included not only a basic record-taking function but many additional features, such as annotations synchronized with the audio record and note taking from the bench. This level of integration, which is sophisticated but also demanding to install and maintain, is not necessary for basic digital recording. Future products may give courts more flexibility in selecting only the features they need and thus in determining costs.
- Because the pilot project was relatively short, the cost/benefit ratio of digital

recording is difficult to determine. For example, only a small number of transcripts could be ordered in the time frame of the study, limiting the opportunity to see the digital systems' effects, if any.

- Most of the pilot courts did not select their vendors, and thus each court and its vendor were not able to determine whether the vendor's product fit the court's way of conducting its business.
- Because the pilot project was limited to one or two courtrooms in each district, the amount of time some courts could give to planning, implementing, and supporting the digital system may have differed from the amount that would be required if a greater number of a court's judges switched to digital recording and the court gave the implementation its full attention.