

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

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

May 14, 1999

Federal Judicial Center

Donna Stienstra

Patricia Lombard

David Rauma

George Cort

This report was undertaken in furtherance of the Federal Judicial Center's statutory mission to provide research and planning assistance to the Judicial Conference of the United States and its committees. The views expressed are those of the authors and not necessarily those of the Judicial Conference, the Committee on Court Administration and Case Management, the Federal Judicial Center, or the Administrative Office.

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Foreword

At its June 1999 meeting, the Court Administration and Case Management Committee considered the findings of this Federal Judicial Center report and the Administrative Office's recommendation that digital recording technology be approved. The committee then made the following recommendations:

That the Committee recommend that the Judicial Conference approve digital audio recording technology as a method of taking the official record in federal court proceedings upon the development of guidelines by the Director of the Administrative Office. These guidelines should include technical and functional system requirements and a self-assessment tool for courts to use when deciding to purchase digital audio recording systems.

That the Committee not seek funding for this technology, but require courts that wish to use these systems to use local funds for any costs beyond those currently covered for analog systems.

That the Committee make the Federal Judicial Center's report available to all federal courts.

In September 1999, the Judicial Conference approved digital audio recording technology as a method of taking the official record. This approval is to be implemented upon development of guidelines by the Administrative Office and on condition that additional funds beyond the cost of analog recording systems not be provided.

Pursuant to the recommendation of the Court Administration and Case Management Committee, the Federal Judicial Center is pleased to provide to the courts this study of the use of digital recording systems in federal district and bankruptcy courts.

Acknowledgements

We're grateful for the assistance of those who were the subjects of this study. Though we asked much of them, the judges and staff were unfailingly gracious in giving their time and thoughtful responses to our inquiries. And, though managing the many demands of piloting a new technology, the courts' project managers were always helpful and patient with the inevitable requests of a study such as this.

Throughout this study we worked with a group of staff from the Administrative Office who managed the pilot program—Angela Garcia, Rob Tarkington, and Larry Hixon. Their efforts helped ensure that we could do our work well, and the different perspective they brought to the project enhanced our final report. We also appreciate the assistance of our colleagues, John Shapard and Melissa Deckman, whose review of the draft report was a great help.

To all, we offer our thanks.

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The Federal Judicial Center

May 14, 1999

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.

¹ For a description of digital audio recording technology, see Section II.A.

- 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.

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.

2 Both figures include some equipment, such as duplicators, that serve more than one courtroom. Absent information about the number of courtrooms the systems might potentially serve, we have based the estimate on the number of courtrooms in the pilot project. If such equipment serves more courtrooms, costs would be somewhat less.

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. 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. 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.

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. 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 fast-paced 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.

II. THE STUDY: ITS CONTEXT AND DESIGN

A. Context for the Study

Authority and Currently Approved Methods for Taking the Record

The taking of the court record is required by statute, as set out at 28 U.S.C. § 753(b): “Each session of the court and every other proceeding designated by rule or order of the court or by one of the judges shall be recorded verbatim by shorthand, mechanical means, electronic sound recording, or any other method, subject to regulations promulgated by the Judicial Conference and subject to the discretion and approval of the judge.”

In addition to establishing the basic requirement to record court proceedings, § 753(b) directs the Judicial Conference to “prescribe the types of electronic sound recording or other means which may be used.” The sole type of electronic sound recording currently authorized by the Judicial Conference is that made by an analog tape recorder (see Guide to Judicial Policies and Procedures, Vol. VI, Chapter 16).

An analog tape recorder records sound on cassette tapes and is monitored by a court staff member who is typically referred to as an electronic court recorder. The court recorder makes sure the equipment is operating properly and maintains a set of notes—sometimes referred to as log notes or annotations—that record the style of the case, the names and addresses of attorneys and witnesses who are appearing before the court, and, keyed to the numeric count on the tape recorder, the identity of each speaker as he or she speaks. The log notes are important for finding information on the tape, whether for playback in the courtroom or chambers or to make copies for attorneys and transcriptionists. Most court recorders take the log notes by hand; some take the log notes on a personal computer.

Also approved by the Judicial Conference are stenographic methods for taking the record, which include real time reporting when funding is available. Article III judges may select any of the approved methods of taking the record. Bankruptcy and magistrate judges are encouraged to use electronic sound recording.

Description of Digital Audio Recording and the Origins of the Pilot Project

Digital audio recording technology is a computer-based, rather than tape recorder-based, system for taking the record electronically. It uses sound equipment, such as microphones and mixers, and personal computers with specialized software and/or

hardware, which together create digital information files. Stored in these files are the words spoken in court and, synchronized to the words, log notes made by the electronic court recorders. Like other computerized—or digital—files, the log notes can be searched and edited, and both the log notes and the audio file can be electronically transmitted to others. The audio file can also be played back through computers equipped with the necessary hardware and software or from a tape using a digital audio tape player.

Although other devices, such as mini-disks and appropriately configured laptops, can record digitally, and although other equipment, such as personal computers, permit log notes to be typed rather than handwritten, digital recording technology integrates the two processes into a single system. In the computer industry, systems such as these are known as “total solution” systems because they integrate all relevant pieces into a single system, in this instance the functions of recording and annotating the record, searching and playing back the record, archiving the record, and preparing a copy for transcriptionists.

Over the last two or three years, as courts have become aware of this technology they have become interested in purchasing it. Judicial Conference regulations do not, however, authorize this form of taking the record. To determine whether the method should be approved, in September 1997 the Judicial Conference authorized use of digital recording systems in twelve courts for a limited period to test and study its functions.

B. Nature of the Study

The findings presented in this report are based on the experience of twelve courts, eleven of which used digital recording systems designed by commercial vendors and one of which developed its own system.

The Courts

In December 1997 the Court Administration and Case Management Committee selected the twelve pilot courts. Appendix 1 identifies the courts and provides brief descriptions of the digital systems used in each.

Most of the systems were installed in the spring and summer of 1998, and thus most courts have somewhat less than a year’s experience with digital recording. One court, which installed digital equipment before the pilot program began, has used it for about eighteen months, whereas a court that installed a system just last November has only a few months’ experience. The experience in another court, which is developing its own

digital recording system, is even more limited, as the court has just begun regular use of the system. Altogether, digital equipment was installed in eighteen courtrooms.

The Vendors

For this study, the Administrative Office identified the three major vendors in the digital recording field and invited each to participate in the pilot project so there would be as broad a basis as possible for evaluating digital recording technology. Eleven of the twelve courts used systems provided by these three vendors: *For the Record* by Dictaphone Corporation; *CourtSmart* by CourtSmart Digital Systems, Inc.; and *Courtroom DART* by BCB Technology Group, Inc. The bankruptcy court for the Eastern District of Washington is developing its own system, whose initial purpose is to record telephone conferences.

The Study

Our goal in studying these courts was to document their experience in purchasing, installing, and using digital recording technology; to provide information to the Committee to help it determine whether the technology is an acceptable method of taking the record; and to provide information to the Administrative Office to help it develop system standards. The study does not and was not intended to compare the quality of the record taken by digital and analog systems, evaluate particular vendors or products, or make recommendations about system standards or the ultimate question of whether digital recording technology should be approved for use in the federal courts. Rather, we focus on the courts' experiences and their assessments of system functions. This information was obtained primarily through interviews with participants in the pilot courts. Appendix 2 describes the methods used to conduct the study and Appendix 3 provides copies of the interview protocols.

III. THE COURTS' AND VENDORS' EXPERIENCES

In the three sections below, we describe in greater detail the pilot courts' and vendors' experiences with digital recording systems. The discussion in Section A is based on the eleven courts that used systems provided by commercial vendors. Because the system developed by the Bankruptcy Court for the Eastern District of Washington is considerably different in purpose and design from the commercial products and because the court's experience with it is limited, we discuss that court separately in Section B. We discuss the vendors' perspectives in Section C.

A. The Courts' Experiences

Initial Contact

Several of the courts had an interest in the capabilities of digital audio recording technology before the pilot study began and had already contacted vendors for discussions and demonstrations of the technology. For the pilot project, the bankruptcy pilot courts each used the vendor they had identified as their preference, whereas the Administrative Office assigned the vendors used by the district courts so there would be a mix of courts using each product.

Initial contacts with vendors were generally with sales staff, who demonstrated the capabilities of the system but did not provide detailed, court-specific technical information. In some courts, vendor representatives did more targeted site evaluations to assess whether the court had in place the infrastructure to support the digital audio system and to identify what, if any, special changes or adaptations needed to be made. Audio system interfaces, network connectivity, and power considerations were typically the focus of these assessments. In at least one instance, no on-site evaluation was conducted, but a telephone conference with the vendor was held.

In looking back on the experience, several courts reported that it would have been better to have a vendor representative with more technical capability conduct the site evaluation. Courts also noted that these early contacts with the vendor should have been used to discuss in more depth what the court wanted and expected the system to do, how the court does its work, and what special situations might affect the court's use of the system. A common complaint from participants was that the vendor did not know enough about how a federal court operates and that the system was more geared to state courts. More discussion in these early stages about the fit between the court's needs and the

system's capabilities would have been beneficial and might have prevented installation, equipment, and software problems that arose later in most of the courts.

System Acquisition

Using information obtained from the on-site evaluations and from component specifications supplied by the vendor, the courts determined what components they should purchase or upgrade in order to implement and support digital audio recording. Courts also had to take into account procurement and budget constraints in effect for this project. Two of the vendors were not on the GSA schedule, and therefore purchases from these vendors were limited to \$25,000. In addition, procurement regulations and project funding limits set caps on the amount courts could spend on digital systems.

Budgeted funds most often went to purchase the vendor's core system components, such as software licenses and proprietary audio processing or tape duplication equipment. For other components such as workstations, servers, disk drives, networks, and sound boards, the vendor identified minimum requirements—and often manufacturer recommendations—and the courts decided whether their current equipment met the requirements or whether upgrades or new purchases were needed. In a few situations, courts that had decided not to buy a recommended system but to use instead a system meeting vendor specifications were later told by that vendor that equipment failures or incompatibilities would not have occurred if the court had followed the vendor's recommendation.

As part of their installation of digital equipment, one court that had not previously upgraded its network decided to upgrade its current network backbone to a higher speed (100Mbit) to accommodate the additional traffic on the network. One court also isolated the components of the digital audio system to a separate network segment to reduce interference with traffic on the network.

Some courts also upgraded equipment and cabling in the courtrooms, to the point where one court eventually installed a completely new audio system. Similarly, upgrades to computer operating systems, memory, sound cards, and peripherals were frequently made.

For many courts the on-site evaluation, component list, and other contacts with the vendor were not sufficient to accurately identify all of the pieces that were needed to support the installation of the digital audio system. In particular, several courts

experienced unexpected problems when they tried to tie into the courtroom PA systems or to split or boost the audio signals to support simultaneous digital and analog recording.

In one court a participant commented that the system requirements were “a moving target.” This court purchased or upgraded components that met, and in most cases exceeded, the vendor’s minimum specifications, but the system did not work properly. Eventually the court had to purchase several hardware items that were unexpected and had to return previously purchased equipment that would not work with the vendor’s system. Although not typical, this experience was also not unique and may indicate that “minimum requirements” are not always sufficient to provide acceptable performance in a live court environment.

Acquisition Costs

Because the courts were in different starting positions with respect to the status of their existing equipment and capabilities, vendor requirements, and their plans for use of the digital system, the cost of acquiring the necessary system components varied from court to court. The timing of the project permitted some courts to benefit from previous operating system or infrastructure upgrades, which did not count against project funds. Conversely, some courts had to make such upgrades specifically to support the pilot project. Actual costs that exceeded the budget allowed by the Administrative Office were paid from court funds. These variations make it difficult to get an accurate estimate of the cost for implementing a digital audio recording system.

An additional confounding factor is the value of hardware (e.g., audio splitters, sound boards, magneto optical drives, servers, earphones, foot pedals), software (e.g., additional or more functional licenses), and services (e.g., customizations) that the vendors provided free of charge. These gifts were usually items the vendors realized were needed after the initial procurement process was completed and budgeted funds had been spent. The most commonly supplied items were additional licenses and audio equipment, such as splitters and sound cards for courts that ran into unexpected sound problems.

A final confounding factor in trying to determine the cost of a digital system is the possibility that some vendors were discounting the costs quoted to the courts so the courts could purchase the necessary components within budget. As evidence of this, one vendor adjusted its costs upward once it obtained a GSA licensing schedule.

As a counter point, however, it must be understood that many of the infrastructure and workstation upgrades that were made by the pilot courts are changes the courts would likely have made over time anyway. Also, our cost estimate is based on installations in one or two courtrooms; if the systems are expanded to additional courtrooms, some of the upgrades will not have to be made again. And in courts adopting digital recording for the first time, upgrades that are spread over a larger number of courtrooms will lower the per courtroom cost. Distribution of costs over courtrooms also applies to centralized equipment (e.g., servers) that support more than one courtroom. In addition, vendors may provide site licenses or other volume discounts when multiple courtrooms are being installed.

Given these differing scenarios, it is very difficult to make a general statement about the actual costs of implementing a digital audio recording system. However, using cost information reported to the Administrative Office and the Center, we can report on actual expenditures associated with purchasing and installing digital systems in the pilot courts and provide an estimate of the value of hardware, software, and services received from the vendors at no charge.³ The actual expenditures range from approximately \$18,500 to \$46,500 per courtroom. The average cost was about \$27,500, and the median cost was about \$26,700. The value of components supplied free of charge ranged from \$100 to \$5,500 per courtroom.

Operating Costs

The most identifiable component of ongoing operational costs of the digital recording systems are the cost of the media used to store the recordings, archive them, and transfer recordings to transcriptionists. Courts report that fewer tapes (e.g., DAT tapes) or archival media (e.g., JAZ disks) were used during the study, compared with the number of cassette tapes needed under the analog system. The estimates varied, but a ratio of one DAT tape to ten or fifteen analog tapes per week would not be an excessive estimate. The comparisons to JAZ disks are not as clear. The magneto optical disks (MOs) and CD-ROM disks used

3 For ten out of the eleven courts using proprietary systems, the actual cost figures used in this analysis come from budgeting requests provided to the Administrative Office by the pilot courts. The cost information for the remaining court comes from forms filled out for the Center. The cost figures indicate the total approved by the Administrative Office and not necessarily the amount requested by the courts. In at least two instances, the courts provided information to the Center that indicates they spent funds above the budgeted amount; these funds, taken from the courts' own budgets, were used for network upgrades and supplies. Information on the value of free items comes from forms completed for the Center.

by some courts to transfer information to the transcriptionists hold substantially more information than an audio tape, so if a long record is being transcribed, a single MO disk might replace several tapes. There appears, therefore, to be a savings in media and storage costs, even though digital media cost more than analog media. One court estimated, however, that it cost over \$2,500 to purchase media supplies to support two courtrooms for six months. Another tangible operating cost reported by one of the courts was the cost of a dedicated telephone line to be used as a dial-up diagnostic support line in each courtroom.

Less tangible costs are those associated with changes in the duties of court recorders and other court staff. We have too little information to know whether there is a pattern or if the experiences in these courts were typical, but some points discussed during the interviews are pertinent:

- Court recorders reported doing less work related to searching out and copying materials from the analog tapes to provide the judge or law clerk with a recording to listen to. However, they also reported spending much more time in set-up work before each session in order to get case and attorney information into the system.
- Court recorders who perform courtroom deputy duties in addition to recording duties may find it hard to do both since the digital recording system requires more constant attention.
- In some courts, court recorders no longer prepare materials to send to transcriptionists or attorneys. These tasks are presently handled by only one or two staff who have the appropriate equipment.
- In two courts, a person identified as the liaison to the vendor or project support staff spends several hours a week dealing with issues related to the operation of the digital system.

Installation

The process of installing system hardware and software varied widely in the pilot courts, with participant assessments ranging from “great” to “horrible.” Even within the same court, participants sometimes had substantially different roles in the installation and quite different opinions of the process. Although numerous factors contributed to the courts’ experiences (e.g., how many workstations and servers needed the digital software, how many courtrooms and chambers needed to be wired, whether the system was stand-alone or

centralized), there were some common elements that characterized the quality of the installation.

Participants who reported difficult installations identified a variety of problems, such as vendor representatives who seemed unfamiliar with their product, installers who did not have the correct software, installers and sales representatives who did not agree on the equipment or software that was required, and installers who had to load software manually or make numerous ad hoc adjustments during the installation. Generally, the installation by a particular vendor was more difficult in the first court than in subsequent courts.

Surprises encountered during the installation, especially ones that resulted in substantial delays and rescheduling, also led to dissatisfaction. In several courts these surprises were due to incompatibilities between the digital system and existing audio systems or computer networks that were not identified during the preliminary site evaluations. Not only were second visits required, with related scheduling conflicts, but installation problems frequently interfered with or truncated training. The court's readiness for the installation was also a contributing factor to the success of the installation. Late arrival of equipment ordered by the court or unexpected proceedings in the courtroom sometimes threw the installation off schedule.

Most of the court participants had previously been involved in major system installations and were not expecting a problem-free experience. In fact, medium to good ratings were given to installations in which minor problems arose if the installer appeared to have things under control and was able to replace or fix faulty components quickly.

The best-rated installations were those handled primarily or exclusively by the vendor, with little court involvement, coupled with either a scripted installation or an off-site pre-installation. In the latter situation, the courts shipped servers directly to the vendor, who installed the software and tested it before coming to the court for what was then a much shorter and smoother installation.

Training

The vendor-supplied training fell into two general categories. Training in some courts was provided by persons designated as trainers, who came in after the installation of the hardware and software was completed. Training in the other courts was provided by the vendors' installation staff, sometimes while installation was still in progress.

One vendor gave training sessions after installation, using separate trainers who typically spent one to two days with electronic court recorders and, schedules permitting, judges. Staff in several of this vendor's courts reported receiving additional vendor training on the software after the initial training had taken place. The other two vendors typically scheduled a block of three to five days for installation, testing, and training, all by the same staff. Staff in several of these vendors' courts reported that installation and testing problems cut into the time allotted for training. In two courts where training was interrupted by installation problems, court staff insisted on and received additional training. In one case, the vendor's representative returned to the court to provide that training; in the other case, the training was done by telephone. In only one of eleven courts was there satisfaction with the amount of training and the content of the training.

The time actually spent training staff varied greatly across the courts, but there is no single cause for this variation, nor does it appear that the courts and vendors specifically planned it that way. In fact, staff in a number of courts described training as ad hoc. Sometimes it was interrupted by installation problems. In other instances, it was interrupted by court schedules (e.g., judges and/or electronic court recorders had court proceedings) or other work schedules. Generally, judges who were planning to use the digital recording software spent less time in training than did staff. The time spent on training was also affected by the content of the training. When training included hands-on experience in a courtroom, such as a mock trial or an actual proceeding, training time was longer. However, such hands-on training, though desired by court staff, was the exception. Staff and/or judges in all eleven districts wanted more training from their vendor.

In almost every district, court staff reported that the trainers, whether they were the installers or separate trainers, were not very knowledgeable about the operation of federal courts and sometimes seemed not to be very knowledgeable about their product. The vendors did not provide users' manuals, at least during the early part of the pilot project, and staff in several courts produced their own manuals for the electronic court recorders. Later in the project, two vendors produced users' manuals. Only one vendor supplied separate training materials; according to court staff, the other two vendors relied primarily on demonstrations and/or hands-on experience with their product. In only one of eleven districts did the staff receive what they said were adequate training materials or manuals at the time training occurred.

Court staff reported that each vendor's training assumed a basic knowledge of computers, in particular familiarity with the Windows 95/98 operating system. In some of the districts, electronic court recorders had limited experience with computers—some were taking handwritten log notes in the courtroom prior to the installation of the digital recording system—and reported difficulty with the training as a result.

Transcribers usually received little or no training from the vendors on the transcription software. None of the transcribers reported receiving training materials or reference manuals from the vendors, although at least one vendor did have an 800 number for questions.

Court computer systems staff did not receive training on the software used for the digital recording, nor were they trained on the hardware supplied by the vendor. In many of the courts, systems staff had to learn the system on their own in order to answer users' questions or troubleshoot hardware or software problems.

Expectations, Actual Use, and Problems Encountered

Courts' Expectations for Digital Audio Recording

Participants in the pilot project had a wide range of expectations for digital recording. Some of these expectations were shared by all participants, others were shared by those who perform certain roles within the courts.

Shared Expectations

At least some staff members in every pilot court wanted to move to a digital audio system in order to take advantage of computerized technology and prepare for what they consider to be the “wave of the future” in court recording. They were interested in keeping up with technological change, such as the ability to transmit audio and annotation files to transcription companies electronically and the ability to scan documents and pictures of witnesses and electronically attach these items to the court record. Most courts expected digital systems to be more reliable, to produce a record with high quality audio, to provide an easy and quick way to play back recordings in the courtroom, and to require less storage space for the files of recorded proceedings. There was a general expectation that the new systems would be a better overall approach to recording in the courtroom and would serve as the next step toward more complex computerized systems for their courts in the future. Court staff were also interested in replacing aging mechanical equipment.

Judge Expectations

Many of the judges were interested in digital recording's promise of ready access to recorded testimony in chambers. They expected this to save time because they would no longer have to ask staff to retrieve tapes from elsewhere in the courthouse. Many judges were also interested in using the system's note-taking function for taking notes during the proceedings, while a few others had no interest in this feature and did not have the system installed on the bench. Two judges expected the digital system to bring them a step closer to real time reporting.

When asked about the security issues involved with having the court record in a more accessible form in a computerized environment, most judges tended to think the potential benefits of the system outweighed that concern. Since the court proceeding is a public record, they saw no reason to restrict access as long as the court maintained a secure copy.

Clerk Expectations

The clerks of court and other court managers expected to see better transcripts from their transcription companies due to an expected better sound quality and more legible log notes. Clerks in courts where log notes were written by hand also expected that typed notes would result in time savings for the electronic court recorders.

Some clerks hoped transcription could take place concurrently with the court proceedings by simultaneously transmitting the record electronically to a transcriber. Some clerks also hoped to be able to recruit transcribers from any part of the country, which would allow courts to seek lower cost transcribers in other regions. A few clerks, as well as other staff members, had hopes of someday being able to post recorded court proceedings on the World Wide Web or on their court's own public access sites.

One clerk thought the digital system might allow courtroom deputies to take over the recording duties of the electronic court recorder, thus reducing the number of staff needed in the courtroom. Some clerks were looking for future staff and time savings associated with a "central control room" approach to digital recording, where, upon expansion throughout the court, a single electronic court recorder could monitor several courtrooms from a central location.

Court Recorder Expectations

Other than the few electronic court recorders who did not know exactly what to expect from the digital systems (e.g., recorders who were new to their positions), most electronic court recorders looked forward to typing and not having to write log notes by hand. Many also expected that having a computer in the courtroom would make their recording duties a more interesting task. Some also hoped the system would be more efficient and thus help them to do their jobs better. Others mentioned that they looked forward to having a spell checker to assist them with legal and medical terms and to a system that would be integrated with the court's calendaring and/or case information systems.

Benefits and Problems of Daily Use

During the pilot project, the amount of time courts spent using their new digital systems varied from court to court. Due to differing equipment acquisition times and installation schedules, some of the courts were on line well before others and thus had more time during the pilot project to use their respective systems. Most of the systems were in place by the summer of 1998, while others came on line later in the fall.

By the end of the project, six pilot courts were able to use their digital systems to record all courtroom proceedings, but one court had terminated its involvement altogether, and another appeared to have been abandoned by the vendor, who had not responded to the court's request that its nonfunctioning system be serviced. Generally, a court's assessment of any given feature of the digital system depended on the importance of that feature to the court. Thus, the same type of problem—e.g., a cumbersome procedure for taking notes on the bench—was annoying only to those who entered the project expecting to have that capability.

Court Recorders

The court personnel most affected by the new digital systems were the electronic court reporters. All of them experienced problems using the systems, especially during the initial phases of the project. These problems included unexpected system shut-downs, slow downs or pauses, screen freezes, printing problems, loss of network connection, time stamps on log notes that were out of sync with the actual times the words were spoken, difficulties with storing and retrieving from archives, clipped audio (audio segments being cut off), and audio fade out when listening through headphones. Other problems tended to

be related to software design, such as font sizes that were too small and not modifiable, the inability to double-space text, not enough space for log notes, and unfriendly user interfaces.

A major problem for the electronic court recorders was user interfaces that were not well suited for certain types of proceedings. For example, in cases where there were multiple attorneys, parties, or witnesses but where the user interface was limited to only a few pre-loaded names, the court recorders were not able to set up enough pick lists (or pull-down selection menus) for all the names in the case. This limitation resulted in electronic court recorders having to type in the names during the proceeding. If proceedings moved very quickly, such as on motion days, they found they could not keep up with their judges. Recorders in three courts also noted that having to use the mouse, rather than using hot keys from the keyboard, sometimes slowed them down to the point that they could not keep up with the fast pace in the courtroom. As a result, three of the nine courts who were still using their digital systems at the end of the pilot project had stopped using the systems for certain types of proceedings, such as motions days and initial appearances, and relied on their analog recording systems. In describing the interface problems, court recorders in three courts noted that the software did not seem to be well suited to the way their federal court did its business. For example, one system was described as being “defendant-based” rather than “case-based,” with a search function limited to searches by date only.

Court recorders using one system found it frustrating to have to set up their pick list options each day before court began. They wanted to be able to set up the list once for each case and have that list carry over from day to day (e.g., for a trial that spans several days), but in this system the list was automatically deleted each time the system was shut down. Consequently, some court recorders no longer used their pick list options.

Another major problem court recorders experienced during most of the pilot project was the inability to modify the text of their annotations during court proceedings. For most of the project, the court recorders were limited to adding notes at the end of the record at the end of the day (e.g., to alert transcriptionists to errors or misspellings in the log notes). To work around this problem, court recorders in two of the courts either moved the log notes out of the digital audio system and edited them with a word processor before sending them to transcriptionists or printed them to hardcopy. This solution was unsatisfactory because it added extra steps to the process of getting log notes ready for transcription. Near the end of the pilot project, one vendor provided a software

update that gave the court recorders the ability to correct their notes while annotating in court.

In two courts, some court recorders were reassigned to other work because they could not adapt to the new software. In another court, a court recorder saw no advantages to the digital system over the analog system and viewed the digital system as a very expensive way of accomplishing the same task that the old system performed satisfactorily. This was a minority view, however, and court recorders in all but two courts said use of digital recording technology should go forward. Some of the benefits they noted included not having disruptive tape changes during court; the ability to fill requests for the record while court is still in session; a decrease in the number of tape requests from judges (in courts where chambers access to the digital systems is functioning well); the ability to make a better record of telephone conferences (since the telephone conferences are being played through the court's PA system); and integration of the recording process into a single machine (instead of log notes being taken separately by hand or on another computer).

Judges

Most judges entered the pilot project hoping to use the digital system to take notes on the bench. By the end of the project, eight judges had abandoned this feature of the systems, finding it either too difficult, too distracting, or too cumbersome to use.

For judges, the primary benefit of the digital system was its superior playback feature. In courts where the systems were installed in chambers, the judges liked being able to listen to previously recorded proceedings without having to request cassette tapes and waiting while they were retrieved. One judge now uses the system in his chambers to review recordings on a daily basis instead of having an electronic court recorder prepare a tape from the analog system. Another chambers advantage noted by five judges was that it permits law clerks and other chambers staff to listen to proceedings and anticipate things the judge may need. Although a court could provide the same service by extending its sound system to chambers, it is much easier to provide access via networked computers.

Five judges said they use the playback feature in the courtroom. Four of these said playback from the digital system was faster and less disruptive than playback from the analog system. All five found the sound quality satisfactory.

Although there were major problems getting the systems to function properly for many of the judges, and although four judges never received the expected equipment,

they still liked the idea of having a digital system. All thought it would be beneficial to the court once the bugs had been worked out.

Systems Staff

In all but one court, the systems staff were not involved extensively in the day-to-day operation of the digital systems. They usually played some role at the beginning of the project, either in procuring new hardware, upgrading existing hardware, and/or assisting with installation, but once the system was operational the systems staffs in most courts tended to step out of the process.

For the most part, the new digital systems running in the pilot courtrooms tended not to have an adverse affect on the performance of other network services in use in the courts. All of the systems used in the pilot project were recommended for use on a 100Mbit network. Since all courts either exceeded this specification from the outset of the project, upgraded their cabling to meet the recommended level, or segmented their network for the digital recording systems, other court services provided over the courts' networks were not adversely affected. For all but one court, integration of the digital systems into the network was less problematic than integration into the sound systems.

Summary of the Courts' Day-to-Day Use of Digital Recording

Although some of the expectations the courts had regarding digital recording technology were not realized during the pilot project, most still feel they want to move in the direction of a digital recording system and believe the technology will perform at its true potential once the problems and bugs are worked out. All courts agreed the problems they faced were exasperating, but they also suggested their experience would be helpful to the courts that follow them.

Transcription

Overall, the pilot courts had limited experience with transcription of the record. Of the eleven pilot courts, two were not able to make arrangements with transcription firms for transcripts and five others had limited access to or experiences with transcription firms. In five of these seven courts, a primary issue was the unwillingness of transcription firms to make the investment in one or more components—either computer equipment or software—needed to transcribe from the digital record. In the sixth, the transcription firm had the equipment and the software, but problems with the courtroom recording equipment meant that only five transcripts were produced from the digital record. And in the seventh,

problems with the digital disks and foot pedals limited the transcriptionists' use of the digital record.

Transcription firms were unwilling to purchase digital equipment and software because they did not know if digital recording would be approved for use in federal courts and if the software they would have to purchase would be the software ultimately selected in their local courts. Transcription is typically done by independent contractors, often in the home, who may use older computers and word processing software to produce transcripts from analog recordings and log sheets. As one transcriber pointed out, the software she would need to transcribe digital recordings cost more than she billed in a year to the courtroom in which the digital recordings were made. As a result, she was unwilling to purchase the software at this time. When interviewed, other transcribers said much the same thing, that it was not worth it to them to purchase the software without assurance of a sufficient workload. Transcribers were more likely to purchase new computers that would be compatible with the digital equipment and software, apparently because they could see a benefit beyond the pilot project in upgrading their equipment.

One of the vendors did make the software and foot pedals available to transcribers on a trial basis in their pilot districts, but in only one of these three districts did a transcriber put together a workable system. Problems with the digital recording equipment limited the number of proceedings that were digitally recorded in this district and, therefore, limited to five the number of transcripts that were actually produced in that district.

Another vendor wrote a runtime version of its transcription software that could be included on CD-ROMs with the digital files for transcription. However, this software was not available until approximately mid-way through the pilot project, and the transcription firms in this vendor's pilot districts had trouble finding foot pedals that would work with their computer systems. The foot pedals were available only during the last months of the pilot project and, as a result, few transcripts were produced from the digital recordings.

The remaining four districts were able to have transcripts made from the digital record. All four courts had the third vendor's product. Three of these districts used the same set of transcription companies. The other district found two local firms that would purchase the software, but one firm produced only three short transcripts and the other firm, because it was in another city, could be used only for routine and not expedited transcripts. This district also had a transcription station in the courthouse, but transcribers did not like to travel to the court to do their work.

The companies used by three courts produced more than 100 transcripts altogether. These transcribers' reports of their experiences do offer some insights. First, for the majority of transcripts, these transcribers reported audio that was very good. Second, audio quality is diminished when speakers move away from microphones, a problem encountered with both analog and digital records. And third, the quality of the electronic court recorders' log notes affects the transcriber's ability to produce a good transcript. Finally, in nearly every instance the court reported that the quality of these transcripts were either satisfactory or very good.

Customization

The user interface to the digital audio recording systems controls how the user can perform the principal recording, annotating, searching, and playback functions of the system. Although the systems are installed with default parameters and constructs, some elements are modifiable so the interface can better conform to the needs of the court and the court recorder. Some of these elements can be modified by the user as needed (e.g., hot key labels) and some require changes that can be made only by the vendor and are usually set as the default for the court (e.g., organizing the record by date-and-time or by case number).

Users of the digital systems identified several elements that did not perform as expected and default functions that did not adequately handle court proceedings. The vendors were informed of these problems and in some instances worked with the court to make the necessary changes. In other situations, the modification requests were too difficult to implement right away, had to be investigated further, or were resisted by the vendor.

Listed below are the kinds of modifications that users requested during the pilot study.

Personal User Interface

Court recorders, judges, and transcriptionists asked for a variety of changes they suggested would help them use the digital systems more efficiently:

- enable users to create personal sets of function keys or pick lists,
- modify the user interface display—e.g., let the user determine whether to use double space, larger fonts, or different window sizes,

- program the system to require fewer keystrokes to do certain tasks, and
- give users the option of selecting functions by keystroke or mouse.

Adaptations to the Way the Court Does Business

The items in this category are primarily requests for modifications that make it easier for the court recorder to handle court proceedings or enter information that is not well captured by the default capabilities. In discussing their experience with the system, several participants said the basic structure of the digital recording systems was not well suited to the needs of federal courts because it could not be adapted to the very different types of proceedings that need to be recorded. Note taking structures that work well for long proceedings in a single case are not very useful, for example, during high volume proceedings such as motions days or calendar calls where hundreds of cases could be called in a single session. Changes participants would like to make to the system include the following:

- ability to select an organizing mechanism that best suits the court (e.g., files organized by case number, not by date and session),
- ability to enter a list of juror names to better handle voir dire proceedings,
- ability to handle other special court proceedings (e.g., calendar calls, motion days, Chapter 13 status calls),
- ability to handle multiple defendants and multiple attorneys,
- ability to have attorney names and addresses appear on the log notes, and
- ability to change function key mapping quickly while recording to deal with special procedures.

Many requests for changes to this aspect of the digital systems, especially requests that required programming or fundamental changes in the structure of the captured information, were not addressed during the study period. Doing their best to adapt to the limits of the systems, court recorders often crafted innovative workarounds, such as inserting adversary docket numbers in the telephone number field.

General Enhancements

The items in this category reflect basic improvements to the operation of the system:

- no limit to the length of text field notation,

- ability to edit log notes immediately while recording,
- ability to edit log notes later from a non-courtroom workstation, and
- ability to do session set-up tasks beforehand and have them persist so they are ready to use in one or more sessions later.

If implemented, these capabilities would allow the operators to produce a better record because annotations would be more complete, more correct, and more useful to transcriptionists. The ability to perform tasks outside of the courtroom and to reuse previously entered information would be a convenience and time-saver for court recorders.

Specialized Requests

These items reflect more elaborate modifications or extensions to the capability of the system:

- interface to case management databases or calendaring systems,
- automatic integration of judge's and court recorder's notes on judge's screen,
- security and privileges for second note taker, and
- ability to obtain administrative and case management information from the system.

Almost all of the courts expressed an interest in being able to integrate information from the case management databases into the digital recording system, so that attorney, case, and scheduling information that is already in electronic format would not have to be reentered.

The requests in this category highlight the fact that digital audio systems need to be flexible to be able to support the range of users and uses in the federal courts. As one participant noted, it is not useful to customize the application to the "least common denominator" and expect it to provide satisfactory results for all users.

Vendor Support

The level of vendor support was a concern in each of the eleven pilot courts; each court wanted more support than was actually supplied by the vendors. The desire for additional support took a variety of forms, ranging from faster responses to questions to software changes to additional training. Staff in many of the courts expressed a desire for

local hardware and software support, whether through a local firm or through training of the court's computer systems staff to provide that support. Requests for support, particularly on-site support, were sometimes a source of tension between the pilot courts and the vendors.

The vendors' support to the pilot courts, exclusive of installation and training, was of three types: telephone support for questions, a modem link for software patches and upgrades, and site visits to complete installations or to fix reported problems. Each of the vendors provided telephone support to their courts. In general, court staff were pleased with the quality of the telephone support they received. More often than not, staff reported that their questions were answered promptly and that they got the information needed to resolve their problems. This experience was not universal, however. Staff in courts with one vendor's product reported that their questions often were directed to vendor staff who were not familiar with their installation and, as a result, answers were not as useful as they wanted. Transcribers using another vendor's product reported difficulty even getting telephone calls returned.

Two of the vendors had modem links between the vendors' headquarters and the courts. There is no information on how frequently these links were actually used. However, staff in several courts were concerned about software changes made by the vendor, via modem, without prior notification to the court. In one of these courts, the vendor made unannounced changes that interrupted the recording of a court proceeding.

Site visits after installation were an issue for most of the courts in the pilot project. Each vendor did make additional visits to one or more of their pilot courts, to fix problems that could not be addressed over the telephone or via modem. However, staff in a number of courts felt that their vendor was unresponsive to their problems because the vendors either did not visit the courts to fix reported problems or did not do so promptly. In one case, court staff reported that the recording system was not available for several months, awaiting a visit from the vendor. In that same court, some equipment still had not been delivered one year after the order was placed. Another court reported that their vendor did not visit to fix problems in spite of multiple requests. A third court reported that the vendor had had no contact with the court since installation. And one of the pilot courts terminated the project altogether after the vendor failed to provide software and equipment changes it had promised.

The Pilot Courts' Overall Assessment of Digital Recording Systems

The story of the courts' experience as pilot courts for digital recording is a simple one. Nearly all found the process of setting up the digital systems to be difficult; most experienced further problems in operating the systems, especially at the outset; none of the products used have all the features court users would like and/or have features the users do not like or want; vendor support has been problematic; and in most courts transcription problems have been ongoing and have more often than not prevented transcription from digital recordings. Yet, every court thinks digital recording is, as we so often heard, "the wave of the future" and "the direction the courts must go." Why do they endorse digital recording as a method for taking the court record? And against what drawbacks should the advantages be weighed?

The Advantages of Digital Audio Recording Systems

There are essentially three reasons why the pilot courts hope digital recording will be approved by the Judicial Conference: (1) it is the direction technology is going, (2) it has promise for future benefits, and (3) it has advantages, even in its present, imperfect form, over analog recording.

Trends in Technology

Both the pilot courts and other courts have been involved for some years in a range of automation projects, beginning with computerized dockets, moving more recently into installation of sophisticated imaging and accounting systems, electronic filing, and electronic evidence presentation. All of these systems are digital—i.e., they store information digitally—and as the courts look ahead, they see all systems moving to this format. Thus, they want approval of digital recording to complement these other technological changes. This is more than just a desire to have the latest innovations. Currently, only two companies continue to make mechanical recording devices that are approved for taking the record, and the courts wonder how long the analog recording systems will be available and supported.

Potential Benefits

Staying in step with technology would permit the courts to realize a potential benefit nearly all identified and desire—electronic transfer of the record to transcription companies. This would, the courts say, save the time currently spent by staff in preparing disks for transcriptionists, the time materials are in transit, and the cost of that transit.

Further, the courts and transcriptionists hope that some of the problems transcriptionists have had in reading disks prepared by the courts will be eliminated when the record is transferred over telephone lines. Most courts also anticipate being able to give attorneys electronic access to the record instead of having to make tapes for them. And in districts that are dispersed geographically, the courts see a benefit in being able to transmit the record electronically from one division to another, rather than relying on the time-consuming process of making and sending tapes.

Two courts also look forward to using digital recording to take a better record in magistrate judge courtrooms. In some courtrooms, staff are not constantly available to monitor the tape recorder and ensure that all courtroom exchanges are fully audible on the recording. This situation can be ameliorated, these courts believe, by installing digital recording systems in the magistrate judges' chambers and linking them all to a central control room where a single staff member can monitor the devices. Such systems are in operation in some state courts and are the type of system initially developed by the vendors involved in this project.

Because digital recording permits a centralized repository of information being recorded at remote sites, whether in a courtroom on another floor or 300 miles away, courts expect that staff will be able to access the record even while it is being taken. Some judges, for example, said it would be very valuable to have law clerks or courtroom deputies monitor proceedings from computers on their desks instead of being confined to the courtroom. And a clerk of court noted how much easier it would be to monitor high profile trials, particularly in other divisions, by tuning in from his desk.

One of the most important potential benefits courts expect from digital recording systems is the ability to link the record of court proceedings to other electronic records. To make preparation for digital recording easier, the courts hope future digital systems will be able to pull case information, such as attorney names and addresses, from their case management databases. This will relieve electronic court recorders of the sometimes tedious task of entering this information before proceedings begin and will provide transcriptionists with more accurate information. The courts also hope to be able to bring into the record exhibits that are provided to the court electronically.

Present Benefits

The pilot courts see sufficient benefit to the digital recording systems, even in their current form, to recommend this method of taking the record and, in several instances, to

begin planning for possible expansion to other courtrooms. While the advantages identified below were not universally realized and while they were often gained only after considerable delay and frustration, the courts as a whole report the following benefits from digital recording systems:

- Clearer, sharper sound

Most courts 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 generally reported a better quality of sound on digital recordings. Keep in mind that these are subjective evaluations of sound quality and are not based on objective measures, such as engineering sound tests. Keep in mind as well that in several courtrooms new sound systems or microphones were installed, making it difficult to attribute changes in sound quality to the digital recording systems alone.

- Easier access and playback for judges and law clerks

One of the strongest arguments in favor of a digital recording system, from a judge's perspective, is that it enables a judge—and the law clerks—to access the record and play it back. This benefit is realized primarily in chambers, since many judges discourage replaying the record during court proceedings. But when judges want to listen to testimony in chambers and when the digital system makes this relatively straightforward (not all did), a digital recording, in their view, offers a means of finding the relevant segments more easily and immediately than on an analog tape. Further, they are freed from dependence on staff who formerly had to retrieve tapes for them.

- Easier for court recorders

Although the court recorders were dissatisfied with a number of features in the digital systems, on the whole they found these systems made their job easier. Many said it is easier to take log notes with a digital system because they can type faster than they can write by hand, they no longer suffer hand cramps, and the system is interactive and thus helps them stay more alert during proceedings. Their log notes are also more legible, helping them and others use the notes more efficiently. The court recorders were also happy to be relieved of the tedious and time-consuming tasks involved in providing tapes to judges and transcriptionists—retrieving the tape, searching handwritten notes for relevant portions of the testimony, playing

the tape back and forth until the segments are found, copying the tape, and packaging up log notes and other papers. Judges can now access the record on their own and the process of copying the record to disk for transcriptionists can be done in a matter of minutes rather than hours.

- Savings in storage space

The digital record is typically stored on media of greater capacity and lesser size than analog cassette tapes. The courts can back up a week's worth of proceedings in a courtroom onto a single disk, whereas a full day of proceedings could require up to four analog tapes. Depending on the medium used to store the digital recordings, the space needed to store these recordings can be considerably less.

- Immediate access to the record, faster preparation of transcripts

Staff who were responsible for providing the record to transcriptionists reported that digital recording systems can make this task much easier. The relevant portion of the record can be found and copied more quickly electronically than it can be mechanically, and log notes do not have to be assembled and copied, thus taking less time to get the record to transcriptionists. This is particularly important when attorneys request an expedited or a daily transcript. Digital systems offer a particular advantage in this regard, staff in some courts reported, because their systems permit the record to be copied from a central repository even as proceedings continue in the courtroom. Thus the record can be fed to the transcriptionist throughout the day, resulting in more timely transcripts.

- More reliable than analog tape recording

Judges and staff in several courts found the digital systems more reliable than the analog recording systems, despite the instances, frequent in some courts, when the digital systems froze or otherwise functioned improperly. Judges and staff in these three courts reported that the analog tape recorders frequently jammed, that tapes broke, that the automatic changeover when a tape was full often failed, that the process of changing tapes was disruptive, and that the machine easily became dirty and was difficult to clean.

- Easier staff access to the record

In courts where funds were sufficient to acquire multiple work stations, computers were placed in the court recorders' offices and offices of members of the clerk's

staff, permitting them ready access to the record. Thus, for example, courtroom deputies could go into the record for information they needed to mark exhibits submitted when they were not in the courtroom, a process that is easier than finding the same information on tapes.

Noticeably missing from this list is judicial use of the digital systems' note taking capability. When the systems were introduced to the courts, judges were told they would find this a welcome feature. Some judges, who do not customarily take notes by computer, declined this offer and did not have the digital equipment installed on the bench. Other judges, however, were enthusiastic about the prospect and had the digital software installed either on the bench or on their personal laptops. By the end of the pilot project, few were using the system to take notes, having found it either unreliable, cumbersome, or inconsistent with how they take notes in court. If judges wish to have this feature in future systems, vendors may have to tailor it to judges' needs in the courtroom.

Like the courts, many transcriptionists who used the digital transcription systems during the pilot project encountered difficulties with the installation and operation of the systems. Yet, also similar to the courts, most transcriptionists believe the judiciary should approve use of these systems for taking the record. They, too, see it as the technology of the future and look forward to receiving the record via modem or over the internet. Several, most notably those with the greatest experience using digital equipment, preferred digital to analog records. In their experience, digital systems produced better sound quality and more legible log notes while providing such useful features as separate volume adjustment on each of the four channels and log notes synchronized to the audio record.

The Drawbacks of Digital Recording Systems

Whether the calculation is made by individual courts or the judiciary's policy makers, the advantages perceived by the courts must be weighed against any actual or potential disadvantages caused by digital recording systems. The conclusion reached by the courts is clear: though they encountered startup problems, all recommend digital recording. This recommendation arises from their confidence that most problems are simply "bugs" or design issues that can be worked out in future generations of the technology. The real issues, for the courts and the judiciary, are not these immediate design issues but larger structural and systemic drawbacks presented by digital systems.

The Costs of Digital Recording Systems

The first and presently most daunting drawback is the cost of digital systems. As documented above, the pilot systems cost a court on average \$27,500 per courtroom in actual monetary outlays and a transcriptionist between \$1,400 and \$2,000 for the digital equipment and any computer upgrades required. Not counted in these figures are the items vendors provided free of charge. An additional cost courts and transcriptionists may incur, one not measured by the pilot study, is the cost of future upgrades to the digital software.

A straight multiple of \$27,500 times the number of courtrooms some courts might want to equip could quickly dim any hopes of expanding this technology. Yet the courts do hope it will be feasible, either because of economies of scale or because costs will come down as the technology changes and as it becomes more mainstream. Further, many of the costs they incurred, they point out, are costs they would have faced at some point anyway, such as purchase of computers for the courtroom or installation of a new sound system. What digital systems will actually cost courts in the future will depend, as well, on where the courts started. For courts with recently upgraded networks or sound systems, the cost will very likely be less.

For transcriptionists, on the other hand, solutions or justifications are not as readily available. Many work at home on contract to a larger company and may bill little more in a year than it would cost to buy the digital equipment and the necessary upgrades for their computers. At this point, only those who own sizable companies or can expect a large volume of work from the courts can afford digital equipment.

Digital systems present various nonmonetary costs as well, such as the impact on court staff. While many court recorders, judges, and law clerks found significant time savings in making and using the digital record, all gave considerable time to learning the system and working through its problems. In addition, staff in several courts now have new responsibilities for ensuring the security of the record and providing support to the court recorders. And court recorders and transcriptionists have lost some of the control they previously had over their work; whereas they could repair a broken tape or coax a jammed tape recorder back to life, most cannot correct network or computer problems. At the same time, many court staff welcomed the opportunity to learn new skills and several clerks pointed out that the introduction of any new system requires training and should be seen as an opportunity to strengthen the staff.

Customization of Digital Recording Systems

Many of the specific problems encountered by the users of the digital equipment revolve around screen layout, keyboard and mouse usage, and protocols for entering and accessing information. Most federal courts, for example, manage litigation by case, not by defendant name or date. Court recorders, who were accustomed to entering attorney appearances and accessing information by case number, found it difficult to operate in an information system organized around the date of the recording session, as some of the systems were. Likewise, transcriptionists, whose income depends on typing speed, found it difficult to profit using a system that required them to take their hands off the keyboard to use a mouse.

The specific problems identified by the users are less important than the broader issue of customization. To be suitable to the federal courts, digital recording systems must at minimum be tailored to the needs of the federal courts. This will require vendors and courts to work together to identify how the courts do their work and how the recording system can be designed to support that work. It will also require the courts and vendors to work with transcriptionists to meet their needs. Altogether, customization will require a degree of flexibility that all parties may have difficulty accommodating. But without some degree of customization, digital recording systems are not likely to succeed in the federal courts.

The Lifetime of Digital Media

Another issue that must be confronted when considering digital recording systems is the current uncertainty about the useful lifetime of digital media. How long will the records now being written on hard drives, CD-ROMs, JAZ drives, and other digital media be viable? This question pertains to tape and paper storage, too, but digital records are so recent that there is no experience yet on which to base predictions. Consequently, no one knows whether they will meet the judiciary's longest requirement—twenty years—for records retention.

Future Access to Digital Records by Other Systems

At present, there is no standard format for digital recording. Absent standardization, there is no assurance that the record produced by any of the systems currently available will be readable if the vendor were to leave the business or cease support of its system. The current difficulties experienced by some transcriptionists in reading disks produced by the same vendor's software suggest caution. Most of the courts had given little

thought to this matter. When asked about it, they generally said they were not concerned and were confident information technology would solve the problem.

The Overall Assessment

For the courts, the advantages of digital recording, though intermittent and in many instances yet to be realized, outweigh both the specific technical problems they encountered and the more systemic drawbacks either we or they identified. While most courts said the start-up was very rough, while many still experience operational problems and are concerned about vendor support, and while several want to use a product other than the one assigned by the pilot project, all hope to use digital systems for taking the record.

This does not mean they are without concern or would jump in immediately. The following two comments capture the prevailing view:

- When it's working, we love it. (a court recorder)
- Digital is a good idea and I want it to go forward, but the technology has to be better. (a clerk of court)

The courts view the past year as an important one in helping the technology move forward. Most were philosophical about their experience—explicit about its frustrations but satisfied that their efforts would make the way smoother for other courts.

B. The Bankruptcy Court for the Eastern District of Washington

The Bankruptcy Court for the Eastern District of Washington chose to bring digital audio technology to their courtrooms by creating their own system. Their software package, titled E.A.R.S., or the Electronic Audio Recording System, is being developed by a court automation specialist and is coded primarily in Visual Basic.

Because the Washington Eastern Bankruptcy Court uses telephone conferences extensively—nearly 90% of its recordings are of telephone conferences—the E.A.R.S. system was built around the need to record these conferences. Thus, it has a special telephone interface, but the system can also be easily integrated into the courtroom by merely plugging it into the courtroom's sound system. A unique strength of this system is that it is programmed with off-the-shelf programming languages and was designed to use as much off-the-shelf equipment as possible. It is also programmed with modular coding in order to keep the product open and compatible with other technologies, a feature designed not only to make future modifications and upgrades easy but to keep development costs

down. A drawback, however, is that the system as currently configured does not provide isolated, four-track recording.

The system is currently capable of pre-loading information from two different calendaring systems (Spokane's ECM and USBC Phoenix's VCAL) so court recorders do not have to manually enter information from the court's calendar. Another versatile feature of E.A.R.S. is that all commands issued from the user interface can be accessed by either a mouse click or by a hot key sequence. The user has the freedom to choose the method that is most comfortable. The system also allows the user to set up "party templates" or lists of names associated with a particular case. These templates are user definable and can be stored on the PC's hard drive for easy retrieval at a later time.

The system is designed to be user friendly. A manual has been written for it, and the functions associated with every hot key sequence are displayed directly on the user screen. The programmer believes a staff member new to digital recording can be up and running with the system after being given a short demonstration that explains the individual buttons on the screen. One of the court recorders in Washington Eastern has worked closely with the programmer to refine the user interface's look and feel in order to further enhance its ease of use. This court's unique contribution to developing this type of system is its knowledge of court processes and how the information from the court proceedings needs to be organized for easy entry and retrieval into a system such as this.

The hardware configuration differs slightly from the configurations offered by the third-party vendors. Each E.A.R.S. workstation is essentially a stand-alone system, a PC with sound card and telephone interface, mounted on a movable cart. The idea is to be able to move the cart into a court recorder's work area, then plug into the court's calendaring system to pre-load party names and perform any setup functions. Then, when it is time to record in the courtroom or record a telephone conference, the cart can be moved to the appropriate location, plugged in, and used as a recording workstation. At a later time, after the court recorder has finished recording and the log notes are satisfactory (proper review has taken place and spell checking has been performed), the log notes and the sound files can be copied to a server connected to the court's computer network. This allows the recording and annotations to be accessed by other court personnel. Future plans include having copies of court proceedings on a public access site for availability to the public as well. The court estimated equipment costs for a single system to be about \$8,800.

The court is also considering developing a limited-function client module that can be used in chambers to search for and replay recordings. A similar module could be used by transcriptionists, providing them an integrated view of audio and annotations. A module that would enable judges to take their own notes during a recording is also being considered, but the stand-alone design of the system makes that enhancement particularly challenging.

As public access to the recordings expands, the court believes requests for transcripts could decrease by as much as 50%. For the requests that are made, the court will write a CD-ROM that contains the sound files written in a commonly accessible open format (e.g., WAV files) that can be played on any multimedia PC. Since no part of the framework is proprietary, transcribers will have the ability to play back the court's recording. An electronic text version of the log notes will also be included.

The court plans to distribute the application and its source code to any federal court that may find it useful. E.A.R.S. is linked to the court's NIBS system by the only module in the application which is not programmed with Visual Basic programming language. This linking module is programmed in Visual FOXPRO. In order for another court to make changes to this part of the application, they would need the expertise of a Visual FOXPRO programmer and a Visual FOXPRO developer's software kit. Modifications to any other part of the application require a person with a background in Visual Basic and a Visual Basic developer's kit. Both development kits are shrink-wrapped products available from any computer software reseller. With these components, any court will have total control of their source code to tailor it as they wish.

The court went live with its current version of the system in early April 1999 and expects additional system modifications to be completed and available in Summer 1999.

C. The Vendors' Perspective

Near the end of the pilot project, we interviewed representatives of the three vendors and asked about their experiences with and reactions to the pilot project. (See Appendix 3 for the interview protocol.) Several of the vendors' comments touched on the way the federal courts do their work. One vendor reported surprise at the detailed level of annotation required and enforced in federal courts, and two vendors reported that they did not anticipate the emphasis placed on transcription. One vendor said he was not prepared for the differences between district and bankruptcy courts. A different kind of problem, cited by two vendors, was the courts' audio systems, which proved to be an unresolvable

problem in some courtrooms, with a detrimental effect on the performance of the recording systems.

Regarding the conduct of the pilot project, two of the vendors were generally critical of their experiences in the courts. They felt that no single person was in charge of the pilot in most or all of their courts to whom they could turn for assistance and final decisions. One of these vendors pointed to a larger issue, that there was never an explicit statement of purpose for the project, such a description of the experiment, technical specifications, and a delineation of the courts' and vendors' expectations and responsibilities.

Computer support was an area where lack of clarity about expectations and responsibilities was most evident. The vendors wanted to limit on-site support and rely as much as possible on telephone support for user questions and modem connections for software support. With no priorities established for providing support, the courts, one vendor said, seemed to consider all problems of equal importance, whether the problem involved a specific question of how to do something or a network or hardware problem that affected the operation of the recording system. Furthermore, vendors wanted to keep their products as standard as possible, partly for support reasons, and resisted making changes that one person or even one court wanted unless those changes had more general applications.

Several vendors reported that staff in some pilot courts seemed to lack a commitment to the pilot project, either because they wanted a different vendor's product or because, with only one or two courtrooms involved, staff made little accommodation to the vendor and/or the project. Staff were not always available, for example, for training when the vendor was ready; computer systems staff sometimes made little or no effort to work with the vendor to resolve audio system or network problems; and after-hours access to a courthouse was sometimes limited, for security reasons, which required the vendor to install, test, and troubleshoot their systems during business hours and while courtrooms were in use. Presented with an array of facilities, computer networks, and audio systems, the vendors were concerned about making their products work in these different environments—but without control over the environments, said one vendor, lack of cooperation by technical staff was a serious impediment to installing a working recording system.

When asked if their companies had been able to supply recording systems that adequately demonstrated the systems' capabilities, the two vendors critical of their

experiences in the pilot project said no. One of these two vendors said it was an issue of cost. The \$25,000 limit on purchases from a single vendor was “totally inadequate,” he said, and as a result the company had lost many thousands of dollars on the project. The other vendor said cost was not the issue but pointed instead to the use of one server per courtroom instead of use of a central server. The third vendor felt that the budget was sufficient to show the system’s capabilities but felt that cost would be an issue in the future. This same vendor said the digital recording system strained the courts’ ability to deal with the system. This comment was echoed by one of the other vendors, who said the single biggest issue in introducing digital recording was overcoming the fear of change.

IV. Guidance for Future Use of Digital Recording Technology

In this section, we bring together additional observations made by the project participants and the study team, observations that may be helpful to the pilot courts, other courts, vendors, and the Administrative Office in deciding whether and how to go forward with digital audio recording technology in the federal courts.

A. Participants' Advice to Their Counterparts in Other Courts

In our final interviews with judges, court staff, and transcriptionists, we asked what advice they would give their counterparts in other districts that might consider use of digital recording technology. Their advice is summarized below:

Site Preparation

- Find a vendor who understands how federal courts work.
- Insist on a thorough site visit by the vendor, including time spent watching court proceedings.
- Assess your needs, get court recorder and transcriptionist input, and talk in depth with vendors so the system can be customized.
- Have properly wired courtrooms. If you are building a new courthouse, wire it now. Contract with a sound engineer if necessary.
- Before buying, make sure the digital system will work with your sound system and that your network can handle the load.
- Before you buy, make sure the interface with the transcription companies will work.

Equipment Acquisition and Support

- Buy a system that is customizable so it is familiar and easy for court recorders and judges to use.
- Compare two or three systems. Do your homework and talk to or visit courts that have used digital recording systems.
- To avoid installation problems and disagreements about the cause of those problems, buy a system where all components are supplied by the vendor.

- Before buying, make sure the specifications for equipment are explicit, detailed, and in writing.
- Make sure you know who will pay for what.
- If you buy or supply any equipment yourself, make sure it meets the vendor's specifications and is top of the line.
- Make sure all equipment is tested and fully functioning before the vendor leaves.
- Insist on receiving documentation, such as technical reference manuals, about the system.
- Determine clearly who is going to support the system and who will handle problems that arise.
- Buy from a company that can provide local support.
- Determine who will pay for and install future upgrades.

Staffing and Training

- Designate one staff member to learn everything there is to know about digital recording and to be the contact person with the vendor.
- Make sure the court recorders are computer literate and trained in the appropriate operating system.
- Make sure your systems staff understands digital recording systems and has a good grasp of how it will be integrated into your network and sound system.
- When introducing the system, use court recorders who can remain cool in the courtroom and who are willing to and capable of learning new technology.
- Start with a judge who is comfortable with computers.
- Make sure training is thorough, is supported by good training materials, and occurs only after the system has been tested and is fully functioning. Be prepared to spend three or four days in training, much of it at a computer.
- Make sure court recorders and systems staff are trained to troubleshoot the system themselves.

B. Other Considerations for Courts Deciding Whether to Use Digital Technology

Individual courts will have to consider a number of issues when deciding whether to switch to digital recording or in selecting a particular manufacturer's system.

Integrated Note Taking Capability

The following issues are raised by the systems' feature that permits court recorder's and judges to take notes that are integrated with the digital audio file:

- Does the court need a recording system that integrates the court recorders' log notes with the audio record?
- During court proceedings, do judges want or need to take notes that are integrated with the audio record?
- If log notes are not integrated with the audio record, will this adversely affect the ability to access and play back the record?
- How easy is it to set up the note taking screens? Will they accommodate all the information the court needs entered into the log, such as names and addresses for all attorneys? Will court recorders be able to enter this information at a convenient time and without disruption to court proceedings?
- Can the court recorder's notes be edited after they are entered?
- Can electronic court recorders maintain the same level of quality with the new integrated note taking system as they achieved with the older system of log notes?

Product Suitability for the Court and Product Customization

In considering vendors, courts should determine whether the vendors' products accommodate the way cases are handled in a federal district or bankruptcy courtroom. Some of the questions courts should ask are the following:

- What custom features are needed as part of the basic operation of the digital recording system (e.g., screens or hot keys) in order to handle special proceedings (e.g., motion calendars) or in order to handle special cases (e.g., sealed cases)?
- If customization is needed, will the vendor customize the installation and provide support for it in the future, or is the court expected to make the customization?

- If the court is expected to customize the system, will the vendor provide software and manuals that will make such customization possible?

Transcription

A court will have to assess its need and the court community's need for transcription services. If transcripts are regularly needed either by judges or attorneys, the court must determine whether transcription companies are available to transcribe the record. At a minimum, courts will have to consider the following issues:

- If judges can easily listen to the record in chambers and/or if attorneys have access to the record via the Internet, will the demand for transcripts be lessened?
- Will transcription firms make the switch to digital transcription? Can the court provide sufficient volume to make the transcription company's purchase of special equipment worthwhile?
- What special equipment and procedures will the court need to send digital audio files to transcription firms? Will it be possible to send the files via the Internet or modem?

Courts will also have to consider whether the equipment they are considering meets the needs of their transcription companies. Transcribers were very consistent in describing their need for equipment, software, and log notes that will allow them to produce transcripts efficiently and accurately. Foot pedals must be available that meet industry standards. The transcription software should allow them to keep their hands on the keyboard as much as possible and have windows and fonts that are sizable and capable of displaying more than one line of text at a time. And, to assist transcribers in the identification of speakers, the digital recording software should time stamp the log notes when a court recorder begins the log note rather than at completion of the note.

Hardware and Software Compatibility

Digital recording equipment may require new hardware and software as well as changes in the court's computer support system. The following issues will have to be addressed:

- What existing hardware and software can be used, with or without upgrades, in the digital recording system?

- What new hardware and software will be required for digital recording, can they be integrated into the court's existing computer environment, and what conflicts might they create with existing hardware and software?
- What impact will the digital system have on the court's current system of computer training and support?

Impact on Court Operations

A new recording system may have an effect on how the court functions. The following issues will have to be considered:

- What modifications, if any, will be required in current courtroom, chambers, or clerk's office procedures?
- What will be the physical impact on the courtroom or other operational areas, including impact on courtroom aesthetics, court recorders' line of sight, and access to aisles and exits?
- What will be the impact on staffing requirements?
- What will be the impact on courtroom scheduling?

Training

A well-conceived, planned, and structured training program is essential to the success of digital recording. That training program should be tailored to the background and needs of the users—judges, electronic court recorders, and transcribers—and should include training materials and reference manuals that can be used after the training is completed. If the courts' computer systems staff are to provide ongoing hardware and/or software support to users, they should be trained as well. With sufficient training, systems staff may be able to diagnose and, perhaps with telephone assistance from the vendor, resolve problems that would otherwise require site visits.

Responsibility for training should not fall entirely on the vendors. A court must help by identifying users' needs (e.g., the level of computer literacy and/or the type and nature of tasks that are to be performed) and by scheduling uninterrupted training that includes hands-on courtroom experience where appropriate (e.g., judges and electronic court recorders). If users need basic computer training, the court should arrange for it to occur prior to training on the digital recording software.

Implications of Adding Courtrooms/Chambers Served

For pilot courts that may be considering expanding the digital audio system to support other courtrooms, the following questions are pertinent:

- Will the present centralized equipment and services be used for the expansion? How many courtrooms can be added before the centralized equipment and services must be duplicated too?
- How much equipment and software must be installed in the individual courtroom, instead of centrally, and must therefore be replicated for each courtroom?
- What infrastructure and local support changes will be necessary? Will support expected from systems staff necessitate hiring someone just for that purpose?

Implications of Running a Mixed Analog/Digital System

Courts may decide to continue using the digital recording systems in some courtrooms but not all courtrooms that currently use electronic sound recording. Issues to consider include the following:

- Does use of a mixed mode undercut the advantages of doing away with older analog technology?
- Will court recorders be able to substitute for each other in different courtrooms unless training is kept up on both systems?
- Will it become complicated to obtain transcripts due to storage of the record in different modes and different locations?

In a similar vein, what consideration should courts give to the backup method for digital recording? During the pilot project, most courts continued simultaneous analog recording as their backup. If this remains the backup system, the issues above—maintaining older technology, keeping up training, and location of recorded material—will persist.

An alternative to an analog backup is to have an emergency “crash cart” that is loaded with the digital audio system and can be substituted if the system fails. There are drawbacks to this approach, however, the first being the cost associated with buying and maintaining an emergency backup, which must be kept current (i.e., loaded with current versions of the software and possibly even the function key mappings) so it can be

substituted in the middle of court proceedings. Second, use of a crash cart resolves problems that arise from a faulty workstation in the courtroom but would not necessarily compensate for server or network problems.

A second alternative that might be considered is to use a digital mini-disk recorder or a laptop with sound input for emergency backup in court. This machine would not be able to reproduce a multi-track recording, but it could easily be substituted during a short break in proceedings. Since such a recorder would only record audio, the court recorder would have to revert to handwritten log notes. This approach addresses the cost and technology issues, but it does not address the problem of having the log notes in a separate format. This could potentially be solved if the digital audio files from a different source, such as a mini-disk, could be transferred into the principal digital recording system so that log notes could be added later.

Centralized Monitoring of Multiple Courtrooms

Some courts are interested in setting up a digital recording system that permits several courtrooms to be monitored from a single location. Such systems require a video and audio feed to a work area, but they also require less noticeable equipment in the courtroom itself. Given the type and level of log notes taken in most federal courtrooms, a single court recorder probably cannot fully annotate the proceedings in multiple courtrooms. It may be possible, however, for a recorder to do full log notes in one courtroom while monitoring basic audio recording in other courtrooms. If minimal log notes are appropriate for certain proceedings, this may be an acceptable approach. To the extent, however, that sound quality and an acceptable transcript depend on constant wearing of headphones, as some suggest, and on detailed log notes, this approach might undermine the quality of the record.

C. Preparation of Guidelines for the Courts

The courts' experiences indicate that up-front planning, including an assessment of the courts' needs and expectations matched against a system's capabilities, is a necessary, if not always sufficient, element in a successful introduction of digital audio recording into a federal court setting. Such planning is complex because there are many components, interactions, and sources of information to consider. Even the most conscientious court might not ask all the right questions or fully understand the consequences of the answers they receive.

If the Judicial Conference approves use of digital recording, the Administrative Office may want to provide guidelines that help courts identify questions they should ask and information they should receive before making a decision about digital recording. Such guidance might include information in the following areas:

- What preliminary assessment should the court make of the needs and expectations they have for the system? What questions should the court ask itself?
- To allow the court to determine if the system meets its needs and expectations, as well as any minimum requirements identified by the Administrative Office, what information should the court receive from the vendor about the vendor's system?
- What information should the court have to provide to the vendor?
- Should the vendor be required to provide an estimate of the cost of purchasing and installing a system, including software licensing costs, hardware purchase and upgrade costs, and impact on networks, audio systems, and space. Should the vendor be required to do a no-obligation site visit?
- What are the minimum requirements for system equipment, media formats, and/or conversion capabilities to ensure reasonable operating longevity, compatibility with other court systems, and adequate archival and retrieval capabilities?
- What are the minimum requirements for training and support, both at installation and on an ongoing basis?
- As part of the certification of transcription service providers, should the Administrative Office separately certify that a transcription company is capable of transcribing digital files?

For many of these questions, the Administrative Office might provide the courts with a checklist of questions the court should ask itself when making a preliminary assessment of its needs. For other issues, the Administrative Office might provide a fact sheet, such as a set of basic facts about each vendor that identifies system capabilities in a standard way so the courts can more easily compare their requirements against these capabilities.

If the Administrative Office decides to set minimum standards for computer equipment, media formats, and other technical aspects of digital recording systems, we suggest that any requirements should be crafted carefully so as not to handcuff the vendors' abilities to take advantage of future technological advances. One possible

requirement, however, might be that all vendors' products must be able to export audio files to a commonly available non-proprietary format (e.g., WAV) and export case identifying information and log notes to a similarly open text format (e.g., ASCII). This export function could be used to archive recordings in a standard format that will make the archived information less tied to the proprietary system used in the particular courts and will ensure access to the record in the future.

Appendix 1

Court By Court Descriptions of System Configurations

Digital Audio Recording Systems in Twelve Federal Courts

System and Implementation Descriptions

U.S. District Court for the District of Arizona

The court has implemented the Courtroom DART digital audio recording system, supplied by BCB Technological Group, in two courtrooms (one district judge and one magistrate judge). The system was installed in early May 1998; the courts started taking the record live on May 18, 1998. The system configuration in each courtroom consists of a workstation for the court recorder and a Voice Processor, which is a proprietary audio component of the Courtroom DART system. These courtroom components are connected by a 100Mbit Novell network to a Novell file server located in a court recorder work area outside the courtroom. Audio and annotation files from each courtroom are copied to this central server; they function as a backup for courtroom data and allow broader access to the audio recordings. A custom-made audio signal splitter was installed in each of the courtrooms to allow simultaneous digital and analog recording during the pilot phase. There are no workstations for judges in the courtroom, but one judge does have the system in chambers. Court recorders also have copies of the Courtroom DART system on the workstations in their work area so they can do pre- and post-processing work there. A separate Courtroom DART workstation is kept on a separate “crash cart” and can be used to swap out a court recorder’s monitoring workstation in a courtroom in the event of a system failure. The courtroom workstations use JAZ disks for system backups and for transferring audio and annotation files to the court’s transcriptionists.

U.S. District Court for the Central District of California

The court has implemented the CourtSmart digital audio recording system, supplied by CourtSmart Digital Systems Inc. The court went live in October 1998, with the digital system running in two district courtrooms on its own segment of the court’s network. The configuration consists of two separate systems—a court recorder’s workstation, a judge workstation, and a file server in each of the two courtrooms. Each courtroom stores its recording on its own server. An audio signal splitter was eventually installed in each of the courtrooms to allow simultaneous digital and analog recording during the pilot project. The court recorders are doing backups to JAZ disks and using CDs as the transfer medium to transcriptionists.

U.S. Bankruptcy Court for the Northern District of California

The court has implemented the CourtSmart digital audio recording system, supplied by CourtSmart Digital Systems Inc. The court went live with the system in July 1998 and is using it in one courtroom. The system configuration in the courtroom consists of a workstation for the court recorder and a workstation on the bench for the judge. The judge also has a workstation in

chambers, and the software is loaded on the clerk's computer, a law clerk's computer, and a computer in the court recorder's work area. The court did upgrade some of its network switches in order to meet the recommended network specifications supplied by the vendor. The file server is being backed up to MO cartridges, and the court recorders are using CDs as the medium for transferring recording files to the transcriptionists. This court also participates in the Electronic Courtroom Project.

U.S. District Court for the District of Connecticut

The court has implemented the For The Record digital audio recording system, supplied by the Dictaphone Corporation. The installation of the system, which is being used in one courtroom, took about three days. The system configuration in the courtroom consists of workstations for the court recorder and the judge and an NT server. In chambers, both the judge's PC and the law clerk's PC are equipped with the software. These components are contained on their own network segment, which is connected to the court's 100Mbit NT network. The court is using the analog Lanier system as a backup in the event of a system failure during the pilot project. The court recorder uses MO disks for transferring audio and annotations files to the transcriptionists and backs up the system onto DAT tape.

U.S. District Court for the Eastern District of Missouri

The court has implemented the Courtroom DART digital audio recording system, supplied by BCB Technological Group, in one magistrate judge courtroom. The system was installed in late June 1998; installation took about four days. The system configuration consists of a workstation for the judge, a workstation for the court recorder, and a Voice Processor, which is a proprietary audio component of the CourtroomDART system. These courtroom components are connected to a Novell file server over a recently upgraded 100Mbit network. Audio and annotation files from the courtroom are copied to this central server; they function as a backup for courtroom data and allow broader access to the audio recordings. This server is backed up as part of the normal systems backup. A custom-made audio signal splitter was installed in the courtroom to allow simultaneous digital and analog recording during the pilot phase. Courtroom DART software is also installed on workstations used by the judge and law clerk in chambers, and the court recorders have copies of the system on the workstations in their work area. The court uses JAZ disks to transfer audio and annotations files to transcriptionists. This court also participates in the Electronic Courtroom Project.

U.S. District Court for the District of Nevada

The court has implemented the CourtSmart digital audio recording system, supplied by CourtSmart Digital Systems Inc., in one courtroom. The court began using the system in July 1998. The system configuration consists of a PC workstation with CourtSmart's Automatic Audio Mixer

for the court recorder's use and a workstation on the bench for the judge. The court was able to use its existing microphones and sound system as well as the two existing PCs in the courtroom. The courtroom components are directly wired to a file server located in the court's computer room. The file server in the computer room and sound cards for the PCs in the courtroom were purchased from the vendor. This court participates in the Electronic Courtroom Project.

U.S. Bankruptcy Court for the District of Nevada

The court has implemented the CourtSmart digital audio recording system, supplied by CourtSmart Digital Systems Inc. The system is in use in two courtrooms. Installation took about a week and the court went live in June 1998. The system configuration in each courtroom consists of a workstation for the court recorder and a laptop computer for the judge to use on the bench, all of which the court purchased new. Both courtroom configurations are essentially stand alone systems, but, if digital technology is approved, the court would like to move to a centralized system in order to take advantages of that configuration's economies of scale. The court's audio vendor was brought in during the installation to assist with interfacing the digital system to the court's sound system. In the process, the court replaced its sound system, which was over ten years old. No modifications to the court's network were needed, but the vendor did make software modifications to the digital system during installation. The court's old recording system is kept on a separate "crash cart" and is used as a backup system in the courtroom in case of a digital system failure. The courtroom workstations use ZIP disks for system backups, MO disks for archiving, and CDs for transferring audio and annotations files to the transcriptionists.

U.S. Bankruptcy Court for the District of New Jersey

The court has implemented the For The Record digital audio recording system, supplied by the Dictaphone Corporation. The vendor spent seven to ten days installing the system in two courtrooms. The court went live in September 1997. Originally a stand-alone system, the digital recording system was later configured with a central repository with workstations in both courtrooms connected via a Novell network. The central repository can store thirty days of proceedings on-line. The court recorders use reusable MO disks as the medium for sending audio and annotation records to the transcriptionists and DAT tape as their archiving medium.

U.S. District Court for the Eastern District of Pennsylvania

The court has implemented the For The Record digital audio recording system, supplied by the Dictaphone Corporation. The system was installed in two courtrooms. It was initially configured with stand-alone servers in each courtroom but was later reconfigured with a central repository. The central NT server is a Compaq PC with two GB of storage, which holds about two week's worth of proceedings from both of the courtrooms, and a DAT drive for doing backups. Each courtroom has a court recorder workstation, a judge workstation, a law clerk workstation, as well as

a workstation in each of the judge's chambers. The courtroom PA systems were reconfigured, and additional network cabling was installed to support the new digital system. The court recorders use MO disks for transfers to the transcriptionists.

U.S. Bankruptcy Court for the District of South Carolina

The court has implemented the Courtroom DART digital audio recording system, supplied by the BCB Technological Group. The two courtrooms in which it was installed went live in May 1998. The system is configured with a file server in the basement and two PCs in each courtroom. One of the PCs runs a voice processor and the other runs the Courtroom DART software. All audio files and annotations move over the court's 100baseT network to the server in the basement. The court was able to use its existing PCs and did not have to purchase new ones. A custom-made audio signal splitter was installed in each of the courtrooms to allow simultaneous digital and analog recording during the pilot phase. Backups are done over the network to a jukebox, and the court plans to archive to CD-ROM when it becomes necessary to do so. Since the court has a 32GB hard drive, it estimates it will not have to archive for up to a year from installation.

U.S. Bankruptcy Court for the Western District of Texas

This court has implemented the For The Record digital audio recording system, supplied by the Dictaphone Corporation. The system was installed in one courtroom; installation took about four days. After three days of testing, the court began recording on April 23, 1998. The courtroom system configuration consists of the court recorder's DELL PC workstation with a digital mixer, which produces both an analog and a digital signal. There is also a Compaq file server/workstation located in the court recorder's work area, which is connected to the courtroom over the court's 100Mbit fiber optic network. The file server holds approximately ten days' worth of live recordings. The court recorders use MO cartridges to transfer the record to transcription services, and the file server disks are both mirrored and backed up onto 4mm DAT tape. This court also participates in the Electronic Courtroom Project.

Appendix 2

The Study Design

Federal Judicial Center Study of Digital Audio Recording Systems In Twelve Federal Courts

The Study Design

Project Design

In December 1997, the Judicial Conference Committee on Court Administration and Case Management selected twelve pilot courts for this study, six district courts and six bankruptcy courts. Most of the courts were included in the study because of their expressed interest in digital audio recording. Altogether, digital equipment was installed in eighteen courtrooms.

With two exceptions, the Administrative Office assigned vendors to the courts. The Bankruptcy Court in the District of New Jersey had installed a digital audio recording system by one of the vendors in two courtrooms the previous year, and the bankruptcy court in the Eastern District of Washington was implementing a recording system developed by court staff.

The Committee on Court Administration and Case Management asked the Federal Judicial Center to conduct an evaluation of the use of digital recording technology in the pilot courts. In early 1998, the Center, in response to a work statement prepared by the Administrative Office, developed an evaluation plan, which was agreed to by the Center and the Administrative Office in April 1998.

The pilot period was to begin on April 15, 1998, and end six months later, but only the District of New Jersey was ready to begin recording on April 15, 1998. Most other courts implemented and began using the digital recording systems between early May and the end of August, with one court becoming operational in November 1998. When it became apparent that a six-month pilot period would produce insufficient data due to the later start dates, the pilot period was extended by six months. As a result, the total amount of experience each court has had with digital audio recording varies, depending on the start date, but each of the eleven districts assigned vendors had at least six months of experience. Due to the unique configuration of the system in the Eastern District of Washington—locally developed and installed in chambers to record telephone conferences—that district is treated separately as a special case.

Data Collection

Five of the eight tasks outlined in the Center's evaluation plan called for collection of data from the pilot courts. These tasks were:

- document the courts experience in implementing the digital audio recording systems;
- assess the expectations of the users, including judges and chambers staff, systems staff, any other court staff involved in the project, and transcribers;
- document use and behavior of the digital audio recording systems;
- assess the cost of using digital audio recording technology compared to analog systems and compare the advantages or disadvantages experienced by users; assess such costs as cost of the equipment, staff costs, costs to the court of changing procedures, transcript costs, and storage costs; and
- assess user experience and satisfaction, including judges, chambers staff, systems staff, other appropriate court staff, and transcribers.

Three types of data were collected for this project: interview data with judges, court staff, transcribers, and digital audio recording system vendors; users' self-reports of their installation and training experiences; and users' self-reports of their ongoing experiences with the digital audio recording systems.

The interviews were structured and were conducted twice with judges and court staff, once with the vendors and most transcriptionists. The first interviews were conducted during site visits as soon as possible after implementation of the digital audio recording systems. A total of 107 people—105 judges and court staff and two independent transcribers—were interviewed during these site visits. The second interviews were conducted by telephone at the end of the pilot period. A total of 111 people were interviewed in the second round—ninety-two judges and staff, fifteen transcribers, and four vendor representatives (two from one vendor and one from each of the other two vendors). See Appendix 3 for the interview protocols.

The users' self-reports were captured on forms. A set of initial forms asking about equipment acquisition and cost, installation, and training were designed to be completed once, after installation. Despite frequent reminders from the project team, only six courts returned complete or nearly complete sets of the initial forms.

Court recorders were asked to complete weekly logs, problem reports, and transcript and tape requests, while transcriptionists were asked to complete a form each time they transcribed a record. These forms were designed to be completed regularly (e.g., weekly logs) or as needed (e.g., problem reports). Some participants were more diligent than others in returning the forms; some courts returned almost none at all, despite frequent reminders from the project team. Because we had no independent way of knowing how often problems occurred or transcripts were requested, we do not know whether the forms reflect the actual number of occurrences and thus we cannot use them to provide a numeric accounting of the frequency of various events. See Appendix 3 for the forms.

Appendix 3

Data Collection Instruments

INTERVIEW QUESTIONS FOR COURT CONTACT
DAT Evaluation, Spring 1998

1. Installation and Operation of the Digital System

- 1.1.** Where did the initiative for the digital recording system come from in this court? (i.e., who wanted it?) How were the judges selected? How was the system presented to the judges?
- 1.2.** What role did you play in the installation of the digital system? Will you continue to have a role?
- 1.3.** When was installation completed? When did you begin to take the record with the digital system?
- 1.4.** Do you have a centralized digital recording system? (the alternate is a stand-alone recording system for each courtroom) If not, why not?
- 1.5.** Has the digital recording equipment had any impact on the court's existing computer equipment and network?
- 1.6.** Have you had any difficulty finding someone to transcribe the digital record?
- 1.7.** What procedures will you follow to archive the digital record? (e.g., convert to analog tape)
- 1.8.** What have been the reactions of the judges participating in the project? Have there been reactions from other judges? If so, what were they?
- 1.9.** What have been the reactions of the staff participating in the project?
- 1.10.** On a scale of 1 (very smooth) to 5 (very rough), rate the process of installing the digital system. Compared to installation of other new systems (e.g., e-mail, analog), was this one better or worse?
- 1.11.** How would you characterize the adequacy of the training the court received on the digital system?

Court Contact

2. Global Issues

- 2.1.** Given what you know so far about the digital recording system, how would you weigh its pluses and minuses? Is the system worth it?
- 2.2.** If you were called by a ____ [clerk, etc.] in another court and asked for advice about switching to digital, what advice would you give? How should they prepare for the switch?
- 2.3.** What is the future of digital recording and other new technologies in federal court?
- 2.4.** What features or capabilities do you want in a recording system? Are there features or capabilities that you want but that are not available?

3. Housekeeping Matters

- 3.1.** Who else is involved in the purchase and use of the digital recording equipment? Is there anyone else we should speak to about the system?
- 3.2.** Do you use the AO's forms for logging problems with the recording equipment? If yes, how far back do they go? If no, will you use our forms?
- 3.3.** Can we get management information from the digital system itself? For example, can we get counts of the numbers of cases, frequency of use, and so on?
- 3.4.** Discuss forms.
- 3.5.** Our forms will capture data on the following items:
 - 3.5.a.** Vendor software and training
 - 3.5.b.** New computer equipment
 - 3.5.c.** New equipment, excluding computer equipment
 - 3.5.d.** Upgrading existing computer equipment
 - 3.5.e.** Upgrading existing equipment, excluding computer equipment
 - 3.5.f.** New wiring for sound and for computer network
 - 3.5.g.** New furniture

How can we get cost information for the following items:

- 3.5.h.** Analog machines, tapes and office supplies
- 3.5.i.** Digital tapes (or other media) and office supplies
- 3.5.j.** Transcript prices (analog and digital)
- 3.5.k.** Other changes to the physical plant
- 3.5.l.** Personnel

INTERVIEW QUESTIONS FOR JUDGES
DAT Evaluation, Spring 1998

1. Background Questions

- 1.1. Before the digital audio system was installed, did you use a computer in the courtroom? In chambers? If yes, what did you use the computer for (e.g., notetaking)?
- 1.2. Why are you participating in this pilot program?

2. Digital System & Analog System

- 2.1. Do you ever hold proceedings in chambers? Who records the proceedings? How are they recorded? What did you do before the digital recording system was installed?
- 2.2. Do you ever have conference calls in court? In chambers? How are conference calls recorded? How were these calls handled before the digital recording system was installed?
- 2.3. Do you use the digital recording system to take notes during a proceeding? How did you take notes before the digital recording system was installed? (see answer to Q 1.1)
- 2.4. Do you ever ask for playback of the audio record during a proceeding? Did you ever ask for playback before the digital recording system was installed?
- 2.5. Do attorneys ever ask for playback of the record during a proceeding? How will your response differ with the digital system?
- 2.6. Has the digital recording system ever malfunctioned during a proceeding? What happened and how was the record taken? Did the analog equipment ever malfunction during a proceeding? What happened and how was the record taken?
- 2.7. Do you ever listen to the digital audio record after the proceeding? What happens if the audio is not on the server? Did you ever listen to analog tapes after a proceeding?
- 2.8. How would you characterize the sound quality of the digital recordings? How does it compare to the sound quality of the analog tapes?

2.9. Do you think this digital recording system will be more, the same, or less reliable than the analog recording system?

2.10. Do you have any concerns about the security of the digital recording system? (alterations or erasure of the record; access to the judge's notes)

3. Transcripts

3.1. How frequently do you request a transcript? How much and/or what portions of a proceeding are likely to be transcribed? Has this changed with the digital audio recording system?

3.2. Does anyone in the court check transcripts for errors? Has this changed with the digital audio recording system?

3.3. Are there ever problems with the transcripts? What happens when problems are identified? Has this changed with the digital audio recording system?

4. Training

4.1. How many hours of training have you received on the digital system. How much was vendor-supplied? Court-supplied? Will you receive more training?

4.2. What did the training include? Topics?

4.3. How would you characterize the adequacy of the training you received on the digital system (ask R to define adequate)?

5. Digital Features

5.1. What features or capabilities do you want in the digital recording system? Are there features or capabilities that you want but which are not available?

5.2. Does the lack of recording capability in chambers present a problem?

6. Court/Courtroom Procedures

- 6.1.** Will there be changes in court and/or courtroom procedures because of the digital recording system? (Probe: slow down, speed up proceedings because of digital system?) If so, describe these changes.
- 6.2.** What will be the impact, if any, of the digital system on courtroom decorum?

7. Digital System Implementation Issues

- 7.1.** On a scale of 1 (very smooth) to 5 (very rough), rate the process of installing the digital system. Compared to installation of other new systems (e.g., e-mail, analog), was this one better or worse?
- 7.2.** If you were called by a judge in another court and asked for advice about switching to digital, what advice would you give? How should they prepare for the switch?
- 7.3.** Given what you know so far about the digital audio system, how would you weigh the pluses and minuses? Is the system worth it?

QUESTIONS FOR COURTROOM RECORDER OPERATORS
DAT Evaluation, Spring 1998

1. Background Questions

- 1.1. What is your job here at the court, and what role did you play in implementing the digital audio recording system?
- 1.2. Before the digital audio system was installed, did you use a computer in your work? If yes, what did you use the computer for (e.g., notetaking)?

2. Comparison of Digital & Analog Systems

I'd like you to compare the analog and digital recording systems.

- 2.1. Which one is easier to use? Why?
- 2.2. Which one takes the better record? Why?
- 2.3. What feature do you like most/least in the two systems?
- 2.4. What problems have occurred? How were they solved?
- 2.5. Do the systems differ in their impact on the courtroom? On courtroom decorum?

Interviewer: Keep the following in mind while probing responses to the questions above:

note taking	setup procedures
play back	conference calls in courtroom
searching	conferences in chambers
security	preparation of transcripts
reliability	accuracy of transcripts
sound quality	screen layout, appearance
the lists that come up	

- 2.6. What features or capabilities do you want in a recording system? Are there features or capabilities that you want but that are not available?

3. How the Digital System Works (ask only if not already known)

Now I'd like to ask you some questions about how the digital system works.

- 3.1. Do you have and use shortcut or picklist keys?
- 3.2. Are there limits on the length of annotations?
- 3.3. Can annotations be modified once they are entered?
- 3.4. How are timestamps generated? By the first keystroke of an annotation or after hitting the RETURN key?
- 3.5. Is the system able to record playback? If not, should it?
- 3.6. Do you have visual confirmation (i.e., on the computer monitor) that the system is recording?
- 3.7. Do you use a backup system in case the digital system fails? (e.g., an analog tape recorder)
- 3.8. Have you ever tried to listen to the audio or access the annotations without using the vendor's software? If so, what happened?
- 3.9. Can the digital record be linked to other files, such as scanned images or BANCAP?
- 3.10. How many days of proceedings are kept on the system at any given time? What do you do if the judge wants the record of a proceeding that is no longer on the system?

4. Transcript Preparation (ask only if not addressed at Q2)

- 4.1. What is the procedure for preparing the record for transcription? What media are used to transmit the record to transcribers? Does the form of the media make a difference?
- 4.2. Do you have internal transcribers? If yes, do they have the capability to do "live" transcription while court is in session?
- 4.3. Who fulfills requests by attorneys or others for copies of the record? Are these supplied on analog tapes? What is the procedure for producing these copies?

5. Training

- 5.1.** How many hours of training have you received on the digital system. How much was vendor-supplied? Court-supplied? Will you receive more training?
- 5.2.** What did the training include? Topics?
- 5.3.** How would you characterize the adequacy of the training you received on the digital system?

6. Digital System Implementation Issues

- 6.1.** On a scale of 1 (very smooth) to 5 (very rough), rate the process of installing the digital system. Compared to installation of other new systems (e.g., e-mail, analog), was this one better or worse?
- 6.2.** If you were called by an ECRO in another court and asked for advice about switching to digital, what advice would you give? How should they prepare for the switch?
- 6.3.** Given what you know so far about the digital recording system, how would you weigh its pluses and minuses? Is the system worth it?

**INTERVIEW QUESTIONS FOR SYSTEM MANAGERS
and NETWORK ADMINISTRATORS
DAT Evaluation, Spring 1998**

* = court reporters may be better able to answer these questions

BACKGROUND QUESTIONS

- 1.1 What is your job here at the court?
- 1.2 What was your role in the installation of the digital audio recording system? Do you continue to have a role?

SYSTEM OVERVIEW

- 2.1 Was a site evaluation performed by the vendor prior to installation of the system? Was it satisfactory?
- 2.2 What is your system configuration ? (Centralized, stand-alone, additional workstations in chambers, crash cart, where is duplication equipment,....)
- 2.3 Were you able to use any of the court's existing equipment with the new system or was it all purchased new? (microphones, mixer,....)
- 2.4 What is your backup method? (tape, disk mirroring, independent server, etc.)
Does backup system require intervention by the monitor or is it automatic? (dual tape drives that change over automatically?)
- 2.5 What are your archiving procedures? What gets archived? (audio, annotations, both? how often?)
- 2.6 Did the vendor make any system modifications to meet any special needs of your court?
- 2.7 How involved is the system staff in the day-to-day operations of the system?
- 2.8* Have you tried to listen to audio files independently of the vendor's software?
If yes, did standard sound cards produce acceptable sound quality?
- 2.9* Have you used the data from the annotations database outside of the vendor's software package? Is structure of annotation database an industry standard?
If no, do you have ways of accessing the information if the vendor's software ever becomes unavailable (switch vendors, vendor goes out of business)?
- 2.10 What type of reports can be produce directly from the system? Are they customizable?
- 2.11 Are you doing concurrent analog recording during the pilot period?

NETWORK

- 3.1** What is the system's impact on the court's network? What's the speed of your network?
- 3.2** Was network segmentation required or recommended?
- 3.3** Did you have the option of either a centralized system or individual courtroom systems?
If so, why did you choose the setup you did?
If not, do you think there would be advantages to having the "other" system?

JUDGES

- 4.1** Are judges notes private / secure? How are they protected? Can they be "passed on" to another judge who takes over a case?
- 4.2** Can a judge see the court reporters annotations? in "real time"?

SEARCH/RETRIEVING

- 5.1** How are data being stored for purposes of searching? (central server, are multiple databases being searched, is this transparent to the user, etc.)
- 5.2*** What is your protocol for accessing archives?
- 5.3*** How is audio accessed? (by time, key word in annotations, etc.)
- 5.4*** Can audio be linked to other files? (scanned images, etc.)
- 5.5** How much data is kept on-line at once? How did you decide on that amount? Is it adequate?

TRANSCRIBERS

- 6.1** Do you have internal transcribers?

If yes, is "live" transcription an option for internal transcribers? (Is there a workstation where a transcribers can listen while court is in session?)

PUBLIC

- 7.1*** What are procedures for producing audio segments for the public? (copy audio to cassette tape?)
- 7.2*** Can short audio "segments" be "cut" from larger portions of audio?

GENERAL TOPICS

- 8.1** Have you found that any of your software conflicts with the new digital recording system?
- 8.2** Has the system caused any other types of technical problems?
- 8.3** On a scale of 1 (very smooth) to 5 (very rough), rate the process of installing the digital system. Compared to installation of other new systems (e.g., e-mail, analog), was this one better or worse?
- 8.4** How would you characterize the adequacy of the training the court received on the digital system?
- 8.5** If a systems person from another court called to ask advice about moving to this technology, what advice would you give them to help them prepare and complete the installation?
- 8.6** Knowing what you know so far, how would you weigh the pluses and minuses of digital audio recording? Is this system worth it?

Digital Audio Technology Evaluation Project

Federal Judicial Center

1998

TO: Court Contact, Digital Audio Recording Pilot Program

FROM: Research Division, Federal Judicial Center

SUBJECT: Forms for Data Collection

As part of the pilot test of digital audio recording technology, the Federal Judicial Center is conducting an evaluation on behalf of the Judicial Conference, the policymaking body for the federal courts. The purpose of the study is to determine whether digital audio recording should be approved as a method for taking the official court record.

The Center is using a variety of methods for collecting information that will help the Judicial Conference in making its decision. One of these methods is a series of forms to be completed by the courts and the transcription service providers.

We would like to ask your assistance in distributing the forms and, where appropriate, completing them. To that end, we are enclosing three packets of forms.

The first set of forms should be completed by those who take the digital audio record in the courtroom and respond to tape and transcript requests. This will very likely be the courtroom recorders. Please distribute Packet # 1 to the court recorders or give it to their supervisor.

The second set of forms should be completed by those who prepare transcriptions from the digital audio record. Please forward a complete set of the forms found in Packet # 2 to each of the transcription services the court is using for transcription from the digital record.

The third set of forms asks about the court's experience in purchasing, installing, and training for the digital audio system. You will very likely be the appropriate person to complete the forms in Packet # 3, though you may want to enlist the help of others as well, such as your systems and procurement staff.

There are separate instructions inside each packet and printed on the back of each form. Nonetheless, don't hesitate to call us if questions arise. Our names and telephone numbers are printed on the materials in each packet.

We are very grateful for your help in distributing and completing the forms.

Digital Audio Technology Evaluation Project

Federal Judicial Center

1998

TO: Courtroom Recorders, Digital Audio Recording Pilot Program
FROM: Research Division, Federal Judicial Center
SUBJECT: Forms for Data Collection

As part of the pilot test of digital audio recording technology, the Federal Judicial Center is conducting an evaluation on behalf of the Judicial Conference, the policymaking body for the federal courts. The purpose of the study is to determine whether digital audio recording should be approved as a method for taking the official court record. The enclosed forms seek information that will assist the Center in its study of the twelve pilot programs. We very much appreciate your help in completing the forms.

Purpose of the Forms. The purpose of these forms is to capture information about the courtroom recorders' experiences in using the digital audio recording systems. We suggest you read through all the forms first, so you'll be prepared to complete them at the appropriate times.

When to Complete the Forms. On the next page, you'll find a table listing the five types of forms in this packet. For each type, the table also indicates when the form should be completed. More detailed instructions for completing the forms are printed on the back of each form.

Who Should Complete the Forms. We ask that you have the forms completed by the person best able to provide the information. For most of these forms, that is likely to be you. If, however, someone else does such functions as making tapes or satisfying transcript requests, please have that person complete the relevant forms. If any comments you wish to make are longer than the space provided on the forms, please feel free to use the back of the forms or attach additional sheets.

IMPORTANT NOTE: We urge you to make a copy of the completed forms before putting them in the mail. You will also need to make extra copies of the blank forms, since they must be used throughout the pilot period.

Where to Send the Forms. As you complete the forms, please send them to:

Federal Judicial Center
Research Division
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Digital Audio Technology Evaluation Project

List of Forms And When They Should Be Completed

Form	Color	When to Complete
Weekly Log of Time	Ivory	At end of each week
Problem Log	Blue	For each problem
Tape Requests	Green	For each request
Transcript Requests	Yellow	For each request
Audio & Annotation Evaluation / Transcription Difficulties	Pink	For each request

If you have questions about the forms, please call any member of the Federal Judicial Center project team at 202-502-4070.

Pat Lombard

David Rauma

George Cort

Donna Stienstra

Electronic Court Recording Operator's Weekly Log of Time* Spent on Digital Audio Recording Tasks

Operator's Name: _____ Time Period Covered: ____/____/____ to ____/____/____

- Recording: _____ Time spent recording court proceedings
- Set Up: _____ Time spent preparing and setting up equipment for the recording sessions
- Transcripts: _____ Time spent preparing and setting up the digital audio system environment for the recording sessions
- Tapes: _____ Time spent in all activities for processing transcript requests (including selecting material and producing tape or disk)
- Review: _____ Time spent in all activities for duplicating tapes sold to parties (including selecting material and producing tape)
- Support: _____ Time spent reviewing transcripts and tapes
- Maintenance: _____ Time spent supporting judges, chamber's staff, or others in the use of the digital audio system
- Other: _____ Time spent in maintaining hardware equipment and software applications
- Total: _____ Time spent on other digital audio recording tasks (please specify: _____)
- Total: _____ Total time spent on digital audio recording tasks during the time period

Please note any particularly positive or negative experiences you had with the digital audio recording system during this time period.

* Record all time in hours rounded to nearest whole number. Values should sum to the total time spent on digital audio tasks during the indicated time period.

Please return to: Federal Judicial Center
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for the time you spend each week in tasks related to digital audio recording.

Complete this form at the end of each week and return it to the Center. Even if you spend no time in a given week in tasks related to digital audio recording, please complete the form by entering zeroes for the total time spent.

Important Note: If someone other than the courtroom operator is responsible for any of these tasks—e.g., satisfying transcript or tape requests—that person should complete a separate copy of this form, inserting his or her name on the “operator’s name” line.

Electronic Court Recording Operator's Digital Audio Recording Problem Log

Person reporting the problem: _____ Date of this report: _____

Date and time problem occurred: _____ a.m. p.m. Location of equipment: _____

Problem involved (check all that apply):

- Audio equipment ECRO's workstation Central server Digital audio system software
 Archiving equipment Judge's workstation Reformatting equipment Specific digital audio system feature
 Emergency backup equipment Teleconferencing equipment Duplicating equipment Other (specify) _____

Briefly describe the problem (include information on staff or proceedings affected).

Briefly describe the actions taken to resolve the problem.

Is the problem solved? Yes No

If Yes,

Date and time solved: _____ a.m. p.m.

Was the solution timely: Yes No

Is the solution satisfactory: Yes No

If No,

Is a workaround available: Yes No

Has the workaround been implemented: Yes No

Is the workaround satisfactory: Yes No

Please return to: Federal Judicial Center
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for information about each problem encountered in using the digital audio recording system.

Complete this form each time a problem is encountered. Some problems may continue for a period of time before being resolved; complete the form when the problem is resolved. If a problem is resolved and then recurs at a later date, report the problem again by completing another form. Some problems are resolved by finding a workaround, rather than actually solving the problem; the form provides an opportunity to note such resolutions. If a problem continues indefinitely, please complete one of these forms at the close of the pilot period to report the problem and note that it is unresolved.

The items on the form are self-explanatory.

Electronic Court Recording Operator's Tape Requests

Date of request: _____ Request processed by: _____

Requested by: Party Judicial Officer Other _____ Date request fulfilled: _____

Case number: _____ Case name: _____

Briefly identify the proceeding to be copied, including, for example, the type of proceeding, the date, and if meaningful, whether it was the a.m. or p.m. session (e.g., "Testimony by John Smith, May 20, 1998, a.m." or "Trial, June 3-7, 1998").

Number of copies requested, by format

Reformatted (2-track) _____
Unreformatted (4-track) 1-7/8 speed _____
Unreformatted (4-track) 15/16 speed _____
Digital format (e.g., DAT tape) _____
Other: _____

Please note any particularly positive or negative experiences encountered while processing this tape request (e.g., any difficulty accessing or restoring material, using the equipment or software).

Please return to: Federal Judicial Center
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for information about requests for tapes made from the digital audio record.

Complete the form each time you receive a request for a tape, whether the event you are transferring to tape is short or long. For example, if the request is for a single, short event, such as a hearing or a segment of testimony, complete a form for that request. If, on the other hand, the request is for an entire trial—but is still a single request—complete a single form for that request. If you receive a request that lists several discrete events—for example, a hearing from one case, a trial from another, testimony from a third—treat each individual case as a separate request and complete a form for each request.

The items on the form are self-explanatory.

Electronic Court Recording Operator's Transcript Requests

Date of request: _____ Request processed by: _____
Requested by: Party Judicial Officer Other _____ Date request fulfilled: _____
Case number: _____ Case name: _____

Briefly identify the proceeding to be transcribed, including, for example, the type of proceeding, the date, and if meaningful, whether it was the a.m. or p.m. session (e.g., "Testimony by John Smith, May 20, 1998, a.m." or "Trial, June 3-7, 1998").

Transcript order processing

Transcription service provider: _____
Date materials sent to transcriber: _____
Date transcript(s) received from transcriber: _____

Number of copies requested, by type

Ordinary _____
Expedited _____
Daily _____
Hourly _____

Materials were sent using:

DAT tape
 MO disk
 Electronic transfer
 Other _____

Transcript quality was:

Very good
 Satisfactory
 Poor

Transcript timeliness was:

Early
 On time
 Late

Overall transcription service was:

Very Good
 Satisfactory
 Poor

Please note any particularly positive or negative experiences encountered while processing this transcription request (e.g., any difficulty accessing or restoring material, using the equipment or software, obtaining transcription).

Please return to: Federal Judicial Center
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for information about requests for transcripts made from the digital audio record.

Complete the form each time you receive a request for a transcript, whether the transcript is for a short or long event. For example, if the request is for a single, short event, such as a hearing or a segment of testimony, complete a form for that request. If, on the other hand, the request is for an entire trial—but is still a single request—complete a single form for that request. If you receive a request that lists several discrete events—for example, a hearing from one case, a trial from another, testimony from a third—treat each individual case as a separate request and complete a form for each request.

The items on the form are self-explanatory.

Electronic Court Recording Operator's Audio and Annotation Evaluation / Transcription Difficulties In-House Transcription Service Provider

Name of Transcriber: _____ Date: _____

Case number: _____ Case name: _____

Briefly identify the proceeding to be transcribed, including, for example, the type of proceeding, the date, and if meaningful, whether it was the a.m. or p.m. session (e.g., "Testimony by John Smith, May 20, 1998, a.m." or "Trial, June 3-7, 1998").

Transcript order processing

Date order received: _____
Date transcript completed: _____
Number of transcript pages: _____

Number of copies requested by type

Ordinary _____
Expedited _____
Daily _____
Hourly _____

Digital audio quality was:

- Very Good
- Satisfactory
- Poor

Annotation quality was:

- Very Good
- Satisfactory
- Poor

Transfer medium (e.g. DAT tape, MO disk) was:

- Easy to use
- OK to use
- Difficult to use

Please note any particularly positive or negative experiences encountered while processing this transcription request (e.g., any difficulty hearing the audio, using the equipment or software, accessing material).

Please return to: Federal Judicial Center
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for information about transcriptions made **in-house** rather than by a provider located outside the court.

The form asks for your evaluation of the digital audio record and the annotations you worked with. It also asks you to record any difficulties you may have had in transcribing the record.

Complete this form each time you satisfy a transcription request, whether the event you are transcribing is long or short. For example, if the request is for a single, short event, such as a hearing or a segment of testimony, complete a form for that request. If, on the other hand, the request is for an entire trial—but is still a single request—complete a single form for that request. If you receive a request that lists several discrete events—for example, a hearing from one case, a trial from another, testimony from a third—treat each individual case as a separate request and complete a form for each request.

Date: Enter the date the form was completed.

Name of Transcriber: Enter the name of the person who did the transcription.

Other items on the form are self-explanatory.

Digital Audio Technology Evaluation Project

Federal Judicial Center

1998

TO: Transcription Providers, Digital Audio Recording Pilot Program
FROM: Research Division, Federal Judicial Center
SUBJECT: Forms for Data Collection

As part of the pilot test of digital audio recording technology, the Federal Judicial Center is conducting an evaluation on behalf of the Judicial Conference, the policymaking body for the federal courts. The purpose of the study is to determine whether digital audio recording should be approved as a method for taking the official court record. The enclosed forms seek information that will assist the Center in its study of the twelve pilot programs. We very much appreciate your help in completing the forms.

Purpose of the Forms. The purpose of these forms is to capture information about the transcribers' experiences in purchasing, installing, training for, and using the digital audio recording systems. We suggest you read through all the forms first, so you'll be prepared to complete them at the appropriate times and give them to the appropriate persons.

When to Complete the Forms. On the next page, you'll find a table listing the four types of forms in this packet. For each type, the table also indicates when the form should be completed. More detailed instructions for completing the forms are printed on the back of each form.

Who Should Complete the Forms. We ask that you have the forms completed by the person best able to provide the information. For some questions, that is likely to be the owner of the transcription service; for others it will be the person who completes the transcription. If any comments you wish to make are longer than the space provided on the forms, please feel free to use the back of the forms or attach additional sheets.

IMPORTANT NOTE: We urge you to make a copy of the completed forms before putting them in the mail. You may also want to make extra copies of the first three types of forms before completing them so you have a blank set in case of errors. You will need to make extra copies of the fourth form, since it must be used each time a transcription is made.

Where to Send the Forms. As you complete the forms, please send them to:

Federal Judicial Center
Research Division
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Digital Audio Technology Evaluation Project

List of Forms And When They Should Be Completed

Form	Color	When to Complete
Equipment Use and Acquisition	Ivory	During or shortly after installation
Installation Record	Blue	During or shortly after installation
Training Record	Green	Shortly after training is complete
Audio & Annotation Evaluation/Transcription Difficulties	Yellow	Each time a transcription is made

If you have questions about the forms, please call any member of the Federal Judicial Center project team at 202-502-4070.

Pat Lombard

David Rauma

George Cort

Donna Stienstra

Transcription Service Provider's Implementation Experience

Equipment Use and Acquisition

Transcription Service Provider: _____ Date: _____

Component	(1) Used existing equipment "as is"	(2) Used existing equipment with upgrade		(3) Purchased new equipment	
	Was equipment purchased or upgraded within the last year (Yes, No, Not sure)?	From digital audio system vendor	From other source (identify source)	From digital audio system vendor	From other source (identify source)
Transcriber's workstation -- Hardware					
Transcriber's workstation -- Software					
Transcription material transfer media unit (e.g. DAT drive, CD-ROM)					
Foot pedal control of audio					
Special function furniture					
Other component:					
Other component:					

Please return to: Federal Judicial Center
 Digital Audio Technology Evaluation Project
 One Columbus Circle, NE
 Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for information about equipment use and acquisition for the digital audio recording system.

This form should be completed only once during the pilot study.

Transcription Service Provider: Enter the name of the company providing the transcription service.

Date: Enter the date the form was completed.

Components: Consider each component listed in the lefthand column. Then:

If you used existing equipment (Column 1), answer whether it was purchased or upgraded in the last year.

If you upgraded existing equipment (Column 2), indicate who provided it.

If you purchased new equipment (Column 3), indicate who provided it.

Any or all of Columns 1, 2, and 3 may be marked for any given component.

If a component is not part of your digital system, write NA (not applicable) on the line in Column 1.

Transcription Service Provider's Implementation Experience

Installation Record

Transcription Service Provider: _____ Date: _____

Date all equipment was ordered by: _____

Delivery was: Early or On Time

Date all equipment was delivered by: _____

About 1-2 weeks late

More than 2 weeks late

Installation and testing took _____ days

In general, the installation went:

This was: Less than expected

Well

About as expected

OK

More than expected

Poorly

Did installation and testing disrupt normal business activity: Yes No If yes, for how many days: _____

Please note any particularly positive or negative experiences encountered during the installation in this location, especially any unexpected situations or changes you had to deal with. If any of these experiences were due to hardware or software provided by the digital audio system vendor or by other suppliers, please include the name of the vendor or supplier.

Please return to: Federal Judicial Center
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Instructions For Completing This Form

This form asks about your experience in installing the digital audio recording equipment..

This form should be completed only once during the pilot study.

Transcription Service Provider: Enter the name of the company providing the transcription service.

Date: Enter the date the form was completed.

Date equipment ordered and delivered: Enter month, day, and year if possible; enter month and year if day is not known.

Other items on this form are self-explanatory.

Transcription Service Provider's Implementation Experience

Training Record

Transcription Service Provider: _____ Date: _____

Training Provided by Digital Audio System Vendor

Individuals trained	Number trained	Typical # hours of training each person received	Training topics (mark all topics that were covered)
Transcribers			<input type="radio"/> General system overview <input type="radio"/> Playback <input type="radio"/> Archiving and retrieving <input type="radio"/> Recording <input type="radio"/> Transcribing <input type="radio"/> System security <input type="radio"/> Annotating <input type="radio"/> Tape duplication <input type="radio"/> Other (specify) _____
Administrative staff			<input type="radio"/> General system overview <input type="radio"/> Playback <input type="radio"/> Archiving and retrieving <input type="radio"/> Recording <input type="radio"/> Transcribing <input type="radio"/> System security <input type="radio"/> Annotating <input type="radio"/> Tape duplication <input type="radio"/> Other (specify) _____
Other			<input type="radio"/> General system overview <input type="radio"/> Playback <input type="radio"/> Archiving and retrieving <input type="radio"/> Recording <input type="radio"/> Transcribing <input type="radio"/> System security <input type="radio"/> Annotating <input type="radio"/> Tape duplication <input type="radio"/> Other (specify) _____

Was this training? Insufficient Sufficient Too Much

Do you have any other comments regarding the training experience?

Please return to: Federal Judicial Center
 Digital Audio Technology Evaluation Project
 One Columbus Circle, NE
 Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for information about training provided by the **digital audio system vendor**.

Transcription Service Provider: Enter the name of the company providing the transcription service.

Date: Enter the date the form was completed.

The other questions on this form are self-explanatory.

Transcription Service Provider's Implementation Experience

Training Record

Transcription Service Provider: _____ Date: _____

Training Provided by the Court

Individuals trained	Number trained	Typical # hours of training each person received	Training topics (mark all topics that were covered)
Transcribers			<input type="radio"/> General overview of the system <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify)
Administrative staff			<input type="radio"/> Changes in use of court staff <input type="radio"/> Changes in transcription procedures <input type="radio"/> Other (please specify)
Other			<input type="radio"/> General overview of the system <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify)
			<input type="radio"/> Changes in use of court staff <input type="radio"/> Changes in transcription procedures <input type="radio"/> Other (please specify)

Was this training? Insufficient Sufficient Too Much

Do you have any other comments regarding the training experience?

Please return to: Federal Judicial Center
 Digital Audio Technology Evaluation Project
 One Columbus Circle, NE
 Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for information about training provided by the **court**.

Transcription Service Provider: Enter the name of the company providing the transcription service.

Date: Enter the date the form was completed.

The other questions on this form are self-explanatory.

Transcription Service Provider's Implementation Experience

Training Record

Transcription Service Provider: _____

Date: _____

Training You Provided Your Employees

Individuals trained	Number trained	Typical # hours of training each person received	Training topics (mark all topics that were covered)
Transcribers			<input type="radio"/> General overview of the system <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in use of staff <input type="radio"/> Other (please specify) _____
Administrative staff			<input type="radio"/> General overview of the system <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in use of staff <input type="radio"/> Other (please specify) _____
Other			<input type="radio"/> General overview of the system <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in use of staff <input type="radio"/> Other (please specify) _____

Was this training? Insufficient Sufficient Too Much

Do you have any other comments regarding the training experience?

Please return to: Federal Judicial Center
 Digital Audio Technology Evaluation Project
 One Columbus Circle, NE
 Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for information about training provided to staff by the **transcription service**.

Transcription Service Provider: Enter the name of the company providing the transcription service.

Date: Enter the date the form was completed.

The other questions on this form are self-explanatory.

Transcription Service Provider's Operational Experience

Audio and Annotation Evaluation / Transcription Difficulties

Transcription Service Provider: _____ Date: _____

Case number: _____ Case name: _____

Briefly identify the proceeding to be transcribed, including, for example, the type of proceeding, the date, and if meaningful, whether it was the a.m. or p.m. session (e.g., "Testimony by John Smith, May 20, 1998, a.m." or "Trial, June 3-7, 1998").

Transcript order processing

Date order received: _____
Date transcript completed: _____
Number of transcript pages: _____

Number of copies requested by type

Ordinary _____
Expedited _____
Daily _____
Hourly _____

Digital audio quality was:

- Very Good
- Satisfactory
- Poor

Annotation quality was:

- Very Good
- Satisfactory
- Poor

Transfer medium (e.g. DAT tape, MO disk) was:

- Easy to use
- OK to use
- Difficult to use

Please note any particularly positive or negative experiences encountered while processing this transcription request (e.g., any difficulty hearing the audio, using the equipment or software, accessing material).

Please return to: Federal Judicial Center
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Instructions For Completing This Form

This form asks for your evaluation of the digital audio record and the annotations you received from the court. It also asks you to record any difficulties you may have had in transcribing the record you received.

Complete this form each time you satisfy a transcription request, whether the event you are transcribing is long or short. For example, if the request is for a single, short event, such as a hearing or a segment of testimony, complete a form for that request. If, on the other hand, the request is for an entire trial—but is still a single request—complete a single form for that request. If you receive a request from the court that lists several discrete events—for example, a hearing from one case, a trial from another, testimony from a third—treat each individual case as a separate request and complete a form for each request.

Transcription Service Provider: Enter the name of the company providing the transcription service.

Date: Enter the date the form was completed.

The other questions on this form are self-explanatory.

Digital Audio Technology Evaluation Project

Federal Judicial Center

1998

TO: Court Contact, Digital Audio Recording Pilot Program

FROM: Research Division, Federal Judicial Center

SUBJECT: Forms for Data Collection

As part of the pilot test of digital audio recording technology, the Federal Judicial Center is conducting an evaluation on behalf of the Judicial Conference, the policymaking body for the federal courts. The purpose of the study is to determine whether digital audio recording should be approved as a method for taking the official court record. The enclosed forms seek information that will assist the Center in its study of the twelve pilot programs. We very much appreciate your help in completing the forms.

Purpose of the Forms. The purpose of these forms is to capture information about the court's experience in purchasing, installing, and training for the digital audio recording system. We suggest you read through all the forms first, so you'll be prepared to complete them at the appropriate times and give them to the appropriate staff persons.

When to Complete the Forms. On the next page, you'll find a table listing the three sets of forms in this packet. For each set, the table also indicates when the form should be completed. More detailed instructions for completing the forms are printed on the back of each form.

Who Should Complete the Forms. We ask that you have the forms completed by the person best able to provide the information. For many questions, that is likely to be you, but you may also need to consult the system manager, courtroom operators, and others. If any comments you wish to make are longer than the space provided on the forms, please feel free to use the back of the forms or attach additional sheets.

IMPORTANT NOTE: We urge you to make a copy of the completed forms before putting them in the mail. You may also want to make extra copies of the forms before completing them so you have a blank set in case of errors.

Where to Send the Forms. As the forms are completed, please send them to:

Federal Judicial Center
Research Division
Digital Audio Technology Evaluation Project
One Columbus Circle, NE
Washington, DC 20002-8003

Digital Audio Technology Evaluation Project

List of Forms And When They Should Be Completed

Form	Color	When to Complete
Equipment Use and Acquisition	Ivory	During or shortly after installation
Record of Installation Experience	Blue	During or shortly after installation
Record of Training Experience	Green	Shortly after training is complete

If you have questions about the forms, please call any member of the Federal Judicial Center project team at 202-502-4070.

Pat Lombard

David Rauma

George Cort

Donna Stienstra

Equipment Use and Acquisition

Courtroom

Date: _____

(Judge's name) _____	(1) Used existing equipment "as is"		(2) Used existing equipment with upgrade		(3) Purchased new equipment	
	Was equipment purchased or upgraded within the last year (Yes, No, Not sure)?	From digital audio system vendor	From other source (identify source)	From digital audio system vendor	From other source (identify source)	
Component						
Digital audio recording system unit						
Archival media unit (e.g. DAT or MO drive)						
ECRO workstation -- Hardware						
ECRO workstation -- Software						
Judge's workstation -- Hardware						
Judge's workstation -- Software						
Microphones (# used _____)						
Audio mixer						
"Splitter" for concurrent analog recording						
Courtroom playback system						
Patching in telephone conferencing						
Audio "confidence" monitoring capability						
Equivalent to "tape counter" display						
Cabling -- Audio						
Cabling -- Network						
Conduit or other infrastructure changes						
DCN connections						
Special function furniture						
Other component:						
Other component:						

Instructions For Completing This Form

This form asks for information about the digital audio recording equipment installed in the courtrooms.

Use a separate form for each courtroom included in the pilot study. This form should be completed only once during the pilot study for each courtroom where digital audio recording equipment is installed.

Date: Enter the date the form was completed.

Courtroom: On the blank line, enter the name of the judge to whom the courtroom is assigned.

Components: Consider each component listed in the lefthand column. Then:

If the court used existing equipment (Column 1), answer whether it was purchased or upgraded in the last year.

If the court upgraded existing equipment (Column 2), indicate who provided it.

If the court purchased new equipment (Column 3), indicate who provided it.

Any or all of Columns 1, 2, and 3 may be marked for any given component.

If a component is not part of your digital system—e.g., there is no capability to patch in telephone conferencing—write NA (not applicable) on the line in Column 1.

Equipment Use and Acquisition

Chambers

Date: _____

(Judge's name) _____	(1) Used existing equipment "as is"		(2) Used existing equipment with upgrade		(3) Purchased new equipment	
	Was equipment purchased or upgraded within the last year (Yes, No, Not sure)?	From digital audio system vendor	From other source (identify source)	From digital audio system vendor	From other source (identify source)	
Component						
Judge's workstation -- Hardware						
Judge's workstation -- Software						
Other workstations -- Hardware						
Other workstations -- Software						
Cabling -- Network						
Conduit or other infrastructure changes						
DCN connections						
Special function furniture						
Other component:						
Other component:						

Instructions For Completing This Form

This form asks for information about the digital audio recording equipment installed in chambers.

Use a separate form for each chambers included in the pilot study. This form should be completed only once during the pilot study for each chambers where digital audio recording equipment is installed.

Date: Enter the date the form was completed.

Chambers: On the blank line, enter the name of the judge who occupies the chambers.

Components: Consider each component listed in the lefthand column. Then:

If the court used existing equipment (Column 1), answer whether it was purchased or upgraded in the last year.

If the court upgraded existing equipment (Column 2), indicate who provided it.

If the court purchased new equipment (Column 3), indicate who provided it.

Any or all of Columns 1, 2, and 3 may be marked for any given component.

If a component is not part of your digital system, write NA (not applicable) on the line in Column 1.

Equipment Use and Acquisition

ECRO Work Area/ In-Courthouse Transcription Area

Date: _____

Component	(1) Used existing equipment "as is"	(2) Used existing equipment with upgrade		(3) Purchased new equipment	
	Was equipment purchased or upgraded within the last year (Yes, No, Not sure)?	From digital audio system vendor	From other source (identify source)	From digital audio system vendor	From other source (identify source)
ECRO workstation -- Hardware					
ECRO workstation -- Software					
ECRO "dubbing" station					
Transcribers' workstations -- Hardware					
Transcribers' workstations -- Software					
Cabling -- Audio					
Cabling -- Network					
Conduit or other infrastructure changes					
DCN connections					
Special function furniture					
Other component:					
Other component:					

Instructions For Completing This Form

This form asks for information about the digital audio recording equipment installed in the ECRO work area and in-courthouse transcription area. The ECRO work area refers to any equipment used by the ECRO outside the courtroom, not the ECRO's workstation within the courtroom.

This form should be completed only once during the pilot study for the ECRO work area or in-courthouse transcription area where digital audio recording equipment is installed.

Date: Enter the date the form was completed.

Components: Consider each component listed in the lefthand column. Then:

If the court used existing equipment (Column 1), answer whether it was purchased or upgraded in the last year.

If the court upgraded existing equipment (Column 2), indicate who provided it.

If the court purchased new equipment (Column 3), indicate who provided it.

Any or all of Columns 1, 2, and 3 may be marked for any given component.

If a component is not part of your digital system—e.g., there is no audio cabling—write NA (not applicable) on the line in Column 1.

Equipment Use and Acquisition

Central Control System

Date: _____

Component	(1) Used existing equipment "as is"	(2) Used existing equipment with upgrade		(3) Purchased new equipment	
	Was equipment purchased or upgraded within the last year (Yes, No, Not sure)?	From digital audio system vendor	From other source (identify source)	From digital audio system vendor	From other source (identify source)
Central recording unit/ database server -- Hardware					
Central recording unit/ database server -- Software					
Archival media unit (e.g. DAT or MO drive)					
Other workstations -- Hardware					
Other workstations -- Software					
Cabling -- Audio					
Cabling -- Network					
Conduit or other infrastructure changes					
DCN connections					
Special function furniture					
Other component:					
Other component:					

Instructions For Completing This Form

This form asks for information about the digital audio recording equipment installed for the Central Control System.

This form should be completed only once during the pilot study for the digital audio recording system's Central Control System.

Date: Enter the date the form was completed.

Components: Consider each component listed in the lefthand column. Then:

If the court used existing equipment (Column 1), answer whether it was purchased or upgraded in the last year.

If the court upgraded existing equipment (Column 2), indicate who provided it.

If the court purchased new equipment (Column 3), indicate who provided it.

Any or all of Columns 1, 2, and 3 may be marked for any given component.

If a component is not part of your digital system—e.g., there is no audio cabling—write NA (not applicable) on the line in Column 1.

Equipment Use and Acquisition

Emergency Backup System

Date: _____

Component	(1) Used existing equipment "as is"	(2) Used existing equipment with upgrade		(3) Purchased new equipment	
	Was equipment purchased or upgraded within the last year (Yes, No, Not sure)?	From digital audio system vendor	From other source (identify source)	From digital audio system vendor	From other source (identify source)
Audio recording system unit -- Digital					
Audio recording unit -- Analog					
Archival media unit (e.g. DAT or MO drive)					
Cabling -- Audio					
Cabling -- Network					
DCN connections					
Special function furniture					
Other component:					
Other component:					

Instructions For Completing This Form

This form asks for information about the digital audio recording equipment installed for the Emergency Backup System.

This form should be completed only once during the pilot study for the digital audio recording system's Emergency Backup System.

Date: Enter the date the form was completed.

Components: Consider each component listed in the lefthand column. Then:

If the court used existing equipment (Column 1), answer whether it was purchased or upgraded in the last year.

If the court upgraded existing equipment (Column 2), indicate who provided it.

If the court purchased new equipment (Column 3), indicate who provided it.

Any or all of Columns 1, 2, and 3 may be marked for any given component.

If a component is not part of your digital system—e.g., there is no audio cabling—write NA (not applicable) on the line in Column 1.

Equipment Use and Acquisition

Cost Summary

Date: _____

In the categories below, please provide your best estimate of the total cost incurred by your district for new equipment purchases, equipment upgrades (hardware and software), or other related services purchased to support the use of digital audio recording in your court. Refer to the components listed on the Equipment Use and Acquisition forms for Courtroom, Chambers, etc. when estimating these costs. Include all costs, regardless of the source of funding (e.g., Administrative Office funding, court funds).

New equipment purchased to support digital audio recording

From digital audio recording system vendor: \$ _____ From other source: \$ _____

Upgrades for existing equipment purchased to support digital audio recording

From digital audio recording system vendor: \$ _____ From other source: \$ _____

Installation, training, or customization services purchased to support digital audio recording

From digital audio recording system vendor: \$ _____ From other source: \$ _____

Any other costs (please specify amount)

\$ _____

Briefly describe other costs:

Estimated value of all equipment, software, and services provided by the digital audio recording system vendor free of charge to support digital audio recording

Equipment: \$ _____

Software: \$ _____

Services: \$ _____

Briefly describe free items:

Instructions For Completing This Form

This form asks about the costs incurred by your court in purchasing, installing, customizing, and training for the digital audio recording system. In calculating the costs, include all expenditures made by the court. Refer to the components listed on the Equipment Use and Acquisition forms for Courtrooms, Chambers, etc. when estimating the costs. Do not include staff time.

The first four sections on the form are self-explanatory.

In the fifth section, please report any equipment, software, or services the vendor may have given the court at no cost. For example, if the vendor charged the court for only five of ten software licenses, please estimate the value of the five licenses received at no cost. Likewise, if cabling, extra training, or equipment such as mixers or computers were provided free of charge, please estimate their value.

Record of Installation Experience

Courtroom _____ **Date:** _____
(Judge's name)

Date all equipment was ordered by: _____ Delivery was: Early or On Time
Date all equipment was delivered by: _____ About 1-2 weeks late
 More than 2 weeks late

Installation and testing took _____ days
This was: Less than expected
 About as expected
 More than expected

In general, the installation went: Well
 OK
 Poorly

Did installation and testing disrupt normal use of this area: Yes No If yes, for how many days: _____

Please note any particularly positive or negative experiences encountered during the installation in this location, especially any unexpected situations or changes you had to deal with. If any of these experiences were due to hardware or software provided by the digital audio system vendor or by other suppliers, please include the name of the vendor or supplier.

Instructions For Completing This Form

This form asks about your court's experience in installing the digital audio recording equipment in the courtrooms.

Use a separate form for each courtroom included in the pilot study. This form should be completed only once during the pilot study for each courtroom where digital audio recording equipment is installed.

Date: Enter the date the form was completed.

Courtroom: Enter the name of the judge to whom the courtroom is assigned.

Date equipment ordered and delivered: Enter month, day, and year if possible; enter month and year if day is not known.

Other items on form are self-explanatory.

Record of Installation Experience

Chambers _____ **Date:** _____
(Judge's name)

Date all equipment was ordered by: _____ Delivery was: Early or On Time
Date all equipment was delivered by: _____ About 1-2 weeks late
 More than 2 weeks late

Installation and testing took _____ days
This was: Less than expected
 About as expected
 More than expected

In general, the installation went: Well
 OK
 Poorly

Did installation and testing disrupt normal use of this area: Yes No If yes, for how many days: _____

Please note any particularly positive or negative experiences encountered during the installation in this location, especially any unexpected situations or changes you had to deal with. If any of these experiences were due to hardware or software provided by the digital audio system vendor or by other suppliers, please include the name of the vendor or supplier.

Instructions For Completing This Form

This form asks about your court's experience in installing the digital audio recording equipment in chambers.

Use a separate form for each chambers included in the pilot study. This form should be completed only once during the pilot study for each chambers where digital audio recording equipment is installed.

Date: Enter the date the form was completed.

Chambers: Enter the name of the judge who occupies the chambers.

Date equipment ordered and delivered: Enter month, day, and year if possible; enter month and year if day is not known.

Other items on form are self-explanatory.

Record of Installation Experience

ECRO Work Area / In-Courthouse Transcription Area

Date: _____

Date all equipment was ordered by: _____

Delivery was: Early or On Time

Date all equipment was delivered by: _____

About 1-2 weeks late

More than 2 weeks late

Installation and testing took _____ days

In general, the installation went:

This was: Less than expected

Well

About as expected

OK

More than expected

Poorly

Did installation and testing disrupt normal use of this area: Yes No

If yes, for how many days: _____

Please note any particularly positive or negative experiences encountered during the installation in this location, especially any unexpected situations or changes you had to deal with. If any of these experiences were due to hardware or software provided by the digital audio system vendor or by other suppliers, please include the name of the vendor or supplier.

Instructions For Completing This Form

This form asks about your court's experience in installing the digital audio recording equipment in the ECRO work area and in-courthouse transcription area. The ECRO work area refers to any equipment used by the ECRO outside the courtroom, not the ECRO's workstation within the courtroom.

This form should be completed only once during the pilot study for the ECRO work area and in-courthouse transcription area where digital audio recording equipment is installed.

Date: Enter the date the form was completed.

Date equipment ordered and delivered: Enter month, day, and year if possible; enter month and year if day is not known.

Other items on form are self-explanatory.

Record of Installation Experience

Central Control System

Date: _____

Date all equipment was ordered by: _____

Delivery was: Early or On Time

Date all equipment was delivered by: _____

About 1-2 weeks late

More than 2 weeks late

Installation and testing took _____ days

In general, the installation went:

This was: Less than expected

Well

About as expected

OK

More than expected

Poorly

Did installation and testing disrupt normal use of this area: Yes No

If yes, for how many days: _____

Please note any particularly positive or negative experiences encountered during the installation in this location, especially any unexpected situations or changes you had to deal with. If any of these experiences were due to hardware or software provided by the digital audio system vendor or by other suppliers, please include the name of the vendor or supplier.

Instructions For Completing This Form

This form asks about your court's experience in installing the digital audio recording equipment for the Central Control System.

This form should be completed only once during the pilot study for the digital audio recording system's Central Control System.

Date: Enter the date the form was completed.

Date equipment ordered and delivered: Enter month, day, and year if possible; enter month and year if day is not known.

Other items on form are self-explanatory.

Record of Installation Experience

Emergency Backup System

Date: _____

Date all equipment was ordered by: _____

Delivery was: Early or On Time

Date all equipment was delivered by: _____

About 1-2 weeks late

More than 2 weeks late

Installation and testing took _____ days

In general, the installation went:

This was: Less than expected

Well

About as expected

OK

More than expected

Poorly

Did installation and testing disrupt normal use of this area: Yes No

If yes, for how many days: _____

Please note any particularly positive or negative experiences encountered during the installation in this location, especially any unexpected situations or changes you had to deal with. If any of these experiences were due to hardware or software provided by the digital audio system vendor or by other suppliers, please include the name of the vendor or supplier.

Instructions For Completing This Form

This form asks about your court's experience in installing the digital audio recording system's Emergency Backup System.

This form should be completed only once during the pilot study for the digital audio recording system's Emergency Backup System.

Date: Enter the date the form was completed.

Date equipment ordered and delivered: Enter month, day, and year if possible; enter month and year if day is not known.

Other items on form are self-explanatory.

Record of Installation Experience

Acquiring Transcription Services

Date: _____

How many of your regular providers were able to transcribe digital recordings when the study began? _____ out of _____

Was this number sufficient to meet your digital transcription needs? Yes No

If No, were you able to find new providers in order to meet your digital transcription needs? Yes No Still Looking

How did you identify transcription service providers for digital recordings?

Was there any resistance from providers to transcribing digital recordings?

In general, the switch over to transcription of digital recordings went: Well OK Poorly

Did securing digital transcription services interrupt service to the court: Yes No If yes, for how many days: _____

Please note any particularly positive or negative experiences encountered during the installation in this location, especially any unexpected situations or changes you had to deal with. If any of these experiences were due to hardware or software provided by the digital audio system vendor or by other suppliers, please include the name of the vendor or supplier.

Instructions For Completing This Form

This form asks about your court's experience in acquiring transcription services for transcribing the digital audio record.

This form should be completed only once during the pilot study to report your court's experience in acquiring transcription services.

Date: Enter the date the form was completed.

The questions on the form are self-explanatory.

Record of Installation Experience

Transcription Service Providers

Date: _____

Name of provider	Name of contact	Phone number of contact

Instructions For Completing This Form

This form asks for information about the court's transcription service providers.

Enter the name of **each** provider, the name of the contact at each provider, and the phone number of each contact.

If providers are added to the list after this form has been sent in, please send an updated form.

Enter the **date** the form was completed.

Record of Training Experience

Training Provided by the Digital Audio System Vendor

Date: _____

Individuals trained	Number trained	Typical # hours of training each person received	Training topics (mark all topics that were covered)
Judges			<input type="radio"/> General system overview <input type="radio"/> Recording <input type="radio"/> Annotating <input type="radio"/> Playback <input type="radio"/> Transcribing <input type="radio"/> Tape duplication <input type="radio"/> Archiving and retrieving <input type="radio"/> System security <input type="radio"/> Other (specify) _____
Chambers staff			<input type="radio"/> General system overview <input type="radio"/> Recording <input type="radio"/> Annotating <input type="radio"/> Playback <input type="radio"/> Transcribing <input type="radio"/> Tape duplication <input type="radio"/> Archiving and retrieving <input type="radio"/> System security <input type="radio"/> Other (specify) _____
Electronic court recorder operators			<input type="radio"/> General system overview <input type="radio"/> Recording <input type="radio"/> Annotating <input type="radio"/> Playback <input type="radio"/> Transcribing <input type="radio"/> Tape duplication <input type="radio"/> Archiving and retrieving <input type="radio"/> System security <input type="radio"/> Other (specify) _____
Systems staff			<input type="radio"/> General system overview <input type="radio"/> Recording <input type="radio"/> Annotating <input type="radio"/> Playback <input type="radio"/> Transcribing <input type="radio"/> Tape duplication <input type="radio"/> Archiving and retrieving <input type="radio"/> System security <input type="radio"/> Other (specify) _____
Clerk's office staff			<input type="radio"/> General system overview <input type="radio"/> Recording <input type="radio"/> Annotating <input type="radio"/> Playback <input type="radio"/> Transcribing <input type="radio"/> Tape duplication <input type="radio"/> Archiving and retrieving <input type="radio"/> System security <input type="radio"/> Other (specify) _____
Transcribers (court staff only)			<input type="radio"/> General system overview <input type="radio"/> Recording <input type="radio"/> Annotating <input type="radio"/> Playback <input type="radio"/> Transcribing <input type="radio"/> Tape duplication <input type="radio"/> Archiving and retrieving <input type="radio"/> System security <input type="radio"/> Other (specify) _____
Other			<input type="radio"/> General system overview <input type="radio"/> Recording <input type="radio"/> Annotating <input type="radio"/> Playback <input type="radio"/> Transcribing <input type="radio"/> Tape duplication <input type="radio"/> Archiving and retrieving <input type="radio"/> System security <input type="radio"/> Other (specify) _____

Was this training? Insufficient Sufficient Too much

Do you have any other comments regarding the training experience?

Instructions For Completing This Form

This form asks for information about training provided by the **digital audio system vendor**.

Enter the **date** the form was completed.

The questions on this form are self-explanatory.

Record of Training Experience

Training Provided by the Court

Date: _____

Individuals trained	Number trained	Typical # hours of training each person received	Training topics (mark all topics that were covered)
Judges			<input type="radio"/> General overview of the system <input type="radio"/> Changes in use of court staff <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify) _____
Chambers staff			<input type="radio"/> General overview of the system <input type="radio"/> Changes in use of court staff <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify) _____
Electronic court recorder operators			<input type="radio"/> General overview of the system <input type="radio"/> Changes in use of court staff <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify) _____
Systems staff			<input type="radio"/> General overview of the system <input type="radio"/> Changes in use of court staff <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify) _____
Clerk's office staff			<input type="radio"/> General overview of the system <input type="radio"/> Changes in use of court staff <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify) _____
Transcribers (court staff only)			<input type="radio"/> General overview of the system <input type="radio"/> Changes in use of court staff <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify) _____
Other			<input type="radio"/> General overview of the system <input type="radio"/> Changes in use of court staff <input type="radio"/> In depth training on selected features <input type="radio"/> Changes in transcription procedures <input type="radio"/> Changes in court ESR procedures <input type="radio"/> Other (please specify) _____

Was this training? Insufficient Sufficient Too Much

Do you have any other comments regarding the training experience?

Instructions For Completing This Form

This form asks for information about training provided by the **court**.

Enter the **date** the form was completed.

The questions on this form are self-explanatory.

DAT: Court Contact Interview Federal Judicial Center, March 1999

Use of the DAT Equipment

1. Since we last talked, how has the digital recording system been working in your court? Has it been satisfactory or not?
2. Have there been any problems in using the system, either in taking the record or providing support for the system?
3. What have been its advantages? Its disadvantages?
4. In what form are you giving the record to the transcription services? Have you had sufficient transcription service available? Is the cost of a transcript different using a digital compared to an analog record?
5. Are you confident in the record being taken by the digital system—quality, security, future accessibility?
6. If you were going out on the market to purchase a recording system, what would you be looking for? What would you ask potential vendors?

Implementation, Training, and Support

7. Has the vendor done any additional training?
8. Have you received any other assistance from the vendor? Is there anything you need from the vendor that you haven't gotten?
9. Has the digital system changed the nature of anyone's work, how they do it, or who they have to interact with to get their work done?
10. Has the court implemented any procedural changes to accommodate the digital system?
11. What would be necessary to expand the digital system to more or all court rooms?

Overall Evaluation

12. Weighing the costs and benefits of your experience with digital recording, has it been worth it? What do you think the court should do (e.g., keep the system, expand to all chambers)?
13. What advice would you give to your counterpart in a district considering use of a digital recording system?
14. Looking back over this experience, what, if anything, would you do differently?

DAT: Clerk Interview
Federal Judicial Center, March 1999

Use of the DAT Equipment

1. Since we last talked, how has the digital recording system been working in your court? Has it been satisfactory or not?
2. Have there been any problems in using the system, either in taking the record or providing support for the system?
3. What have been its advantages? Its disadvantages?
4. Are you confident in the record being taken by the digital system—quality, security, future accessibility?
5. If you were going out on the market to purchase a recording system, what would you be looking for? What would you ask potential vendors?

Implementation, Training, and Support

6. Has the vendor done any additional training?
7. Have you received any other assistance from the vendor? Is there anything you need from the vendor that you haven't gotten?
8. Has the use of digital recording changed your staffing needs? Has the digital system changed the nature of anyone's work, how they do it, or who they have to interact with to get their work done?
9. Has it changed your space requirements?
10. Has the court implemented any procedural changes to accommodate the digital system?
11. What would be necessary to expand the digital system to more or all court rooms?

Overall Evaluation

12. Weighing the costs and benefits of your experience with digital recording, has it been worth it? What do you think the court should do (e.g., keep the system, expand to all chambers)?
13. What advice would you give to a clerk in a district considering use of a digital recording system?
14. Looking back over this experience, what, if anything, would you do differently?

DAT: Judge Interview
Federal Judicial Center, March 1999

Use of the DAT Equipment

1. What are you using the system for—e.g., trials, motions days, etc.? How are you using the system—e.g., to take notes, playback in courtroom, access in chambers?
2. Is there anything you'd like it to do that it doesn't?
3. Does it have any functions you're not using?
4. Have you had any problems with the system? What caused the problem (e.g., system failure, operator failure)? Did any problems result in gaps in the digital record?
5. What do you especially like about the system?
6. What do you especially dislike about it?
7. Are you comfortable using this system? Is it easy or difficult to use?
8. Has it changed the way you proceed in the courtroom? The way you use your court recorder?
9. If you were going out on the market to purchase a recording system, what would you be looking for? What would you ask potential vendors?

Implementation, Training, and Support

10. Have you received any additional training for using the digital recording system?
11. Have you had adequate support from the court in your use of the system?

Overall Evaluation

12. Weighing the costs and benefits of your experience with digital recording, has it been worth it? What do you think the court should do (e.g., keep the system, expand to all chambers)?
13. What advice would you give to a judge in a district considering use of a digital recording system?
14. Looking back over this experience, what, if anything, would you do differently?

DAT: Court Recorder Interview Federal Judicial Center, March 1999

Use of the DAT Equipment

1. What are you using the digital recording system for—e.g., all proceedings requiring a record? What functions are you using—e.g., log notes, play back in court?
2. Is there anything you'd like it to do that it doesn't?
3. Does it have any functions you're not using? Why aren't you using them?
4. Have you had any problems with the system? What caused the problem (e.g., system failure, operator failure)? Did any problems result in gaps in the digital record?
5. Has it changed anything about the way you do your work—e.g., how work is assigned or who you interact with in operating the system?
6. What do you especially like about the system?
7. What do you especially dislike about it?
8. Are you comfortable taking the record with this system? Is it easy or difficult to use?
9. In what form are you giving the record to the transcription services?
10. If you were going out on the market to purchase a recording system, what would you be looking for? What would you ask potential vendors?

Implementation, Training, and Support

11. Have you had any additional training?
12. Have you received any other assistance from the vendor?
13. Has the court done anything to assist your use of digital recording?

Overall Evaluation

14. Weighing the costs and benefits of your experience with digital recording, has it been worth it? What do you think the court should do (e.g., keep the system, expand to all chambers)?
15. What advice would you give to a court recorder in a district considering use of a digital recording system?
16. Looking back over this experience, what, if anything, would you do differently?

DAT: Systems Staff Interview Federal Judicial Center, March 1999

Use of the DAT Equipment

1. Since we last talked, how has the digital recording system been working in your court? Has it been satisfactory or not?
2. Have there been any problems in using the system, either in taking the record or providing support for the system?
3. Are you confident in the record being taken by the digital system—quality, security, future accessibility?
 - Have you changed any of the procedures originally implemented for the digital system?
 - What backup procedures do you use (a) for everyday (b) for disaster recovery (c) for archiving?
 - From what you know about how the data files are stored, what procedures are needed to retrieve all the recorded proceedings for a single case? Would it be retrievable without proprietary software?
 - Do you think it is possible to ensure open access to the audio and annotations?
4. If you were going out on the market to purchase a recording system, what would you be looking for? What would you ask potential vendors?

Implementation, Training, and Support

5. Has the vendor done any additional training?
6. Have you received any other assistance from the vendor? Is there anything you need from the vendor that you haven't gotten?
7. Has the digital system changed the nature of your work (e.g., how they do it or who they have to interact with to get their work done)?
8. Has the court implemented any procedural changes to accommodate the digital system?
9. What would be necessary to expand the digital system to more or all court rooms?

Overall Evaluation

10. Weighing the costs and benefits of your experience with digital recording, has it been worth it? What do you think the court should do (e.g., keep the system, expand to all chambers)?
11. What advice would you give to your counterpart in a district considering use of a digital recording system?
12. Looking back over this experience, what, if anything, would you do differently?

DAT: Transcriber Interview

Federal Judicial Center, March 1999

Transcribing the DAT Record

1. In what form are you receiving the record from the court (tape, CD)?
2. How many transcripts have you completed for the court from a digital record?
3. How does the audio on digital records compare to analog records from the court?
4. How do the log notes compare to those from the court's analog systems?
5. What difficulties, if any, have you encountered in transcribing the digital record (noise, unintelligible voices, etc.)? Are these problems due to the digital recording or some other cause?
6. What advantages, if any, does the digital record have (faster, more accurate, etc.)?
7. Would you estimate that it takes you more, less, or about the same time to produce a digital transcript as an analog transcript?
8. Would you estimate that it costs more, less, or about the same amount to produce a digital transcript as an analog transcript?

Installation, Training, and Support

9. Did you have to purchase new equipment? What kind of equipment? At what cost?
10. Did you have to make any changes in how your office functions (for example, reassign staff, allocate time differently)?
11. Did you receive training from the vendor?
12. Have you received any other assistance from the vendor? Is there anything you need from the vendor that you haven't gotten?

Overall Evaluation

13. Weighing the costs and benefits of your experience with digital transcription, has it been worth it? What do you think the court should do (e.g., keep the system, expand to all chambers)?
14. What advice would you give to your counterpart in a district considering use of a digital recording system?
15. Looking back over this experience, what, if anything, would you do differently?

DAT: Vendor Interview Federal Judicial Center, March 1999

Introductory Statement

Points to make:

- We are conducting an independent evaluation of the pilot project, focusing on how digital recording works a method for taking the record. We are not evaluating individual vendors and their systems.
- We are not involved in the policymaking; we are doing the research at the request of the policymakers. As part of this, we will not make any recommendations about specific systems, specific vendors, nor any issues involving contracts.
- We are interviewing all of the vendors participating in the pilot project and we understand that this is a new experience for everyone involved.

Background

1. How and when did your company learn about the pilot project?
2. How did your company become one of the pilot project vendors?
3. How were your districts selected? Did your company have any choice of districts?
4. What was your company told about the purpose of the pilot project? The anticipated schedule? The budget?

Site Survey

5. Did your company do site surveys in each district before installation?
6. What did that survey consist of?
7. At the time, did you feel that the site survey was adequate? If no, why not?
8. In terms of the site survey and based upon your experience, what would you do differently if a federal court wanted to purchase your system? For example, are there questions that you would ask now that you did not ask before?

Interview Questions, DAT Vendors

Software

9. What, if anything, did you do to customize your software for the federal courts?

(These questions should be asked for each district court.)

10. Did the court request any custom features that are not part of your standard system?

11. Did you do specific customizations for the court? If yes, please describe them.

12. If yes, how have these customized features worked in practice? What is your assessment?

13. What feedback have you gotten from the court about your software?

Computer and Audio Equipment

(These questions should be asked for each district court.)

14. Did you recommend a specific computer and/or network hardware configuration?

15. Did the court purchase this hardware? If no, why not?

16. Did you recommend specific audio equipment?

17. Did the court purchase this equipment? If no, why not?

18. How has the equipment in this court worked out? What is your assessment?

19. What feedback have you gotten from the court?

Installation

(These questions should be asked for each district court.)

20. When was your installation complete? *(Have the vendor define "complete.")*

21. What timetable were you given for completing the installation? Was this sufficient?

22. If there were delays, what were the reasons for the delays?

23. During the installation, did you encounter situations or problems that you did not foresee? *(Prompt for a description.)*

Interview Questions, DAT Vendors

24. Overall and from your perspective, how did the installation go?
25. What feedback have you gotten from the court about the installation?

Training

26. What type of training and/or training materials did your company provide to the courts?
27. What topics were covered by the training?
28. Who received the training?
29. How much time was spent in training?
30. In your view, how did the training go?
31. What feedback have you gotten from the courts, if any, about the training?
32. Are you planning to provide additional training?

Maintenance and Service

33. What is your company responsible for maintaining and servicing?
34. How is this done? (Prompts: Toll-free number for problems/questions; Site-visits; Modem links)
35. Describe the types of maintenance and service your company has provided to the courts thus far.
36. In your view, how has your system for maintenance and service worked out?
37. What feedback have you gotten from the courts?

Transcription

38. What software and hardware would a transcriber need to transcribe your system's digital recordings of court proceedings?

Interview Questions, DAT Vendors

39. What is the cost of your software for transcription? Are volume discounts or site licenses available?
40. How many transcription companies have purchased your software for this pilot project? (Prompt for the company names.)
41. Has your company made any special arrangements to provide transcribers with your software and/or equipment for this project? (Prompt for a description of the arrangements.)
42. What feedback have you gotten from the courts and/or transcription companies?

Costs

43. From your perspective, was the budget specified for the pilot project sufficient? If no, why not?
44. Was your company able to supply systems to the courts that adequately showed your product 's capabilities? If no, why not?

Miscellaneous

45. Based on your experience, what are the unique needs and/or requirements of the federal courts compared, for example, to state courts?
46. What type of storage media does your company recommend? Why? What is the expected life of that media?
47. What changes do you plan or foresee making to your system? Were any of these the result of suggestions by a court or specific customizations requested by a court?
48. Do you think that it is feasible economically to market systems that permit each court to customize the interface according to its own needs?

Anything Else?

49. Is there anything else that you would like to tell us?

Appendix 4

Description of the Features of a Digital Audio Recording System

Description of the Features of a Digital Audio Recording System

The following table identifies several features that are associated with digital audio recording systems. For each feature we've included notes that identify its use and benefits and also any problems or disadvantages. We've constructed this table from information we learned during our interviews with participants in the pilot study, from the data forms that were returned, and from our observations of the systems operating in different court settings. While the list is not intended to be exhaustive of all the features a digital recording system could have, it does represent a set of features that may be of particular relevance when considering the use of digital recording in the federal courts.

Although most of these features were represented in the recording systems used during the pilot study, current systems by other vendors and particularly systems that become available in the future may include a subset of these features or, conversely, may provide functions that were not available during the pilot study. The core element of all digital audio recording systems is that they produce a digital representation of the audio input. Many of the benefits associated with digital recording (e.g., less storage space and more storage options, direct access to a selected portion of the recording, ability to copy or transmit the file electronically, ability to integrate the file with other data sources) are due primarily to the digital nature of the audio file and are independent of the recording application that produced the file. Beyond that basic functionality, however, different vendors have chosen to implement other features in order to provide their own multifaceted application. These other features provide additional capabilities or add to the system's reliability or ease of use. The ability of a court to assess its own needs and expectations for a digital recording system and then to match them to the features offered by a particular recording system will be an important component of the future success of these systems in the federal courts.

Specifications written to provide guidance to courts considering implementing digital recording, therefore, should emphasize flexibility and permit systems that provide a wide range of capabilities. This will allow vendors to tailor systems to the identified needs of the courts and to take advantage of changes in technology to provide ever expanding or efficient capabilities. Tightly written specifications today could limit the features available to the courts in the future. Similarly, requiring specific features beyond the minimum requirement of producing a quality audio recording in a digital format could add to the cost or complexity of systems and inhibit courts from making their own cost-benefit analysis and possibly choosing less fully-featured, but less expensive systems.

For each of the features listed below we have indicated whether we think that item should be an optional or required feature of digital recording systems used in the federal courts. Some features are labeled standard instead of optional to identify those that would most likely be included in a system that was intended to provide an integrated solution to recording extended courtroom proceedings (as opposed to chambers or telephonic proceedings). To preserve the flexibility encouraged above, most features are labeled optional or standard. However, even those described as required should be viewed very broadly. The requirement should attach to the functionality and whether it has been achieved with a particular implementation in the court and not necessarily that a selected application itself provides the feature. For example, having a long term backup copy of the digital audio files is a required security feature. However, the court could meet that requirement by implementing its own procedures for backing up the system's data disks without the system having to have its own integrated function. This would allow low-end systems to be used as backup systems for more fully featured primary systems or to digitally record proceedings that do not require or would not necessarily benefit from additional functionality (e.g., four channel recording of telephone conferences).

Feature	Status	Notes
<p>Audio Recording</p> <p>Sound processing</p>	<p>Required</p>	<p>This is the basic function of converting the analog audio signal received from the microphones into a digital signal. This function is usually done with special purpose hardware and/or software. Value added elements, often proprietary, include mechanisms to boost or clarify the signal.</p> <p>This is the core feature of every digital audio recording system.</p> <p>During the study several courts required the use of splitters in order to send the audio signal both to the digital recorders and to analog recorders that were being used as backups. Getting and installing the splitters was sometimes problematic, but the need for splitters should be much less in the future when concurrent analog recording is no longer used.</p>
<p>Confidence monitoring</p>	<p>Standard</p>	<p>This is a mechanism for ensuring that the audio signal has accurately been recorded to tape or disk. The mechanism accesses the already recorded signal from tape or disk (not the signal directly from the microphones) and transmits it to a headset worn by the court recorder. The sound in the monitoring headphones is usually offset from the live audio, often by 1 to 3 seconds. Longer delay times may be more difficult for the court recorder. Monitoring is done either continually or on a periodic basis throughout the session.</p>
<p>Multi-channel recording</p>	<p>Standard</p>	<p>This is a capability to keep the audio signals received from different microphones separate. This is helpful when listening to or transcribing a playback because the user can isolate a single channel to listen to while turning off the others, making it easier to hear what is being said in that microphone without competing audio from other microphones. A common configuration is for a courtroom to have 8 microphones for input and 4 recording channels on output. Using an audio mixer, the signals from the microphones are assigned to different audio channels (e.g., microphones at the plaintiffs' table and at the jury box would record on channel 2,</p>

		<p>while those at the defendants' table would record on channel 3). One of the channels, often 1, records the input from all microphones. Transcriptionists, in particular, benefit from multi-channel recording. A minimum of four channels is currently a requirement of analog electronic sound recording.</p> <p>4-channel recording is beyond the level of recording done by typical off-the-shelf sound recording boards, which are usually 1-channel (mono) or 2-channel (stereo) recorders. Therefore specialized, sometimes proprietary, hardware and software is used to provide this feature. This feature is most useful when recording in locations where there are multiple, scattered sound sources and multiple speakers. It is possible that future sound systems may provide a greater number of recording channels to allow greater distinctions among speakers.</p>
"Live" channel indicators	Optional	<p>This feature visually displays information that informs the court recorder that recording is being done on different channels. The court recorder can then check microphones or channels that are not working properly.</p>
Record playback	Optional	<p>This is the ability to continue to record the session while playing back a portion of the record that was previously recorded.</p> <p>This feature would provide a more complete record because the record would include the comments made by attorneys and witnesses during the playback.</p>
Storage mechanisms	Required	<p>This feature pertains to the location where the audio signal is stored as a digital file. All of the products used during the study had primary storage on hard disk; this might have been on the disk of the recorder's workstation or on a local server. Two of the systems also had automated mechanisms for writing a copy of the session recording to secondary storage, either DAT tape or JAZ disk. If the system configuration included a central server, copies of the recording files were also written to the central server.</p> <p>The DAT tape or JAZ disk provides a mechanism for storing session material off-line, which can be restored to primary storage if older records that are no longer on-line are needed. Copying data to a central server allows material from different courtrooms to be available to others without having to have a connection to the courtroom server directly. Previously recorded material can be played back even</p>

		<p>while proceedings are still going on. This feature can facilitate short-turnaround transcription since material can be available on a very short delay.</p>
<p>Recording format</p>	<p>Required</p>	<p>This refers to the format in which the converted audio signal is written to disk or tape. There is currently no standard for this format; some systems choose to use proprietary formats and others choose more open, publicly available, formats. Systems typically also include a compression algorithm to reduce the size of the stored audio files.</p> <p>Using a proprietary format can allow a system to take advantage of new advances and efficiencies that can be built into the system. However, storing material in proprietary format makes the information less accessible in the future unless the proprietary application is available.</p>
<p>Annotations</p> <p>Integrated note taking</p>	<p>Standard</p>	<p>This refers to whether the system itself provides the general capability to take notes that are tied to timestamps marking particular sections of the audio recording. This mechanism includes storing the text notes (usually in a data base) and an integration utility that provides a method for directly accessing the desired audio segment once the timestamp of the annotation is known.</p> <p>Integrated note taking was a major component of all of the vendor systems that were used during the study. At the very basic level, each system performed this task; however, the mechanisms used were different and provided different options and capabilities.</p> <p>Although integrated note taking is likely to be included in a full-featured digital audio recording system, integrated notes are not required to realize many of the benefits of digital recording. Hand notes or notes taken with standard word processing software can be used instead, as long as a timestamp synchronized with the audio record is kept.</p>

<p>Session setup</p>	<p>Standard</p>	<p>This refers to the procedure for preparing to record a session, which involves entering identification information about the session (e.g., date and time, courtroom, judge) and other session specific information that will be used in the annotations (e.g., case numbers and names, attorney names, types of proceedings). Depending on the user interface, setup could also include assigning specific text to function keys, creating pick lists, verifying that there is good audio feed on all channels, verifying that primary and secondary storage mechanisms are functioning, etc.</p> <p>The setup procedures help ensure the smooth functioning of the system during the session and make available to the court recorders shortcuts that can be used while taking session notes. During the study, several court recorders commented that they would like to have been able to set up information for one session, or perhaps even one case, and have it carry over to another session of the same case so the information would not have to be entered again. Similarly, a couple of courts also would have liked the ability to integrate case information from their case management or calendaring system so it would not have to be entered independently.</p>
<p>Organization</p>	<p>Standard</p>	<p>This refers to the primary method for structuring, or categorizing, the recorded material so it is retrievable in the future (the “filing” method, so to speak). It potentially affects the way the annotations and identifiers are stored in the database, the directory structure used to store the files on disk, the way the digital recordings are captured on secondary storage (e.g., DAT tape or JAZ disks), and the logical first approach to searching for previously recorded material.</p> <p>A session-based structure is more akin to the current analog structure where all proceedings in a particular session are recorded together and desired material is retrieved by date and time. A case-based structure makes it easier to keep all the proceedings of a single case linked together regardless of when it was recorded. The different structures may also be more attuned to different types of proceedings (e.g., session-based is more useful for motions-day or calendar call proceedings, and case-based is more useful for multi-day trials). Regardless of the primary</p>

		<p>organization, both case and session information was captured in the systems and could be used to identify desired recorded material but with different levels of ease.</p>
<p>User interface</p>	<p>Standard</p>	<p>This is the “look and feel” of the system while the user (e.g., court recorder, judge, transcriptionist) is recording a session and/or performing other system specific tasks. Different components of the system may have different interfaces (e.g., the window for recording is not the same as the one for playback); however, there is usually a common approach to the interface that persists across components, making the transition from one task to another easier. Examples of variations in interfaces include the layout of the screen, the choice of whether to use pull down menus or function keys, the composition of the annotation (e.g., timestamp, identity of speaker, special note), the amount of information that is visible on the screen at once, whether “live” channels are indicated, etc.</p> <p>During the study, participants made several comments regarding what they liked and did not like about the interfaces they used. Having more information on the screen (e.g., being able to see a scrolling list of previous annotations as well as the current one) was considered a plus by several court recorders and transcriptionists. Criticisms of current systems included lack of flexibility in how annotations were structured, the need to use fields to store information other than what they were designed to store (e.g., putting a reference case identifier in the phone number field), limits on how much information could be entered, and functions that required too many mouse clicks.</p>
<p>Customization</p>	<p>Optional</p>	<p>This topic covers both the ability to make one time configuration choices that will affect the use of the system by all users (e.g., the ability to choose session-based or case-based organization or the standard screen layout) and the ability to make ad hoc changes to tailor the interface for each session, type of proceeding, case, etc. (e.g., assigning different text tags to function keys, creating pick lists, changing the size of the window). The former changes, if available, would most likely be made during installation of the system by the vendor. The latter changes are highly integrated with the user interface and often the vendor provides a mechanism for making the changes but the user makes them as needed. A third type of customization, the ability to choose only those system features that are</p>

		<p>needed, was available to a limited extent during the pilot, but it may be a more common element in the future.</p> <p>The ad hoc customizations were the ones most participants commented on when asked about this topic. In general, greater flexibility to make changes to fit the particular proceeding or case was preferred. Some participants also wanted the ability to pre-set different kinds of customizations (e.g., function key tags) so that they could be used more than once and so they could easily switch from one to another during a recording session.</p>
Editing capabilities	Standard	<p>This feature concerns the ability to make changes to annotations taken during a recording session, either immediately or after the session recording is over. This capability is important to court recorders because they often need to correct the spelling of a speaker's name or a technical term. It would also allow recorders to delete or modify erroneous notes or add new ones tagged to the appropriate timestamp. Annotations edited in this way are clearer, more complete, and more useful to transcriptionists and users searching for material to play back.</p>
Field limits	Optional	<p>This refers to whether or not there are limitations on how much information can be entered into a single field. Systems sometimes impose limits on the length of text fields in order to keep down space requirements. Limits that are too short, however, can impede the court recorder's ability to include complete information (e.g., the names of all of the defendants in a multi-defendant case).</p>
Multiple annotators	Optional	<p>Some systems provide a utility that allows users other than the court recorder (e.g., judges, law clerks) to take notes. Those notes are linked by timestamp to the audio and are maintained in the system database. The user has the option of letting others see these notes or keeping them private. These personal notes can assist the user in finding material for playback later because they can be searched just as the court recorder's notes can.</p> <p>This feature adds complexity to the basic recording system because it usually requires the networking of both court recorder and judge workstations to maintain synchronized timing and some additional security measures to keep private notes private.</p>

Playback		
Access	Required	<p>This is the basic ability to listen to material that was previously recorded. All digital recording systems provide this capability, often using a proprietary function that is able to decode a proprietary recording format. Depending on the system configuration, access may have to be done from the court recorder’s workstation or can be done from other networked locations (e.g., the workstation in chambers).</p> <p>The ability to do playbacks in chambers, on demand, without requiring assistance from the court recorder was a major benefit of the digital recording systems experienced by the pilot courts.</p>
Search annotations	Standard	<p>This is the ability to search through the annotations associated with a session recording to find specific material to play back or review. The ability to take complete notes and the ability to search on different fields (e.g., the fields with speaker names or event tags, in addition to the general notes field) enhances the usefulness of the search utility.</p>
Search audio	Optional	<p>This refers to the ability to search through the actual audio file, as opposed to the annotations, to find material to play back. At a basic level this can be done by skipping through the audio file and listening for the section you are interested in. This is usually accomplished by using some mechanism provided by the digital system to access material recorded at different timestamps.</p> <p>If, however, this feature is viewed as the ability to identify in the audio record a signal that represents certain material you want to select (e.g., search for the first occurrence of the discussion on “experts”) then this is an extremely complex and difficult signal parsing task; it is unlikely it will become a feature of digital recording systems in the near future.</p>
Highlight current tag	Optional	<p>This feature refers to the ability of some digital recording systems to highlight on the screen the annotation associated with the audio that is being played back. As the audio advances the highlight bar scrolls down the annotations so that the user can see the visual synchronization of the two.</p>

Channel isolation	Standard	<p>This feature is closely associated with multi-channel recording discussed above. This allows the user to listen to material recorded on a specific channel, and perhaps enhance the clarity or volume of that signal, to make it easier to understand what is being said without the interference of sound recorded from other microphones. This feature is particularly useful to transcriptionists, when listening to material recorded from multiple microphone sources, and when speakers are difficult to hear.</p>
<p>Archive and Restore</p> <p>On-line capacity</p>	Optional	<p>This refers to the amount of primary storage disk space that is available on the local workstation or server to store the live, day-to-day, session records and annotations data base. The amount of disk space can vary greatly and range from several days to several weeks worth of information that could be maintained on-line. Once the on-line capacity is reached either a manual or automatic mechanism is used to remove older items to make way for new material. There must be an off-line copy of the material before this is done. Systems differ regarding whether only the audio files are removed from the disk or if both audio and annotations are removed. When older material is needed for playback or transcription it must be restored to the on-line disk to be accessible from the standard system interface. This restore function is usually done by the court recorder. The more on-line capacity the more likely the material needed will be readily available.</p>
Off-line storage	Optional	<p>The off-line storage mechanism can be a copy of the files on another server disk or on smaller removable media such as DAT tapes or JAZ disks. The DAT or JAZ options provide the benefit of keeping a small number of sessions together (e.g., a few days or a week) on a medium that can be catalogued and stored separately in a manner similar to the current storage of analog tapes. The material is then readily available to the court recorders if it needs to be restored to the on-line disk.</p>
Find and restore	Standard	<p>This feature pertains to the process of locating material that has been moved to off-line storage and restoring it to the on-line disk. Systems that automatically download data to a secondary storage medium, and that automatically free up on-line capacity by removing older sessions, are also likely to have an integrated</p>

<p>Permanent archive</p>	<p>Required</p>	<p>function for keeping track of which sessions are on which tapes. That makes it easier to identify what needs to be restored. The court can also maintain its own cataloging system. The choice of organizational structure can affect how material gets copied to off-line storage and how it is searched for and restored.</p> <p>One of the requirements for federal data records, including electronic sound recordings, is that they must be held for up to 10 years in case they need to be used in future proceedings. The recordings and text notes made by digital audio systems must also be accessible in the future.</p> <p>Unfortunately, as mentioned above, the recording systems often use proprietary formats to store their data files. If that was the only format the data files were ever stored in it is possible that recordings made in one court could not be accessed by a court that did not own a proprietary license for the vendor system that created the file. Similarly as technology changes and new capabilities are incorporated into recording systems, even if a court is still using the same vendor, it may have a difficult time restoring a recording that was several years old. This situation would interfere with the court's obligation to keep a copy of the record that is accessible to others now and in the future.</p> <p>There needs to be a mechanism, therefore, to export the audio recording and the annotation text from the digital recording system and produce a version of the material in a very basic, non-proprietary format, that is likely to avoid these future access issues as much as possible. There is currently no approved and implemented standard for digital audio files. However, the .WAV format for digital audio is a publicly available, non-proprietary format that can be accessed from many different products and utilities. Standard ASCII text files can be used as a standard format for the session information and annotations. This would provide a combined digital archive. It is also possible that a copy of the digital audio could be output to analog audio tape (a function that each of the current systems has because it is used to produce 4-track and 2-track tapes for the public) since this is the currently acceptable format for archiving analog recordings.</p> <p>This requirement to export files in a non-proprietary format for permanent archive</p>
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		need not and should not impinge on the vendor's ability to use proprietary formats or to take advantage of new algorithms or other changes in technology for the material maintained and accessed within the recording system (both on-line and off-line storage). The export conversion would only be invoked when a copy of recorded material was declared ready to go to the archive.
Transcription		
Selection of material	Optional	This feature refers to the ability to identify recorded material that needs to be sent to the transcriptionist (e.g., the 2-day trial held in a particular case). The standard search mechanisms used to locate desired material for playback are also used to locate this material. In some systems, the material for the entire session that includes the segment that needs to be transcribed is copied to a transfer medium. In other systems, the user is able to identify just the segment of the session that is desired and copy only that portion to a transfer medium. Some systems allow multiple segments to be copied to the same transfer medium. Both the audio recordings and the annotations are included in the material sent to the transcriptionist. A printout of the annotations can be included as well as the electronic version.
Transfer medium	Optional	This refers to the mechanism used to transfer the digital recordings and annotations to the transcriptionist. CD-ROMs, MO (magneto-optical) disks, and JAZ disks were the media used most often during the study. Because of the digital format, the material can also be transferred electronically over phone lines or network connections without the need for a separate physical transfer medium. Though electronic transmission was not used during the study, several courts commented they would like to use that method in the future.
Proprietary client software	Optional	This feature refers to a separate component of the digital recording system that is used by transcriptionists to access the material to be transcribed. The program is able to process the files copied to the transfer medium, which may still be in a proprietary format, and provides at least a method to listen to the recordings and advance through the audio, usually using a foot-pedal interface. For systems that use integrated note taking, the program provides a user-interface

		<p>that displays the annotations synchronized to the recorded audio. It can also provide other features such as the visual highlighting of the annotation corresponding to the current audio, the ability to access the different audio channels and isolate them or change volume on each, and the ability to skip to a particular audio sequence directly either by selecting the associated annotation or by using other selection mechanisms provided through the screen interface.</p> <p>The need to use proprietary client software in order to transcribe digitally recorded material was an impediment for some courts during the pilot study. Transcriptionists did not want to purchase the necessary software licenses without knowing the volume of work they would receive from the courts or even if the use of digital recording would continue after the pilot phase. Some vendors assisted in resolving this problem by providing software, and sometimes hardware, to transcriptionists at little or no cost. Another approach taken by one of the vendors was to create a version of the client software that could be copied to the transfer medium along with the recordings and annotations so that the transcriptionist did not have to have a separate copy of the software.</p>
<p>Peripherals</p>	<p>Optional</p>	<p>This refers to peripheral devices needed by transcriptionists to transcribe digital recordings. These include the device needed to access the transfer medium (e.g., MO drive or CD-ROM drive), and the foot-pedal used with the proprietary client software, which may or may not be a standard configuration.</p>
<p>Tape Duplication</p> <p>Selection of material</p>	<p>Optional</p>	<p>This feature refers to the ability to identify recorded material that needs to be copied to tape for a requesting judge, court officer, attorney, member of the public, etc. The standard search mechanisms used to locate desired material for playback are also used to locate this material. In some systems, the material for the entire session that includes the segment requested is copied. In other systems, the user is able to identify just the segment of the session that is desired and copy only that portion to tape. Some systems allow multiple segments to be copied to the same tape. Only the audio recording is output to the tape in an analog, not digital, format. A printout of the annotations can be included if requested.</p>

Multi-channel duplication	Optional	<p>The output analog tape can be either a 4-channel tape or a 2-channel tape. 2-channel tapes are standard stereo cassette tapes that can be used in a standard tape player. 4-channel tapes are used in special tape players that can access all four channels. 4-channel tapes are often provided to transcriptionists, most other tape requests are for 2-channel tapes.</p>
Duplication speed	Optional	<p>This refers to how long it takes to create a duplicate tape. A “1x” duplication speed indicates that it would take 1 hour to copy a 1 hour tape; at “4x” it would take 15 minutes to copy 1 hour of audio. Some of the tape duplicating equipment used during the pilot study had tape duplication speeds of 16x or higher. Higher duplication speeds mean a quicker and less burdensome tape duplication process.</p> <p>Tape duplication equipment were relatively costly components of the digital recording systems used during the study. It is possible that in the future the need for tape duplication will be reduced. Essentially 4-channel tapes for transcriptionists could be eliminated. And, a mechanism for exporting digital audio in a non-proprietary format may replace the need for 2-channel tapes for general users. The digital audio could be transmitted electronically or on standard digital media such as CDROM, and the recipient could listen to it using a variety of multi-media utilities that can process non-proprietary audio files (e.g., .WAV files).</p>
Administration		
User setup	Standard	<p>This refers to the basic utilities used to add someone to the list of valid users of the system or to modify information about current users. During this setup procedure a username and password combination may be assigned as well as indications of the type and level of access allowed (e.g., a court recorder may have the privilege to edit annotations for sessions he/she personally recorded, but would not have those access rights for sessions recorded by others). In some systems it may be possible to establish certain customizations for each user, such as the parameters or elements of the user’s screen interface.</p>
Security and privileges	Optional	<p>Building on the item above, this feature refers to the procedures used to provide basic identity checking to ensure that a potential user is a valid user of the system,</p>

		and that he/she is provided the required level of access but no more. For systems that allow non-court recorders to take annotations and/or allow users to declare their annotations “private”, there must be some security procedures to lock and unlock those files.
Maintenance functions	Standard	This refers to the requirement or opportunity of court personnel to perform standard setup and maintenance functions for the system, including identifying network routing parameters, defining disk structures, correcting network interfaces, rebuilding damaged databases, and making adjustments to accommodate disk storage requirements. Some vendor systems may provide utilities for performing these functions, others may not give court personnel access.
Emergency backup	Standard	This feature refers to the equipment and procedures to be used when the primary recording system fails and is unable to take the record of a proceeding. This function could be handled in several different ways including: having a spare workstation with the digital recording system loaded on it that could be pressed into service to continue recording; reverting to using a backup analog recorder and taking hand notes; using a low-end digital system, such as a laptop with a recording sound board to take the audio record and taking hand notes. It is likely that whichever backup method is used, the audio recording and the notes will not be in the same format as material recorded with the digital system (this may be true even with a spare system workstation). Therefore, the emergency plan may also include a method for entering the recording and annotations taken with the backup system into the primary digital recording system so that there are no gaps in the material accessible through the digital system. Having a backup procedure that can be put in place quickly is important, otherwise system failures could cause longer disruptions to court. Solutions that can be invoked by the court recorder rather than requiring the assistance of systems staff would be quicker.
Long term backup	Required	This refers to the need to have an off-line backup of the audio files and annotations database for disaster recovery. In some systems, the session DAT tapes or JAZ disks provide a secondary storage mechanism that could fulfill this function. Also periodic backups of the disks on the servers or workstations as part

		of the normal preventive maintenance routines could fulfill this function, even though the material from the digital recordings may be intermixed with general files from other court servers.
Management reports	Optional	This refers to utilities that provide basic reports on the status and contents of the system files and database. A great deal of peripheral information is captured by the digital recording system about each recording session. This information may be useful in identifying frequency and patterns of use, needs for training, and capacity planning.
Vendor Support		
On-site evaluation	Standard	This refers to an early technical evaluation of the components of the digital system that are needed to provide the level of service the court wants. It includes an assessment of hardware and software, whether existing equipment can be used, how the interface to the network will be handled, and what physical changes may need to be made in the court (e.g., cabling or sound system).
Installation	Standard	This refers to the actual installation of all system components, hardware and software, in the court location. It includes testing, initial setup of parameters or special customizations, and interfacing with the court's network where appropriate. Some vendors may choose to pre-install software and perform customizations prior to the physical installation at the court.
Startup training	Standard	This refers to training provided by the vendor in the care and use of the system. Several different types of users need to be trained (e.g., court recorders, judges, systems staff). The amount of time spent and the specific topics covered will vary according to the tasks the user will be required to perform. Training sessions during live or mock courtroom proceedings were helpful to court recorders during the pilot study.
On-going support	Optional	After installation and training are complete and the system is functioning properly, the vendor may provide on-going support for the system to troubleshoot and correct any new problems that occur, to provide additional training, or to make modifications or enhancements requested by the user. Phone support (i.e., the ability to call a technical support operator and ask for assistance in solving a problem) or on-line support (i.e., the ability of the vendor to access the court's

		system via phone or network connections to run diagnostics, examine error files, or perform corrective actions) are the most common levels of support provided as part of the standard maintenance agreement. On-site support where the vendor physically returns to the court to provide maintenance and service is less often provided by vendors without a special maintenance contract.
Upgrades	Standard	This refers to whether periodic upgrades (either providing new functionality or correcting identified problems) are included as part of the maintenance agreement. Upgrades can be user-installable, can be installed via on-line support or may require on-site support depending on the complexity of the upgrade.
System Components		
Proprietary software	Standard	This refers to the software programs that constitute the digital recording systems. Most, but not necessarily all, functionality provided by the system will be through completely proprietary components or through proprietary interfaces to other generally available utilities or packages (e.g., the vendor may supply its own editing functions, or it may link to a standard word processing package). The vendor may sell the system bundled (i.e., all functionality is purchased together as a unit) or unbundled (i.e., components are separate and buyers can choose the components they need). Similarly, licensing to use the system may extend to the entire functionality or be limited to particular components. Licenses may be calculated on a per-user basis, by groups, or sites.
Proprietary hardware	Optional	This refers to hardware components of the system that are provided by the vendor and cannot (at least under normal circumstances) be substituted for by other more generic equipment. Sound processing equipment (e.g., sound boards, mixers and voice processors) are often proprietary hardware. Tape duplication equipment, especially those providing very high transfer speeds may also be proprietary.
Dedicated hardware	Optional	This refers to workstations, servers, disk and tape drives, power protection equipment, modems, etc. that are dedicated to the functioning of the digital recording system. They do not, however, need to be purchased from the vendor as long as the configuration meets the vendor's required specifications.

Configurations		
Standalone system	Optional	This is a recording configuration in which all of the system components are running on or attached directly to the court recorder's workstation. The system is not connected to other computers; this limits direct data sharing but isolates the system from network related problems.
Networked systems	Optional	This is a recording configuration in which the system components (e.g., workstations and servers) participate in a networked environment that allows data sharing (e.g., recorded information stored on the workstation in the courtroom can be accessed by the workstation in chambers) and shared use of storage devices and other peripherals. The digital system can participate in the court's common network or run on its own isolated segment.
Central server	Optional	This is a variation of the networked configuration. In this configuration recorded material and database information is not only stored on the workstation or server associated with each courtroom, but it is also copied to a central location. This central repository provides another backup copy of the data as well as allowing access to recorded material without having to access the courtroom servers directly.
Monitoring multiple courtrooms	Optional	<p>This is a recording configuration in which video and audio signals are sent from several courtrooms to servers and monitoring equipment in a single centralized control room. This approach requires less equipment in the courtroom and allows for more efficient use of servers, storage disks, and other peripherals. A court recorder in the central location can record and monitor sessions being held in more than one courtroom at a time. However, detailed note taking may only be occurring for one courtroom, while the others receive only basic monitoring.</p> <p>This configuration was not used during the pilot study, but one court is investigating the possibility of installing centralized systems if digital recording is approved.</p>

<p>Integration</p>		
<p>Importing data from an external source</p>	<p>Optional</p>	<p>This feature is the ability to integrate into the system digital audio recordings and/or annotation text that were created by a method other than the standard session recordings done by the system. This would allow, for example, digital recordings done in chambers or by emergency backup systems to be linked in with the other recordings done by the court. That way the system database has all, not just most, of the recordings made by the court and selection of material for playback or transcription can be done using a single utility and result in a more complete record.</p> <p>This feature can also refer to the ability to read in data produced by other systems (e.g., calendaring information, or attorney identifiers) to use during setup or annotating.</p>
<p>Exporting data in a standard non-proprietary format</p>	<p>Optional</p>	<p>Integration goes both ways. The digital nature of the recording makes it possible for the file to be imported or linked in with other systems (e.g., case management system), but for that to be possible it is most likely that the recordings would need to be in a non-proprietary format.</p>
<p>Accessibility of data by non-system utilities</p>	<p>Optional</p>	<p>Though similar to the feature above, this refers to the ability to read the actual digital recording system files (not exported copies) using utilities (e.g., multi-media audio processors that come standard with sound boards or operating systems) other than the digital recording system.</p>