
COURTRAN II SERIES

Follow-up Study of Word Processing and Electronic Mail in the Third Circuit Court of Appeals



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FOLLOW-UP STUDY OF
WORD PROCESSING AND ELECTRONIC MAIL
IN THE THIRD CIRCUIT COURT OF APPEALS

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This publication is a product of a study undertaken in furtherance of the Center's statutory mission to conduct and stimulate research and development on matters of judicial administration. The analysis, conclusions and points of view are those of the author. This work has been subjected to staff review within the Center, and signifies that it is regarded as responsible and valuable. It should be emphasized, however, that on matters of policy the Center speaks only through its Board.

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EXECUTIVE SUMMARY

In 1978 and 1979, the United States Court of Appeals for the Third Circuit and the Federal Judicial Center evaluated the impact of word processing, electronic mail, and automatic typesetting on the preparation and dissemination of appellate court opinions and on judicial productivity. The first report, The Impact of Word Processing and Electronic Mail on United States Courts of Appeals, described the substantial productivity gains and time savings that word processing effected in the court's deliberation process. This follow-up report describes several technological enhancements made in 1979 and analyzes the additional time and cost savings and productivity gains obtained after the Third Circuit fully implemented and integrated word processing, electronic mail, and automatic typesetting. Overall, these technologies are cost-justified for the United States courts of appeals.

Among the most significant findings of this study were:

Word processing and electronic mail substantially speed the preparation and publication of court opinions and reduce the overall processing time for cases with written opinions by six weeks (10 percent). The first report cited a three-week reduction.

Word processing and electronic mail reduce by 40 to 50 percent the amount of time the court takes to prepare and issue per curiam and signed opinions.

The word processing-electronic mail system has become the principal method--for some judges almost the sole method--of exchanging intra-circuit correspondence, court documents, and draft opinions; 90 percent of all court documents are now transmitted by electronic mail.

The electronic mail system was used extensively in 1979; more than 20,000 documents (60,000 pages) of the Third Circuit's correspondence and draft opinions were transmitted on the Courtran II electronic mail system.

The electronic mail system delivers more than 85 percent of the court's mail the same day it is sent, guarantees receipt by the following work day, and costs less than other priority delivery services.

The electronic mail and automated typesetting systems permit local commercial printers to produce all Third Circuit published slip opinions in one day (traditional typesetting services previously required an average of seven days), at a 20 percent reduction in printing costs.

The study concluded that the Third Circuit should retain word processing, electronic mail, and automatic photocomposition technologies. Most circuits should consider introducing the word processing and electronic mail technologies.

Although several word processing manufacturers offer suitable equipment and telecommunication features, the equipment installed should be comparable within a circuit to ensure compatibility and reliability. Circuits with dissimilar word processing equipment may be able to exchange and transfer machines with other circuits.

BACKGROUND

Findings of First Study

In 1978, as part of the Federal Judicial Center's Courtran II project, the United States Court of Appeals for the Third Circuit instituted an extensive word processing and electronic mail system for all active circuit judges and administrators (clerk of court and circuit executive) in six cities within the circuit. A video-display word processor containing telecommunications capability was installed in each appellate judge's chamber and administrative office. The technology permitted each user to prepare and send typed documents electronically to other Third Circuit offices and chambers, via the Courtran II centralized computer facility.

The first project report, The Impact of Word Processing and Electronic Mail on United States Courts of Appeals, assessed the efficacy of those two technologies to expedite the processing of appeals.¹ The study evaluated the impact of word processing on the drafting and production of opinions, on judicial and secretarial productivity, and on office

1. J. Greenwood & L. Farmer, The Impact of Word Processing and Electronic Mail on United States Courts of Appeals (Federal Judicial Center 1979).

procedures and judicial work styles. The study also assessed the impact of electronic mail on the time required to distribute and review working papers and draft opinions, on the processing of court opinions, and on court productivity.

Word processing technology had a striking impact on the opinion preparation process. The court saved substantial time and money and improved both secretarial and judicial productivity without altering judicial work styles or procedures. Specifically, secretarial production increased by 250 percent. The court's deliberation process time (the number of days for the court to prepare, review, and issue opinions) dropped by 52 percent for per curiam opinions (from 53 days to 25 days) and 25 percent for signed opinions (from 99 days to 74 days). The total appellate processing time for appeals requiring written opinions (the time from the filing of the appeal to the disposition of the appeal) decreased by 6 percent (from 331 days to 312 days).

In the initial Center report, inconclusive evidence was presented to support the permanent installation of electronic mail service. Although electronic mail service improved the delivery time among chambers and administrative offices compared to regular postal service, the overall efficacy of this newly developed technology was lessened somewhat by various technical and procedural problems. The electronic mail service was occasionally unreliable during document transmissions. Court personnel had reservations about the flexi-

bility and ease of transmitting documents electronically. Therefore, the court and the Center decided to extend the development and evaluation of the electronic mail system to determine whether the court would prefer to use electronic mail service or rely on alternative methods such as postal service, facsimile transmission, or private express delivery services.

Objectives of Follow-up Study

At the request of the Third Circuit, the Center agreed to refine and upgrade the capabilities of the word processing and electronic mail systems during the spring of 1979

to continue a comprehensive evaluation of the electronic mail service through 1979

to review and comment briefly on the court's utilization of the word processing system since the initial evaluation study was completed

to assess the effect of integrating electronic mail and an automated photocomposition system for the publication of the court's slip opinions.

Word Processing and Electronic Mail System Enhancements

For its major impact on speeding the appeals process and the unique integration of word processing and electronic mail communications, the Third Circuit received a major national achievement award from the information processing industry. The Third Circuit is the first court to implement an elec-

tronic mail exchange system in the country. It is also among the first word processor users in government or industry to transmit lengthy documents on a regular basis through a centralized "electronic post office" and a network of word processing systems located in various cities.²

In the early spring of 1979, after the Third Circuit system had been used for more than a year, various equipment enhancements and technical modifications were made to reduce electronic mail transmission disruptions and operator mistakes. Those changes included installation of new word processing equipment, modifications to the Courtran II electronic mail computer software programs, and upgrading FTS telephone lines. The original word processing machine in each judge's and administrator's office was upgraded.³ The new equipment contains more sophisticated and reliable telecommunications capabilities--including simultaneous text-editing and electronic mail transmission--doubles typing and storage capacity, and provides additional automatic text-editing functions.

2. For a full description of the system's capabilities and functions, see *The Impact of Word Processing and Electronic Mail on the United States Courts of Appeals*, supra note 1.

3. The original Digital Equipment Corporation (DEC) model WP 100, single terminal, was upgraded to a DEC model 82 (a two-terminal, shared-logic system).

Computer personnel at the Center modified the computer programs controlling the electronic mail capabilities on the Courtran II system to increase the service's reliability, security, and ease of use. Those modifications helped reduce transmission disruptions caused by computer program failures and faulty operating procedures.

Simpler transmission procedures reduced the incidence of operator errors. Improved encryption techniques were introduced, eliminating unauthorized access to court documents.⁴

During the initial study, a few offices experienced frequent transmission failures. The General Services Administration and the local telephone company were asked to modify telephone circuits and electrical lines that could cause interference and disruption to either the word processing or the electronic mail system.

While the systems were being modified, all Third Circuit secretaries attended an advanced training program to review and upgrade their skills in using the word processing and electronic mail systems. At the judges' discretion, secretaries taught law clerks the rudimentary techniques needed to operate the word processing equipment.

4. Encryption limits access to specified documents to designated Third Circuit personnel.

FINDINGS

Electronic Mail Transmission Reliability

The reliability of the electronic mail service has improved substantially. The system now provides reliable, convenient document transmission for all court users.

In the initial Center report,⁵ transmission reliability was described as inadequate; 85 percent, or one out of every eight documents sent or received, was disrupted and needed to be retransmitted. Those reliability statistics were substantially below telecommunication industry standards and were unacceptable to both Center technical personnel and the court. Transmission failures wasted staff time and required repeating tasks already performed. During busy work periods and under severe time pressures, failures became too time-consuming and disconcerting. Without reasonable transmission reliability (95 percent reliability is reasonable 98 to 99 percent is desirable) many users were hesitant about fully utilizing the system, and they were tentative about its long-term value.

Since the technical modifications were completed in early 1979, electronic mail communications reliability has

5. Supra note 1.

improved steadily and substantially (table 1). From a weekly average of 87 percent in 1978, electronic mail reliability has consistently reached 97 to 98 percent reliability (only one out of every 50 documents is disrupted during transmission). Considering the length of documents, telecommunication protocols, and technical capabilities used,⁶ the transmission reliability has probably reached its optimum level.

Court User Attitudes

User attitudes have improved since the technical enhancements and additional training were completed. The court now unanimously wants to retain both the word processing and electronic mail services.

Several Third Circuit judges and secretaries did not endorse electronic mail when the original evaluation was completed in 1978.⁷ They expressed strong reservations about the service's consistency (particularly poor transmission reliability) and flexibility (the complexity and constraints in simultaneously sending documents and text-editing on the word processor).

After the technical modifications were completed in 1979, not only did transmission reliability increase, but

6. Asynchronous electronic transmissions, 1200 baud rate, FTS regular voice-grade telephone lines.

7. Supra note 1.

TABLE 1

TRANSMISSIONS SENT AND RECEIVED
IN 1979

Week of	Transmissions Sent	Transmissions Received	Total	Transmission Reliability (%)
4/30 - 5/4	79	306	385	97%
5/7 - 5/11	91	340	431	88
5/14 - 5/18	77	314	391	93
5/21 - 5/25	76	352	428	95
5/28 - 6/1	82	328	410	96
6/4 - 6/8	31	122	153	97
6/11 - 6/15	76	295	371	94
6/18 - 6/22	83	378	461	95
6/25 - 6/29	119	496	615	95
7/2 - 7/6	132	469	601	96
7/9 - 7/13	122	519	641	93
7/16 - 7/20	130	651	781	97
7/23 - 7/27	113	406	519	95
7/30 - 8/3	112	464	576	94
8/6 - 8/10	84	333	417	95
8/13 - 8/17	101	448	549	95
8/20 - 8/24	117	503	618	98
8/27 - 8/31	70	233	303	98
9/4 - 9/7	22	101	123	98
9/10 - 9/14	72	297	369	98
9/17 - 9/21	95	391	486	98
9/24 - 9/28	164	564	728	97
10/1 - 10/5	127	631	758	97
10/8 - 10/12	107	508	615	98
10/15- 10/19	132	639	771	98
10/22- 10/26	128	608	736	97
10/29- 11/2	104	397	501	96
11/5 - 11/9	115	544	659	97
11/12- 11/16	113	529	642	97
11/19- 11/23	149	646	795	98
11/26- 11/30	175	832	1007	98
12/3 - 12/7	101	377	478	97
12/10- 12/14	155	732	887	98
12/17- 12/21	214	761	975	98
12/24- 12/28	122	436	558	98
Total	3,790	15,950	19,741	

user confidence and acceptance of the system also dramatically improved. Although the court's assessment of the electronic mail system was divided in 1978, the court now unambiguously favors permanent retention of the electronic mail system (table 2). The question whether the electronic mail services are worth the additional expenditures is ultimately the court's decision. The court has expressed itself not only in words but in action--it has substantially increased its use of electronic mail.

Number of Electronic Mail Transmissions

The number of electronic mail transmissions has increased dramatically, far more than projected in 1978.

Electronic mail usage steadily increased during 1978 and averaged 125 document transmissions each week by late 1978. In a typical week, a judge sent four documents, received 12 to 15 documents, and spent two hours using the electronic mail service.

In the initial report, the Center projected a 50 to 75 percent increase (an additional 3,000 to 4,000 documents) in electronic mail usage for 1979. Instead, the actual use of electronic mail escalated even more dramatically throughout 1979 (table 3). In 1979, the Third Circuit used the electronic mail system to transmit approximately 20,000

TABLE 2

JUDICIAL AND SECRETARIAL ATTITUDES
TOWARD ELECTRONIC MAIL

Question	Responses	1978	1979	1978	1979
		Judge	Judge	Secy.	Secy.
What value, if any, has the electronic mail service had for you?	Substantial	3	10	2	10
	Moderate	4	0	6	0
	Small	2	0	2	0
	None	1	0	0	0
What is your overall reaction to the electronic mail service?	Favorable	7	10	6	10
	Unsure	2	0	4	0
	Unfavorable	1	0	0	0
If it were your decision, would you permanently retain electronic mail in the Third Circuit?	Yes	6	10	5	10
	No	4	0	5	0

TABLE 3

NUMBER OF DOCUMENTS EXCHANGED
BY ELECTRONIC MAIL

Number of Pages	April 1979	May 1979	June 1979	July 1979	Aug. 1979
1-5	735	1,232	1,147	1,826	1,664
6-10	62	73	89	167	49
11-15	64	74	89	100	47
16-20	15	20	59	43	9
21+	35	82	52	68	50
Total	911	1,481	1,398	2,204	1,819

Number of Pages	Sept. 1979	Oct. 1979	Nov. 1979	Dec. 1979
1-5	1,073	2,270	2,390	1,850
6-10	97	117	132	160
11-15	88	90	124	142
16-20	53	64	71	87
21+	42	51	25	67
Total	1,353	2,592	2,742	2,306

Note: January to March 1979 data are not included because the electronic mail and word processing capabilities were being upgraded during that period. The new capabilities were fully available beginning in April 1979.

documents containing more than 60,000 pages of typed text. According to several measures (table 4), electronic mail has increased almost fourfold, averaging more than 450 documents a week during 1979. In a typical week, a judge now sends more than a dozen documents, receives more than 50 documents, and uses the electronic mail system for about three hours. The volume of documents transmitted has increased because, in addition to draft opinions and responses, court personnel are now sending nearly all court memoranda and correspondence by electronic mail. While volume increased, the average length of a document decreased (table 4).

The court's utilization rate during 1979 greatly exceeded any earlier projections. The substantial increase reflects the Third Circuit's full acceptance of electronic mail as the primary method (in some instances, almost the sole method) of document transmission. Increased reliability has made electronic mail easy and convenient to use. Because most typed documents distributed within the Third Circuit are now sent by electronic mail, the annual volume of electronic transmissions will plateau within another year. The clerk's office may increase its use of the service. Thereafter, changes in the volume of electronic mail transmissions will be more closely related to changes in the caseload. Based on anticipated projections and recent utilization rates, the

TABLE 4

ELECTRONIC MAIL USAGE RATES

Measures	1978	1979
<u>Total documents</u>		
Sent (annual rate)	1,366	5,054
Received (annual rate)	5,564	21,266
<u>Distribution list ratio</u> (no. of recipients per document)		
	4.1 to 1	4.2 to 1
<u>Weekly average</u> (no. of documents)		
Sent	27	108
Received	111	456
<u>Transmission reliability</u> (weekly rate)		
Range	55% - 91%	88% - 98%
Average	87%	97%
<u>Document size (pages)</u>		
1-5	72%	84%
6-10	9%	6%
11-15	5%	5%
16-20	4%	2%
21+	10%	3%

courts' annual transmission rate via electronic mail should reach 100,000 pages by 1982.

Method of Exchanging Documents

Court users have shown a strong preference for the electronic mail system as the principal method of sending correspondence and opinions among themselves.

Four methods are available to each judge and administrator in the Third Circuit for sending documents to other chambers or administrative offices: (1) regular postal service, (2) word processor-electronic mail service, (3) facsimile service,⁸ and (4) hand delivery (particularly between offices in the same building).

The frequency with which a particular transmission method is used is a good indicator of user preferences. A survey of actual document transmission methods (table 5) shows an overwhelming preference for using the word processing and electronic mail service. Electronic mail is now used to transmit approximately 90 percent of all intracircuit

8. Each judge's chamber or administrative office contains a facsimile machine. The machine is a quasi-photographic copier that can electronically transmit a document over telephone lines to another device that produces a "facsimile" of the original document. The machine is particularly desirable when documents containing signatures, graphics, or pictures must be transmitted rapidly to another location.

TABLE 5

METHOD OF DOCUMENT DISTRIBUTION

Office (Sender)	WP-EM ^a	Postal	Facsimile	Hand Delivery
Judge A	95%	3%	1%	1%
Judge B	84	5	10	1
Judge C	98	1	1	0
Judge D	90	8	1	1
Judge E	90	5	5	0
Judge F	90	5	4	1
Judge G	85	10	5	0
Judge H	94	4	1	1
Judge I	97	2	1	0
Judge J	90	5	2	3
Circuit executive	81	10	6	3
Clerk's office	5	80	10	5

^a Word processing-electronic mail.

correspondence (opinions, memoranda, reports, orders, etc.); 6 percent is sent by regular postal service, 3 percent by facsimile machines, and 1 percent is hand-delivered.

There are two alternate methods of sending documents using word processing and electronic mail: (a) transmitting documents through the centralized Courtran II computer system, and (b) sending documents directly (point-to-point) to other users.

The point-to-point method permits each user to send a document directly to another word processing machine, circumventing the central Courtran II computer. That approach is practical if the document is sent to only one recipient. If there is more than one recipient, however, the sender must repeat all transmission procedures for each additional recipient. Therefore, a two-page letter that takes two minutes to transmit electronically will require the sender to spend at least eight to ten minutes if the letter is sent to four recipients.

Using the Courtran II system, the same document sent to four recipients will require only two minutes of the sender's time. In either situation, each recipient will take two minutes to receive the document. The sender and recipient must carefully coordinate their activities if the direct

method is employed; using the Courtran II system, the recipient can choose the time at which he receives the document.

Because most documents transmitted in the Third Circuit are sent to three or more recipients, the central Courtran II mail system is favored, as usage figures strongly indicate. In fact, only 2 percent of electronic mail transmissions are sent by the point-to-point method. For the Third Circuit, the direct method is less practical, more time-consuming, and more expensive than the centralized approach. However, in courts where the dissemination of correspondence and opinions is limited to one or two recipients, the direct method might be as efficient as the Third Circuit's centralized approach.

Delivery Time

The implementation of electronic mail service in the Third Circuit has reduced the delivery times of court documents by almost 85 percent compared to regular postal service.

Since its implementation in the Third Circuit in 1978, electronic mail has consistently proved a faster delivery method than the United States postal service.

The average delivery time for postal service within the circuit is usually two days, but it varies depending on distance and destination.⁹ As noted in the initial report,

9. Supra note 1.

same-day postal delivery service is nonexistent, about half the court's documents are delivered in one day, and about 10 percent of the mail takes three or four days for delivery.

More than 85 percent of all documents sent by electronic mail are now received on the day they are sent, and all documents are received by the next work day (tables 6 and 7). A more detailed analysis shows that more than half the electronic mail documents are received within one hour, and more than 80 percent in less than three hours. Electronic mail has reduced delivery time by 85 percent, from an average of 39 hours using the postal service to less than five hours (under two regular working hours) for an electronic mail transmission. In addition, unlike regular mail service, the time needed to deliver electronic mail is unrelated to the distance between the correspondents or the recipient's location.

Because office practices and internal court administrative procedures tailored to the use of electronic mail have now been established, the normal delivery times using electronic mail may be close to an optimum level. Typically, users check their electronic mail boxes and "pick up" their mail three to four times a day, although some chambers check almost hourly. Correspondence sent in the late afternoon or after normal working hours (usually 5 to 10 percent of transmissions) is received and reviewed by recipients the follow

TABLE 6

POSTAL SERVICE AND ELECTRONIC MAIL
DELIVERY TIMES (HOURS)

	Postal Service May 1978 ^a	EM ^a May 1978	EM Sept. 1978
Hours for Delivery	%	%	%
1 (or less)	--	--	41
3 (1 - 3)	--	--	22
6 (3 - 6)	1	45	8
24 (7 - 24)	45	36	29
48 (25 - 48)	45	14	0.5
72 (49 - 72)	7	5	0
73+	1	0	0
		EM May 1979	EM Sept. 1979
Hours For Delivery		%	%
1 (or less)		62	57
3 (1 - 3)		18	25
6 (4 - 6)		3	5
24 (7 - 24)		17	13
48 (25 - 48)		0.5	0
72 (49 - 72)		0	0
73+		0	0

^a Survey in May 1978 did not include electronic mail deliveries under six hours.

TABLE 7

POSTAL SERVICE AND ELECTRONIC MAIL
DELIVERY TIMES (DAYS)

Days for Delivery	Postal Service May 1978	EM May 1978	EM Sept. 1978
Same work day	1%	45%	71%
One	45%	36%	28%
Two	45%	14%	1%
Three	8%	5%	0%
Four or more	1%	0%	0%

Days for Delivery	EM May 1979	EM Sept 1979
Same work day	82%	87%
One	18%	13%
Two	0%	0%
Three	0%	0%
Four or more	0%	0%

ing work day (15 to 24 hours later). Judges could establish office procedures to ensure receipt of all electronic mail within one hour; however, in practice, one-hour receipt is unnecessary.

Most judges commented that the electronic mail service has substantially improved their "continuity of thought"--particularly during panel reviews of draft opinions--and that this has both improved the quality of opinions and facilitated the opinion review process. Before the advent of electronic mail, written comments frequently took several days or a week to be exchanged. That delay often required judges to reacquaint themselves with case materials. Now, detailed commentaries can be transmitted, reviewed, and responded to in a few minutes instead of days.

Electronic Mail Costs

The cost per page of the electronic mail system has been substantially reduced. The cost reduction is due primarily to the increase in electronic mail usage. The Third Circuit electronic mail system is cheaper than alternate electronic transmission techniques or other express delivery services.

As discussed in the initial report, electronic mail is competitive with other priority delivery services. The cost of the system is lower than that of either facsimile transmission services or commercial express delivery services.

Although electronic mail costs more than regular postal service, which averages two to three days for delivery, it is cheaper than guaranteed overnight United States postal express service.

Electronic mail is substantially cheaper and more flexible than facsimile systems; it also requires less personnel time and produces a document of higher quality. Although each Third Circuit office now contains both a word processing-electronic mail machine and a facsimile machine, the former is heavily used in most offices, and facsimile is rarely employed (table 5).

With the unanticipated surge in electronic mail usage, the initially projected cost figures needed to be recalculated (tables 8 and 9). Compared to 1978, electronic mail cost per page decreased in 1979 by more than 30 percent, and the cost is projected to decrease by more than 50 percent in 1980. It now costs 45 cents to send a legal-size page of information on the electronic mail system; the long-term cost per page will be between 40 and 45 cents per page.

The fixed equipment costs of electronic mail software, telephones, and ancillary equipment constitute about 25 percent of the total costs. The largest cost component remains the telephone line, at 20 cents per minute. The total cost of electronic mail should increase only slightly in the next few years (\$35,000 annually), and the cost per

TABLE 8

COST ELEMENTS OF ELECTRONIC MAIL SERVICE

Basic Costs per Office or Chamber

Word processing communication software features (one-time charge)	\$1,500
Telephone	\$10/month
Modem (1200 baud)	\$40/month
Telephone transmission time (GSA rate)	\$12/hour
Courtran II computer connect time	\$ 3/hour

Cost Projections for Third Circuit

Fixed Costs

Word processing communication features (Capital expenditure: \$1,500 x 13 machines prorated over 7 years);	\$2,800/year
Telephone and modems (13 offices)	\$7,800/year

Variable Costs

Transmission and connect time

7,200 documents/year	1,250 hours/year
21,000 documents/year	1,625 hours/year
30,000 documents/year	2,080 hours/year
36,000 documents/year	2,210 hours/year

TABLE 9
ESTIMATED ELECTRONIC MAIL COSTS
FOR THE THIRD CIRCUIT

<u>Year</u>	<u>Number of Documents</u>	<u>Avg. Size per Document</u>	<u>Annual Costs</u>			<u>Cost per Page</u>		
			<u>Fixed</u>	<u>Variable</u>	<u>Total^a</u>	<u>Fixed</u>	<u>Variable</u>	<u>Total</u>
1978	5,000	6 pages	\$10,600	\$15,950	\$26,550	\$.35	\$.53	\$.89
1978	7,200	6 pages	10,600	18,750	29,350	.24	.43	.67
1979	21,000	3 pages	10,600	24,375	34,975	.17	.39	.56
1979-80	30,000	3 pages	10,600	31,200	41,800	.12	.35	.47
1980	36,000	2.75 pages	10,600	33,150	43,750	.11	.33	.44
long-term	45,000	2.5 pages	10,600	36,200	46,800	.09	.32	.41

^a Approximately \$10,000 of total costs are one-time capitalization costs. In 1981, Annual budget allocation for the Third Circuit electronic mail system will be approximately \$35,000.

page will be relatively constant (about 40 cents per page). Those figures do not include the potential savings involved in the automated composition of slip opinions (see Table 13).

Transmission costs could be further reduced by 20 to 25 cents per minute if (a) electronic mail were limited to off-hour transmission periods (5:00 p.m. to 8:00 a.m.); currently only 5-10 percent of electronic mail is received the day after it is sent, or (b) higher transmission speeds were utilized¹⁰; however, transmission reliability might sharply decrease.

All Third Circuit users realize that electronic mail will remain somewhat more expensive than regular mail service; but they believe that the incremental expenditures for this technology are easily offset by the expedited delivery of documents, improvements in the quality of opinions, and substantial improvements in judicial productivity and expedited case processing.

10. Increasing the baud rate from 1200 to 2400 or 4800.

Case Processing Time

Word processing reduces the time spent in drafting opinions by four to five weeks, and electronic mail reduces the time spent for distribution and review of draft opinions by approximately one week.

The extent to which word processing and electronic mail expedites the processing of appeals is a strong measure of the potential value of these technologies. Word processing makes its greatest impact during the initial drafting of an opinion (the time between the date of formal submission on the merits or oral argument of the appeal until the date the draft opinion is distributed to the panel members). The greatest impact of electronic mail is during the court's panel and en banc review of the draft opinion (the time between the circulation of a draft opinion and the rendering of the opinion). Neither technology affects the amount of time during which the litigants perfect their appeals.

We have completed an appellate case-tracking survey that analyzes cases in which the Third Circuit issued written opinions during 1979.¹¹ The results from this and previous case tracking surveys permitted us to compare appellate case processing times for opinions prepared during three time periods:

11. For details of the research objectives, methodology, and data analysis procedures of this survey see *The Use of Word Processing and Electronic Mail in United States Courts of Appeals* (Chap.2), supra note 1.

1. Opinions prepared prior to the introduction of either word processing or electronic mail into the Third Circuit (survey of opinions prepared and filed between July 1976 and December 1977).
2. Opinions prepared after the initial introduction of those technologies in 1978 (survey of opinions between April and November 1978).
3. Opinions prepared after major equipment alterations and technical modifications were made in early 1979 (survey of opinions between March and December 1979).

The surveys show that the two technologies saved substantial time in the court's deliberation process beginning after the submission of appeals on the merits. Not surprisingly, the average time for a litigant to perfect an appeal (from filing the notice of appeal to formal submission on the merits or oral arguments) has remained constant at about 245 days over the past four years. The 1978 study showed that word processing technology saved substantial case processing time, but that the time savings related to electronic mail was insubstantial; that is, no significant reduction was made in the number of days taken for opinion review. The 1979 survey showed that both electronic mail and word processing had substantial influence on decreasing case processing time. The use of both technologies contributed to reducing the

total case processing time by an average of more than 33 days in each case requiring a written opinion (from 330 days in 1977 to 297 days in 1979).

In 1978, the Third Circuit's total deliberation time to complete a written opinion (table 10, column A) was reduced by an average of 18 days or 21 percent; and in 1979, that time decreased by another 17 days--a total of 40 percent time savings since the two technologies were introduced into the court. Although the time savings reported in 1978 were associated exclusively with the process of initial drafting of the opinion (table 10, columns B and C, WP-EM 1978), the 1979 data showed a substantial time savings for both the drafting process (column B)--when word processing is crucial-- and the dissemination and review of the opinion (column C) when electronic mail is important. Word processing has consistently saved several weeks of case processing time, and electronic mail has saved one week. These findings strongly justify both technologies.

Merely assessing total case statistics without further analysis might be misleading. Moderate changes in the type of appeals (proportion of civil appeals), the appellate process (proportion of cases submitted without oral argument) or appellate court procedures (proportion of per curiam opinions) over the past four years could have caused the time

TABLE 10

THIRD CIRCUIT CASE PROCESSING TIME

	Number of Cases	[A] List to Decision	[B] List to Draft	[C] Draft to Decision
(Number of Days)				
<u>Total</u>				
Pre WP-EM	260	84	59	24
WP-EM 1978	157	66 **	44 **	23 (NS)
WP-EM 1979	262	49 **	30 **	19 **
<u>Type of case</u>				
Civil				
Pre WP-EM	208	85	61	24
WP-EM 1978	132	67 **	43 **	23 (NS)
WP-EM 1979	193	50 **	21 **	19 **
Criminal				
Pre WP-EM	52	78	53	25
WP-EM 1978	25	66 (NS)	45 (NS)	21 (NS)
WP-EM 1979	69	46 **	27 **	19 *
<u>Type of opinion</u>				
Signed				
Pre WP-EM	174	99	71	28
WP-EM 1978	132	74 **	50 **	25 (NS)
WP-EM 1979	175	59 **	38 **	21 **
Per curiam				
Pre WP-EM	86	53	35	18
WP-EM 1978	25	25 **	12 **	14 *
WP-EM 1979	87	29 **	15 **	14 *
<u>Vote</u>				
Unanimous				
Pre WP-EM	207	74	55	20
WP-EM 1978	127	61 **	43 **	18 (NS)
WP-EM 1979	217	44 **	28 **	16 **
Dissent or concurring				
Pre WP-EM	40	116	75	41
WP-EM 1978	38	88 **	47 **	41 (NS)
WP-EM 1979	45	75 **	41 **	34 *

TABLE 10 (CONTINUED)

	Number of Cases	[A] List to Decision	[B] List to Draft	[C] Draft to Decision
		Number of Days		
<u>Oral argument</u>				
Pre WP-EM	224	87	62	25
WP-EM 1978	136	69 **	46 **	22 (NS)
WP-EM 1979	208	54 **	34 **	20 **
<u>Submission</u>				
Pre WP-EM	36	65	44	21
WP-EM 1978	21	51 (NS)	26 *	25 (NS)
WP-EM 1979	54	27 **	13 **	14 **
<u>Panel</u>				
Pre WP-EM	247	81	58	23
WP-EM 1978	152	66 **	44 **	23 (NS)
WP-EM 1979	255	49 **	30 **	19 **

KEY

List: Listing for disposition on the merits (oral argument or submission)

Draft: Draft opinion distributed to court panel for review

Decision: Opinion filed with the clerk of the court

STATISTICAL TEST

(T-Tests) Comparison between pre-project cases and WP-EM cases for a particular year

** Statistically significant difference at the .01 level

* Statistically significant difference at the .05 level

(NS) No statistically significant difference

savings. To further ensure that the time savings were caused primarily by the use of word processing and electronic mail, additional analysis of various subgroupings was completed (table 11).

Irrespective of any case classifications or categories such as the type of case, type of written opinion, or the court's voting pattern, appellate processing time has been reduced consistently and significantly (table 10). It appears that word processing helped save from three to five weeks during the opinion drafting stage, and electronic mail, an additional one week during the court's review process.

The two technologies substantially decreased the time required to prepare both principal types of written opinions. The analysis showed a 40 percent and 45 percent time reduction, respectively, for signed and per curiam opinions.

Compared to the 1978 analysis by various case categories, the 1979 analysis showed word processing technology helped to further improve previous productivity gains, and electronic mail provided, for the first time, significant time savings (table 10). In addition, both technologies consistently helped speed the deliberation process for nearly all judges (table 12). Although the time savings varied by judge, eight out of nine judges realized substantial time savings.

TABLE 11

DISTRIBUTION OF WRITTEN OPINIONS

	Pre-Project Cases	WP-EM 1978 Cases	WP-EM 1979 Cases
<u>Type of case</u>			
Civil	208 (80%)	132 (84%)	193 (74%)
Criminal	52 (20%)	25 (16%)	69 (26%)
<u>Type of opinion</u>			
Signed	174 (67%)	131 (83%)	175 (67%)
Per curiam	86 (33%)	26 (17%)	87 (23%)
<u>Case presentation</u>			
Oral argument	224 (86%)	136 (87%)	208 (79%)
Submitted (no orals)	36 (12%)	26 (17%)	54 (21%)
<u>Composition of court</u>			
Only circuit judges	160 (62%)	122 (78%)	192 (73%)
District judge sitting	100 (38%)	35 (22%)	70 (27%)
<u>Vote</u>			
Unanimous	207 (80%)	127 (81%)	217 (83%)
Concurring	13 (5%)	10 (6%)	14 (5%)
Dissenting	35 (14%)	20 (13%)	30 (11%)
Both (concurring and dissenting)	5 (2%)	0 (0%)	1 (1%)
<u>Judge</u>			
A	31 (12%)	16 (11%)	56 (21%)
B	37 (14%)	20 (14%)	25 (10%)
C	22 (9%)	13 (9%)	21 (9%)
D	36 (14%)	16 (11%)	30 (11%)
E	30 (12%)	22 (15%)	22 (9%)
F	27 (11%)	17 (11%)	25 (10%)
G	21 (8%)	17 (12%)	25 (10%)
H	22 (9%)	8 (6%)	10 (4%)
I	34 (13%)	17 (12%)	26 (10%)

Note: Judge J joined the circuit in late 1977 and prepared 11 and 18 written opinions, respectively, during 1978 and 1979. Judge K joined the circuit in late 1979 and prepared 4 written opinions.

TABLE 12

CASE PROCESSING TIME
(Signed Opinions)

		Number of Cases	List to Decision	List to Draft	Draft to Decision
<u>(Number of Days)</u>					
Judge					
A	Pre WP-EM	11	103	70	32
	WP-EM 1978	16	64	39	26
	WP-EM 1979	20	43	23	20
B	Pre WP-EM	17	63	40	24
	WP-EM 1978	17	51	27	24
	WP-EM 1979	16	44	26	18
C	Pre WP-EM	17	128	90	38
	WP-EM 1978	12	64	41	23
	WP-EM 1979	15	42	27	15
D	Pre WP-EM	31	85	65	21
	WP-EM 1978	15	65	36	30
	WP-EM 1979	25	56	34	22
E	Pre WP-EM	24	86	58	28
	WP-EM 1978	16	99	74	25
	WP-EM 1979	21	81	56	25
F	Pre WP-EM	22	118	91	27
	WP-EM 1978	16	93	69	24
	WP-EM 1979	21	76	50	26
G	Pre WP-EM	13	121	93	28
	WP-EM 1978	11	107	81	26
	WP-EM 1979	15	53	37	16
H	Pre WP-EM	17	122	86	36
	WP-EM 1978	8	69	50	19
	WP-EM 1979	10	61	37	24
I	Pre WP-EM	22	87	62	24
	WP-EM 1978	10	46	25	22
	WP-EM 1979	16	52	34	18

Printing of Slip Opinions

In addition to expediting the preparation and transmission of opinions, word processing and electronic mail permit the circuit both to expedite and reduce printing costs and to expedite the publication and distribution of slip opinions.

According to a recent report,¹² federal courts of appeals annually prepare more than 4,500 opinions totalling 22 million printed pages. The annual cost of printing slip opinions exceeds \$750,000, and printing an opinion requires an average of six days. Although the Administrative Office report does not endorse or recommend any particular printing approach, it does offer several proposals to reduce costs substantially and improve printing production times.

The Third Circuit's existing capabilities now include word processing, electronic mail, and the recently instituted electronic transmission and automatic photocomposition of slip opinions through a printing contractor. Those technologies permit the Third Circuit to adopt any printing alternative ultimately recommended by the Administrative Office or the Judicial Conference of the United States.

One publication approach strongly suggested by the Administrative Office is the linking of word processing to photocomposition equipment, either by telephone (electronic

12. Management Services Branch, Admin. Off. U.S. Courts, Study of Printing Opinions, United States Courts of Appeal (1979).

transmission), by word processing disk, or by computer tape. If an opinion prepared and stored on a word processor can be automatically entered into a typesetting machine, the labor-intensive, time-consuming, and costly process of retyping the text can be eliminated.

The Center undertook an informal technical assessment of one procedure to implement that approach by sending a word processing "floppy disk" (a standard storage medium) to two national publication and legal information companies. Although it was technically feasible to convert the floppy disks to a printer's computer system, the costs were prohibitive, and elaborate administrative and technical procedures were necessary according to these companies.¹³

A more practical procedure is the electronic transmission of the opinion to a printer via regular telephone lines. That procedure, which has recently been adopted in the Third Circuit, is less time-consuming, and it is competitively priced while providing good print quality. Electronic transmission eliminates the technical problem of hardware and software compatibility between different word processing and printing systems, which previously prohibited rapid and inexpensive transfer of text from word processing to photocomposition equipment.

13. The Administrative Services Division of the Administrative Office reports that several printers claim they can accept any floppy disk containing text and automatically produce photocomposed copy at competitive prices.

Beginning October 1, 1979, the Third Circuit contracted with a local printing company to transmit electronically, over regular telephone lines, final draft opinions for automatic typesetting and photocomposition of slip opinions.

Since the Third Circuit adopted the automatic typesetting procedure, all opinions have been printed within one day, compared to the average eight-day printing time in previous years (table 13).

The printer submitted a bid for printing the Third Circuit's slip opinions in fiscal 1980 that was 15 percent below the lowest submitted bid for using traditional typesetting equipment, and more than 20 percent below the fiscal 1979 printing contract (table 13). The potentially cost savings is from 30 to 60 percent as more printing companies convert to this new typesetting technology and as administrative procedures are further streamlined.

The following narrative describes how the new publication system operates in the Third Circuit and illustrates the processing of a typical slip opinion, including typical production times.

On Tuesday at 2:15 p.m., Judge X, in Pittsburgh, receives approval from the court to release a ten-page signed opinion. At 2:20, his secretary sends the opinion from his word processor to the clerk of court in Philadelphia, via the Courtran II computer. By 2:45, a deputy clerk in the clerk's office receives the entire

TABLE 13

PRODUCTION COSTS AND TIME OF PRINTING
THIRD CIRCUIT SLIP OPINIONS

Fiscal Year	<u>Cost per Printer's Camera- Ready Page</u>	<u>No. Copies of Each Opinion</u>	<u>Cost per Printed Page^a</u>
1980 (EM)	\$17.75	425	\$0.0417
1980 (traditional method)	\$20.75	425	\$0.0488
1979 (traditional method)	\$19.75	375	\$0.0527

	<u>Filing Procedure</u>	<u>Printing Time</u>	<u>Printing Method</u>
1980 (EM)	Printing/ Filing	1 day	computer & cold type
1980 (trad.)	Filing/ Printing	7 days ^b	hot type
1979 (trad.)	Filing/ Printing	7 days	hot type

Note: The terms and variables listed are used by the Administrative Office of the United States Courts. (See Management Services Branch, Admin. Off. U.S. Courts, Study of Printing of Opinions, U.S. Courts of Appeals (1979)).

^aThe Administrative Office suggests that the cost per copy of a printed opinion page is the most realistic and valid measure of slip opinion costs. This measure is calculated by dividing the cost per printer's camera-ready page by the number of copies of each opinion printed.

^bEstimated

opinion on a word processor and prints a temporary copy of the opinion. After the clerk makes a few minor notations, such as listing the official filing date, the document is sent at 3:15 to the printer, using point-to-point electronic transmission.

The printer receives the entire opinion by 3:25. As the opinion is electronically transmitted to the printing company, it enters a device that automatically converts all the text from the word processor into the appropriate computer codes acceptable to the printer's computer. The device permits the printer to accept transmission of any documents sent by almost any word processing machine following prescribed printing formats.

The printer's computer, a mini-computer containing sophisticated text-editing capabilities, is used to rapidly (within minutes) add typesetting codes and reformat the opinion in accordance with the Third Circuit's format and printing requirements. By 4:00, the opinion has been transmitted from the mini-computer into a high-speed cathode-ray-tube (CRT) automatic typesetter, which produces a camera-ready copy of the entire opinion. The film is processed by 4:30 and is ready for normal offset printing procedures (page make-up, imposition, shooting, and preparation of printing plates). (In the near future, the mini-computer will eliminate several of these offset printing procedures.) The printing plates are ready by 6:00. Printing and binding are completed during the night, and the published slip opinion is

delivered to the clerk's office Wednesday morning and mailed Wednesday to the regular subscribers.

If such a procedure were desired, the printer, on behalf of the Third Circuit, could electronically transmit the published slip opinion to national publishers or legal computer information organizations in minutes. That approach would give the court excellent local service and would permit rapid dissemination and national publication of the court's opinions.

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