US007525691B2

(12) **United States Patent**
Gordon et al.

(10) **Patent No.: US 7,525,691 B2**
(45) **Date of Patent: Apr. 28, 2009**

(54) **FACSIMILE TELECOMMUNICATIONS SYSTEM AND METHOD**

(75) Inventors: **Richard J. Gordon**, Los Angeles, CA (US); **James R. Kennedy**, Tucson, AZ (US)

(73) Assignee: **Catch Curve, Inc.**, Atlanta, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/959,570**

(22) Filed: **Dec. 19, 2007**

(65) **Prior Publication Data**

US 2008/0094666 A1 Apr. 24, 2008

Related U.S. Application Data

(60) Continuation of application No. 11/426,505, filed on Jun. 26, 2006, which is a division of application No. 10/927,630, filed on Aug. 26, 2004, now Pat. No. 7,202,978, which is a continuation of application No. 09/717,996, filed on Nov. 21, 2000, now Pat. No. 6,785,021, which is a continuation of application No. 09/686,306, filed on Oct. 11, 2000, now Pat. No. 6,643,034, which is a continuation of application No. 08/780,690, filed on Jan. 8, 1997, now abandoned, which is a continuation of application No. 08/395,062, filed on Feb. 27, 1995, now abandoned, which is a continuation of application No. 08/371,842, filed on Jan. 12, 1995, now Pat. No. 5,459,584, which is a continuation of application No. 08/166,701, filed on Dec. 14, 1993, now abandoned, which is a continuation of application No. 07/955,833, filed on Oct. 2, 1992, now Pat. No. 5,291,302, which is a continuation of application No. 07/654,181, filed on Feb. 12, 1991, now abandoned.

(51) **Int. Cl.**
H04N 1/00 (2006.01)
H04M 11/00 (2006.01)

(52) **U.S. Cl.** **358/434**; 358/407; 379/100.06

(58) **Field of Classification Search** 358/400, 358/402, 405, 407, 434, 435, 436, 440; 379/100.01, 379/100.06, 100.08, 100.09, 114.01, 115.01, 379/115.02

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,594,495 A 7/1971 Bond

(Continued)

FOREIGN PATENT DOCUMENTS

CA 1329852 5/1994

(Continued)

OTHER PUBLICATIONS

Matsushita Graphic Communication Systems, Inc., Facsimile Oerpating Instructions, includes 2001 copyright notice, dated Jan. 2002 on back, actual publication date unknown.

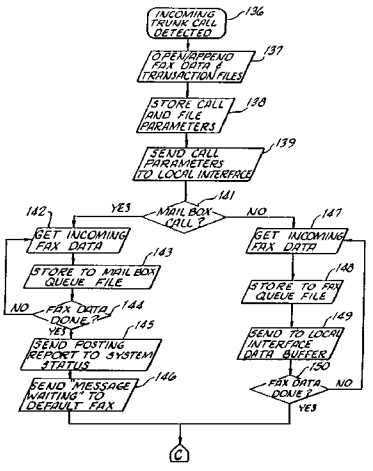
(Continued)

Primary Examiner—Jerome Grant, II
(74) *Attorney, Agent, or Firm*—Weatherly, Kerven & Seigel LLC; David S. Kerven; Mitchell G. Weatherly

(57) **ABSTRACT**

A system and method for facilitating facsimile transmissions coupled to the switched telephone network in a manner supporting multiple communication channels, each of which allowing communication sessions with originating fax machines. The store and forward facilities include a computer for controlling operations and mass data storage equipment. The store and forward facility receives a facsimile message from an originating fax machine. The store and forward facility then delivers the facsimile message to a mailbox associated with the intended receiving facsimile machine. Subscriber mailboxes may be provided as part of the mass storage, which can then be accessed by the subscriber.

20 Claims, 10 Drawing Sheets



U.S. PATENT DOCUMENTS

3,641,432	A		2/1972	Bond
3,728,486	A		4/1973	Kraus
3,920,895	A		11/1975	Vieri et al.
3,920,896	A		11/1975	Bishop et al.
3,958,088	A		5/1976	Vieri
3,993,862	A		11/1976	Karr
3,995,106	A		11/1976	Wern et al.
4,058,672	A		11/1977	Crager et al.
4,058,838	A		11/1977	Crager et al.
4,091,424	A		5/1978	Widergren
4,106,060	A		8/1978	Chapman, Jr.
4,115,765	A		9/1978	Hartke
4,207,598	A		6/1980	Reich et al.
4,245,257	A		1/1981	Yamazaki et al.
4,249,216	A		2/1981	Kanda
4,255,619	A		3/1981	Saito
4,326,098	A		4/1982	Bouricius et al.
4,327,251	A		4/1982	Fomenko et al.
4,340,783	A		7/1982	Sugiyama et al.
4,371,752	A		2/1983	Matthews et al.
4,432,020	A		2/1984	Onose et al.
4,491,873	A		1/1985	Takayama
4,500,751	A		2/1985	Darland et al.
4,504,868	A		3/1985	Hasuike et al.
4,506,111	A		3/1985	Takenouchi et al.
4,513,390	A		4/1985	Walter et al.
4,518,989	A		5/1985	Yahiki et al.
4,523,055	A		6/1985	Hohl et al.
4,549,047	A		10/1985	Brian et al.
4,571,699	A		2/1986	Herzog et al.
4,573,083	A		2/1986	Shimizu
4,581,656	A		4/1986	Wada
4,584,434	A		4/1986	Hashimoto
4,585,906	A		4/1986	Matthews et al.
4,587,633	A		5/1986	Wang et al.
4,602,129	A		7/1986	Matthews et al.
4,613,907	A		9/1986	Yoshimoto et al.
4,614,978	A		9/1986	Doster et al.
4,635,253	A		1/1987	Urui et al.
4,635,255	A		1/1987	Clark et al.
4,642,697	A		2/1987	Wada
4,646,160	A		2/1987	Iizuka et al.
4,652,700	A		3/1987	Matthews et al.
4,652,933	A		3/1987	Koshiishi
4,654,718	A		3/1987	Sueyoshi
4,660,218	A		4/1987	Hashimoto
4,667,248	A		5/1987	Kanno
4,706,126	A		11/1987	Kondo
4,713,837	A		12/1987	Gordon
4,748,656	A		5/1988	Gibbs et al.
4,763,317	A		8/1988	Lehman et al.
4,769,719	A		9/1988	Endo
4,837,798	A		6/1989	Cohen et al.
4,847,891	A		7/1989	Kotani
4,866,758	A		9/1989	Heinzelmann
4,870,678	A		9/1989	Adachi
4,893,333	A		1/1990	Baran et al.
4,905,273	A		2/1990	Gordon et al.
4,914,586	A		4/1990	Swinehart et al.
4,918,722	A		4/1990	Duehren et al.
4,922,518	A		5/1990	Gordon et al.
4,935,955	A		6/1990	Neudorfer
4,941,170	A		7/1990	Herbst
4,942,599	A		7/1990	Gordon et al.
4,964,154	A		10/1990	Shimotono
4,967,288	A		10/1990	Mizutori et al.
4,969,184	A		11/1990	Gordon et al.
4,974,254	A		11/1990	Perine et al.
4,994,926	A		2/1991	Gordon et al.
5,003,575	A		3/1991	Chamberlin et al.
5,008,926	A		4/1991	Misholi
5,014,300	A		5/1991	Harvath et al.
5,018,191	A	*	5/1991	Catron et al. 379/100.09
5,065,254	A		11/1991	Hishida
5,095,445	A		3/1992	Sekiguchi
5,127,047	A		6/1992	Bell et al.
5,136,634	A		8/1992	Rae et al.
5,193,110	A	*	3/1993	Jones et al. 379/93.14
5,224,156	A		6/1993	Fuller et al.
5,239,577	A	*	8/1993	Bates et al. 379/211.02
5,291,302	A		3/1994	Gordon et al.
5,291,546	A		3/1994	Giler
5,459,584	A	*	10/1995	Gordon et al. 358/434
5,488,651	A		1/1996	Giler
4,994,926	C2		7/2001	Gordon et al.
6,643,034	B1	*	11/2003	Gordon et al. 358/434

FOREIGN PATENT DOCUMENTS

DE	3230609		2/1984
EP	0236803	A1	2/1987
GB	2211698		7/1989
JP	56-89167		7/1981
JP	57-4653		1/1982
JP	57-38055		3/1982
JP	57-119537		7/1982
JP	57-119541		7/1982
JP	57-184362		11/1982
JP	57-192167		11/1982
JP	58-133073		8/1983
JP	58-138148		8/1983
JP	58-138162		8/1983
JP	58-165452		9/1983
JP	58-175342		10/1983
JP	58-186253		10/1983
JP	58-187055		11/1983
JP	59-15387		1/1984
JP	59-27664		2/1984
JP	59-30352		2/1984
JP	59-99846		6/1984
JP	59-117845		7/1984
JP	59-196647		11/1984
JP	59-196648		11/1984
JP	59-214365		12/1984
JP	59-214366		12/1984
JP	59-231964		12/1984
JP	60-46647		3/1985
JP	58-165152		5/1985
JP	60-93875		5/1985
JP	60-96945		5/1985
JP	60-119161		6/1985
JP	60-119164		6/1985
JP	60-134554		7/1985
JP	60-134656		7/1985
JP	60-178765		9/1985
JP	60-197059		10/1985
JP	60-248057		12/1985
JP	59-133711		1/1986
JP	61-13727		1/1986
JP	61-60060		3/1986
JP	61-128651		6/1986
JP	63-133753		6/1986
JP	61-154258		7/1986
JP	62-53545		3/1987
JP	62-128651		6/1987
JP	62-132464		6/1987
JP	62-135061		6/1987
JP	62-141847		6/1987
JP	62-199162		9/1987
JP	62-204654		9/1987
JP	63-52539		3/1988
JP	63-64464		3/1988
JP	60-81963		5/1988
JP	63-105544		5/1988

JP	63-187941	8/1988
JP	63-221736	9/1988
JP	63-290041	11/1988
JP	64-1364	1/1989
JP	64-12657	1/1989
JP	64-58160	3/1989
JP	64-73942	3/1989
JP	1-112856	5/1989
JP	1-258526	10/1989
JP	2-5658	1/1990
JP	2-268535	11/1990

OTHER PUBLICATIONS

Matsushita Graphic Communication Systems, Inc., Facsimile Panafax UF-585/595 User's Guide, includes 1999 copyright notice, actual publication date unknown, Dec. 1999 appears as the best date.

Matsushita Graphic Communication Systems, Inc., How to Use Your Panafax UF-250, includes two copyright notices (1987 & 1988), actual publication date unknown, Dec. 1988 appears as the best date.

Postel, J., "Rapicon 450 Facsimile Format", alleged date Sep. 28, 1980, may have been printed from WWW on Jun. 2, 2006.

Document allegedly from Enie Cheung to Jack Neurauter, alleged date Aug. 30, 1991.

Complaint, *Catch Curve, Inc.* v. *Intermedia.NET, Inc.,* N.D. Ga., Case No. 1:07-cv-2597, Oct. 18, 2007.

oaz.lt8, Feb. 21, 1991, PRO012996.

oaz.lt5, Feb. 21, 1991, pp. 1-2, PRO012994-5.

oaz.lt9, Mar. 19, 1991, PRO012993.

oaz.l10, May 10, 1991, PRO012992.

oaz.l13, Jul. 3, 1991, PRO012991.

Product Focus, Lantimes, Dec. 1988, pp. 35-38, PRO012986-9.

Adams & West, e-mail exchange re: dl-mhs NetWare, Feb. 5-6, 1992, PRO012985.

Fiore, Dave, Letter re original License agreements, May 29, 1991, PRO012984.

OAZ Communications, Exhibitors, Network 90 Dallas, 1990, p. 122, PRO012983, The best date appears to be Dec. 1990.

Paradox Development Corp., Para-Mail User's Manual, Jul. 6, 1990, PRO012504-980.

Land, Kris, Proof of Claim, May 21, 1991, N.D. Ca., Case No. 91-40335T, PRO012503.

Fleming, Bill, Link Your Workgroup to the World With Electronic Mail, Mar. 15, 1991, PRO012498-500.

Paradox Development Corp., Invoice 14209, Apr. 30, 1990, PRO012497.

Murphy, Jeff, Cover Letter and Statement re Acct. No. PRA001, May 9, 1991, PRO012495-6.

Kondamorri, Pratap S., Letter re Acct. No. PRA001, May 29, 1991, PRO012494.

OAZ Communications, Inc., Introducing NetFax Manager, PC Week, Jul. 9, 1990, p. 52, PRO012493.

Fiore, Dave, Fax Copy of Revised License Agreement, May 5, 1991, PRO012485-92.

Steve, OAZ Source Code Sale, Nov. 11, 1991, PRO011964.

Hearing Notices, OAZ Communications, Inc. Bankruptcy, N.D. Ca. 91-40335T, May 14-15, 1991, PRO011965-66.

Paradox Development Corp., Para-Mail, Nov. 1990, PRO011967-8.

OAZ Communications, Inc., NetFax Manager Administrators Users Guide, Jun. 1990, PRO011969-2116.

Land, Chris, & Fiore, Dave, Facsimile, Jun. 3, 1991, PRO012117-8.

Paradox Development Corp. & Burkitt, Nick, Proprietary Information and Inventions Agreement, Sep. 6, 1989, PRO012119-24.

Novelo, Tonatiuh, Memo re NFUSER, Mar. 27, 1991, PRO012127-8.

Fiore, Dave, Work to be done on Nfuser Facsimile, May 28, 1991, PRO012129-31.

Paraedit( ), 1989, PRO012133-4, Best date appears as Dec. 1989.

McKenna & Fitting, Claims of Paradox Development Corporation Letter, Feb. 7, 1992, PRO012136-8.

Paradox Development Corporation, Licensing and Professional Services Agreement (May 29, 1991), Jun. 7, 1991, PRO012139-50.

Notice of Dec. 18, 1991 Hearing, N.D. Ca., Case No. 91-40335T, PRO 012151.

Notice of Jan. 22, 1992 Hearing, N.D. Ca., Case No. 91-40335T, Dec. 31, 1991, PRO 012152.

Land, Kris, Memo re OAZ Communications, Summary of signed agreements, verbal discussions and verbal commitments, Dec. 31, 1991, pp. 1-13, PRO012153-65

Notes on OAZ, Jun. 17-18, 1991, PRO012166-7.

Land, Kris, Federal Express Tracking Label, May 21, 1991, PRO012168.

Paradox Development Corp., PM-Remote—Standalone Version of Para-Mail, 1990, pp. 1-4, PRO012171-4, Best date appears as Dec. 1990.

Notice of Rejection of Contract, N.D. Ca., Case No. 91-40335T, Nov. 5, 1991, PRO01275-6.

Notice of Rejection of Contract, N.D. Ca., Case No. 91-40335T, Nov. 5, 1991, PRO01277-8.

Giordano-Krausz, Eva, OAZ Communications Letter, Nov. 6, 1991, PRO01279.

Appointment and Notice of Appointment of Committee of Creditors Holding Unsecured Claims, N.D. Ca., Case No. 91-40335T, Jun. 25, 1991, PRO01280-81.

Land, Kris, Letter to Bankruptcy Court, May 10, 1991, PRO012182-3.

Land, Kris, Federal Express Tracking Label, May 10, 1991, PRO012184.

Duncan, Thom, Paramail Creates an E-mail Paradise, LAN Times, Feb. 4, 1991, vol. 8, Issue 3, PRO012185-6.

Debtor's Proposed Disclosure Statement, N.D. Ca., Case No. 91-40335T, Oct. 8, 1991, PRO012187-217.

Paradox Development Corp., brief description of the program "imp_cont.exe", Mar. 21, 1990, pp. 1-4, PRO012218-21.

OAZ Communications, Inc., NetFax User Quick Reference Guide, Jun. 1990, PRO012222-50.

Answer and Counterclaims of Topcall Corporation, *Catch Curve, Inc.* v. *Topcall Corporation,* Oct. 9, 2006.

Venali Inc.'s Opening Claim Construction Brief, *Catch Curve, Inc.* v. *Venali, Inc.,* Oct. 13, 2006.

Venali Inc.'s Reply Claim Construction Brief, *Catch Curve, Inc.* v. *Venali, Inc.,* Nov. 3, 2006.

CallWave, Inc.'s Reply Claim Construction Brief, *Catch Curve, Inc.* v. *CallWave, Inc.,* Nov. 3, 2006.

Supplemental Declaration of Steven C. Carlson in Support of CallWave, Inc.'s Reply Claim Construction Brief, *Catch Curve, Inc.* v. *CallWave, Inc.,* Nov. 3, 2006.

Plaintiff's Reply Claim Construction Brief, *Catch Curve, Inc.* v. *Venali, Inc.,* Nov. 3, 2006.

Declaration of Brian R. England in Support of Plaintiff's Reply Claim Construction Brief, *Catch Curve, Inc.* v. *Venali, Inc.,* Nov. 3, 2006.

Plaintiff's Reply Claim Construction Brief, *Catch Curve, Inc.* v. *CallWave, Inc.,* Nov. 3, 2006.
Declaration of Brian R. England in Support of Plaintiff's Reply Claim Construction Brief, *Catch Curve, Inc.* v. *CallWave, Inc.,* Nov. 3, 2006.
Plaintiff's LPR 4.1 Infringement Contentions, *Catch Curve, Inc.* v. *Topcall Corp.,* Dec. 8, 2006.
Sheffield, B., Office Automation in Practice, Mar. 1985, pp. 18-20.
Nordin, G., et al., Introduction of a Store and Forward Facility in the Swedish Telex Network, ISS '81 CIC, Sep. 1981.
Elston, S., Distribution 1, EDI '88, pp. 186-188, Best date appears as Dec. 1988.
Bransby, M., Voice Mail Makes a Difference, The Journal on Business Strategy, Jan./Feb. 1990, pp. 7-10.
Hewer, J.M., What's new in fax?, CMA Magazine, Dec. 1990/Jan. 1991, pp. 21-22.
Miki, T., KDD's Facsimile Interworking and X.400 Interconnection, IFIP 1991, pp. 123-134, Best date appears as Dec. 1991.
Complaint, *Catch Curve, Inc.* v. *Comodo Group, Inc.,* N.D. Ga. 1:07cv0489, Feb. 27, 2007.
Complaint, *Catch Curve, Inc.* v. *Streem Communications, L.L.C.,* N.D.Ga. 1:07cv1087, May 11, 2007.
Complaint, *Catch Curve, Inc.* v. *Vera Cruz Marketing, Inc.,* N.D.Ga. 1:07cv0527, Mar. 13, 2007.
Claim Construction Order, *Catch Curve, Inc.* v. *Venali, Inc.,* C.D.Cal. Case No. 05-04820 DDP, May 11, 2007.
Paradox Development Corp., Statement of Aug. 27, 1991, PRO012437.
Notice of Continued Hearing on Disclosure Statement, N.D. Ca., Case No. 91-40335T, Oct. 4, 1991, PRO012438.
Notice of Hearing on Disclosure Statement, N.D. Ca., Case No. 91-40335T, Oct. 9, 1991, PRO012439.
Stein, Donald, Letter re Hearing, Oct. 22, 1991, PRO012441-2.
OAZ Communications, Statement of Oct. 31, 1991, PRO012443.
McKenna & Fitting, Letter to Don Stein re OAZ Communications Bankruptcy, Nov. 1, 1991, PRO012444.
McKenna & Fitting, Letter to Don Stein re OAZ Communications Bankruptcy, Nov. 4, 1991, PRO012445-6.
Larry, Price for libraries for OAZ, Jun. 13, 1991, PRO012453-4.
Plan of Reorganization, N.D. Ca., Case No. 91-40335T, Oct. 8, 1991, PRO012455-67.
Kramer, Matt, et al., Facsimile\Routing through Gateway Servers, PC Week, Oct. 16, 1989, pp. 22, 28, PRO012468-9.
oaz.l14, Jul. 10, 1991, pp. 1-2, PRO012471-2.
oaz.l13, Jul. 3, 1991, PRO012473.
oaz-exh.a, Jun. 7, 1991, PRO012474.
oaz.l12, Jun. 7, 1991, PRO012475.
oaz.l11, Jun. 3, 1991, PRO012476.
Phone Call Notes, Jul. 9, 1991, PRO012478-83.
Share Communications, Inc., FaxShare User's Guide, alleged date Nov. 1989, PRO011525-670.
Share Communications, Inc., Why FaxShare?, alleged date 1990, PRO011671-2, Best date appears as Dec. 1990.
Shore, Joel, FaxShare NLM for NetWare 386 debuts, Computer Reseller News, Mar. 19, 1990, p. 54, PRO011673.
The Pan Network, Don't call us . . . We'll call you, Mix, Mar. 1990, p. 133, PRO011674.
Mölsä, Terhi, Telecommuting and the International Educator, The Advising Quarterly, Fall 1993, pp. 1-40, No. 26, PRO011676-715, Best month appears as Dec. 1993.
Register, Pam, Fax has area man humming new tune, Business The Reporter, Aug. 28, 1989, PRO011716-7.
The Pan Network, Sending & Receiving FAX thru Email, alt.fax, Jun. 11, 1991, PRO011718.
Gamma Technology, Inc. DBA Gammalink, Invoice 2585, Dec. 15, 1987, PRO011719.
The Pan Network, Next time you're not at home . . . Give us a call, Mix, May 1990, p. 35, PRO011720.
Leopold, Perry, and Jackson, Teresa, Facsimile, Aug. 1990, PRO011721-23.
Leopold, Perry, Letter, Feb. 16, 1998, PRO011724.
Leadley, Simon, Modems, bits and pieces, Sonics, Jul./Aug. 1989, p. 46, PRO011726-7.
The Pan Network, Don't call us . . . We'll call you, Keyboard, May 1990, p. 35, PRO011731.
PAN FaxMail Rate Schedule, Jul. 12, 1989, PRO011734.
Newton, F. Roger, IAAM Event Fax, Feb. 19, 1990, PRO011737.
Gamma Technology, Inc. DBA Gammalink, Invoice 4069, Oct. 12, 1988, PRO011739.
Facsimile, Jun. 9, 1988, PRO011740.
PAN FaxMail Rate Schedule, Sep. 15, 1990, PRO011741.
The Pan Network, Sending & Receiving FAX thru Email, alt.fax, Jun. 11, 1991, PRO011743.
The Pan Network Rates & Fees, May 1992, PRO011744.
Dialogic Corporation, Invoice 6174, Aug. 2, 1988, PRO011746.
Newton, F. Roger, Fax It!! Can we share the event facts by Fax?, Facility Manager, Winter, 1989-90, p. 44, PRO011747, Best date appears as Dec. 1990.
Dialogic Corporation, Invoice 6570, Sep. 12, 1988, PRO011748.
Weber Associates, The Pan Network Marketing Plan Proposal, Nov. 20, 1989, PRO011749-51.
The Pan Networks and Dembicki, Dan, Cancellation Request, Jun. 1988, PRO011752.
The Pan Network, Pan Hard Copy, Winter 1990, vol. 7, No. 1, PRO011753-4, Best date appears as Dec. 1990.
Dialogic Corporation, Invoice 6621, Sep. 19, 1988, PRO011755.
Dialogic Corporation, Letter, Jul. 13, 1987, PRO011758.
The Pan Network, Pan Hard Copy, Winter 1990, vol. 7, No. 1, PRO011759-61, Best date appears as Dec. 1990.
Werner, Tom, Just the fax, Ma'am, just the fax—but everywhere, Philadelphia Business Journal, Oct. 30-Nov. 5, 1989, PRO011762.
Store-and-forward fax service debuts, Network World, Jul. 17, 1989, p. 27, PRO011763.
Transcript Excerpts from Perry Leopold Deposition, Aug. 11, 1997, pp. 146-151, PRO011764-5.
New # for TSN & PEP Fax, Nov. 6, 1989, PRO011768.
Pan System/2 Command Card, 1988, PRO011769-72, Best date appears as Dec. 1988.
The Advising Quarterly for Professionals in International Education, Fall, 1993, pp. 1-40, vol. 26, PRO011773-812, Best date appears as Dec. 1993.
OAZ Communications, NetFAX From OAZ, 1989, PRO011829-37, Best date appears as Dec. 1989.
Fiore, Dave, Letter to Paradox Development Corporations, Jun. 6, 1991, PRO011840-1.
Audiofax, Inc.—Audiofax, Inc. Proposal for BellSouth Advanced Networks—Fax Automated & & On-Demand Distribution Methods—Oct. 6, 1988.

Audiofax, Inc.—System Specifications for BellSouth Advanced Networks—Fax Automated & On-Demand Distribution Methods—Nov. 28, 1988.
Comverse Technology, Inc.—Trilogue Message Management System—Dec. 1987—pp. 1-5.
Comverse Technology, Inc.—Trilogue Hardware Architecture—Jan. 1987.
International 100—North American International Business—Jan. 1991.
ComverseActions—Fourth Quarter 1990—Comverse Technology, Inc., Best date appears as Dec. 1990.
Voice Messaging Comes of Age in Today's Mobile Communications Market—Feb. 1988.
Trilogue Voicelogue User Guide—Comverse Technologies, Inc.—Dec. 1988.
Interfax's Unique Fax Service—pp. 58-59—May 1990.
Information Disclosure Statement Serial No. 192,839—Oct. 1988.
3M FaxXchange Market & Product Summary Version 1.0—Oct. 12, 1990.
Fax Fever Slams Business Hard—Insight Magazine—Aug. 22, 1988—pp. 8-12.
The Fax Network (ICM) Product Specification—May 11, 1992.
AT&T Fax Products & Services Speed The Written Message—Apr. 1989—No. 2—pp. 12-17.
Mitel Enterprises—Providing Business Solutions!—Smart-1 SPC Fax Dialer—Nov. 1991.
ATR 300 Telephone Line Powered Call Controller—Hy-Tek Controllers, Inc.—1993, Best date appears as Dec. 1990.
CCITT Red Book vol. VIII—Fascile VIII.7—Data Communication Networks Message Handling Systems—Oct. 1984.
CCITT Red Book vol. II—Fascicle 11.5 Telematic Services: Operations & Quality of Service Oct. 1984.
Electronic Mail Standards to Get Rubber-Stamped & Go Worldwide—Data Communications May 1984 -pp. 159-168.
Development of a Public Facsimile Communication System Using Storage & Conversion Techniques—Karnae—1990 IEEE—pp. 19.4.1-19.4.5, Best date appears as Dec. 1990.
Public Facsimile Communication Network—Takahiko Kamae—1982 IEEE—pp. 47-51, Best date appears as Dec. 1982.
Advanced Facsimile Communication Network—Masayoshi Ejiri—pp. 176-183—Jul. 1983.
A Message Handling System For Public Networks—Nakayama et al.—1983—pp. 103-111, Best date appears as Dec. 1983.
Facsimile Communication in Digital Network—Ejiri et al.—Jan. 1984—pp. 19-27.
Enhanced Message Handling System for In-House Use—Haruta et al.—Dec. 1985—pp. 42.4.1-42.4.6.
Present Situation & Future Trends of Communication Processing Technologies—Hideton Hatz—pp. 228-237—Oct. 1986.
Enhanced Facsimile Communication Network—Hiroshi Katsuki—pp. 30-36—Jan. 1986.
IEEE/IEICE Global Telecommunications Conference 1987—Conference Record Vo. 3 of 3—Nov. 15-18, 1987—Japan.
International Conference on Communication—Jun. 14-18, 1981—Conference Record vol. 2 of 4—Development of Fax Communication System For Pocket Switched Data Network.
Experimental Facsimile Communication System on Packet Switched Data Network—IEEE Transactions on Communication—vol. Com- 29 No. 12—Dec. 1981.
3.3 International Facsimile Communications Over Packet Switched Network—1983—Hiroichi Teramura—pp. 239-247, Best date appears as Dec. 1983.
Recent Advances in Facsimile Communications—Yasuhiro Yamazaki—pp. 118-124 1985, Best date appears as Dec. 1985.
PBX/LAN The Architecture of Meridian SL Integrated Services Networks—1985 pp. 27-33, Best date appears as Dec. 1985.
PBX-Based Lans: Lower Cost Per Terminal Connection Computer Design-Feb. 1984 pp. 191-199.
LAN's—Partners With Voice/Data Systems—Technical Note Sep. 1984—pp. 64g-64p.
An Answering Maching That Really Gives Answers—Business Week—Oct. 9, 1989.
InBound/OutBound—Special Request By SpectraFax—Sep. 1989.
IDP Report—vol. 10, No. 15—Sep. 15, 1989—Knowledge Industry Publications, Inc.
Making Databases Available to Computer Illiterates by Jack Lesar—Dec. 13, 1989.
Just the Fax, Ma'am—Belvidere Native Pioneers Information Service—Belvidere Daily Republican—Dec. 5, 1989.
For Columnist, Getting Fax Has a New Meaning—Southtown Economist—Dec. 8, 1989.
Transcript by Paul Ehrlich—Oct. 3, 1989—Video Monitoring Services of America, Inc.
Facsimile Data Converter Applied to Various Data Communications Services by Masao Setoguchi—Jan. 1987.
Japan is Making INS A Reality—pp. 64-81—Telephony—Oct. 24, 1983.
Integrated Digital Switching System With Queuing Storage Facility—1980—IEEE, Best date appears as Dec. 1980.
Meridian SL Information Services—Telesis 1985—pp. 13-19, Best date appears as Dec. 1985.
Evolution of Integrated Digital Network and Service Integration—Sep. 1979 pp. 1.1.4/1-6.
Electronic Switching Systems—Fujitscu Sci Tech J. 21.3—pp. 225-258—Jul. 1985.
NETMASTER Functional Specification Number: Fax 002 Version: 2.00—Oct. 16, 1984 pp. 1-123.
26 FaxMaster 21 Remote Operation—FaxMaster 21 User Handbook—Sep. 17, 1986.
NEAX 2400 IMS NEC Facsimile Mail Module General Description—1986, Best date appears as Dec. 1986.
NEAX 2400 IMS FMM (Facsimile Mail Module) System Description—Jan. 1986—NEC Corp.
NEAX 2400 IMS FMM (Facsimile Mail Module) Station User's Guide—Jul. 1985—NEC Corp.
ITT Inaugurates FAXPAK—Business Communication Review—Nov./Dec. 1979 pp. 29-31.
Flexible Facsimile Transmission—ITT Domestic Transmission Systems, Inc. Mar. 1990 pp. 39-42.
3 Jeudi 24—Sep. 1981—Interconnection of the Teletex & Other Services.
Internal Memo From Mike Donnenfield—Jun. 9, 1985.
Fax Management System Description—Jul. 1991—Release 1.5.
Network Architecture of Advanced Facsimile Intelligent Communication System—pp. 37-51 Watanabe et al.—1981, Best date appears as Dec. 1981.
Electrical Communications Laboratories Technical Journal, vol. 34, No. 10, Published Oct. 22, 1985—Enhanced Facsimile Intelligent Communication System (FICS-21) w/translation.

Electrical Communications Laboratories Technical Journal vol. 33, No. 7, Published Jul. 22, 1984 pp. 3 to 5, and 9 to 11—w/translation.
Kobayashi and Kamae, "A new Nation-Wide Network for Public Facsimile Communication" JTR, vol. 20, No. 4, pp. 276-281, Dec. 1978.
Kamae, Endo and Nakabayashi, "Facsimile Intelligent Communication System FICS-1" Review of the Electrical Communication Laboratories—vol. 29, No. 7-8, p. 649-662, 1981.
Ejiri, "Advanced Facsimile Communication Network", JTR, vol. 25, No. 3, Dec. 1983.
Allegation of Inequitable Conduct—Sprint Corporation & Sprint Communications Company L.P., Answer, pp. 1-3, Dec. 13, 1999.
Request for Re-Examination—Arguments of Requestor W.T. Babbitt, dated Oct. 19, 1999 pp. 1-10.
CCITT—Red Book—Data Communication Networks Message Handling Systems—Recommendations X.400-X. 430—vol. VIII—Fascicle VIII.7—1984-1985, Dec.
Litigation—Supplemental Listing of Pending and Prior Litigation Involving Part or Related Patents.
"*Audiofax IP LLC* v. *Delrina Corporation, et al.*" Civ. Act. No. 1:95-CV-1052-WBH (N.D. Ga.) Judgment and Order (dated Dec. 12, 1995).
"*Audiofax IP LLC* v. *Boston Technologies, et al.*" Civ. Act. No. 1:95-CV-3388-MHS (N.D. Ga.) Complaint and Demand for Jury Trial (dated Dec. 29, 1996).
"*Audiofax IP LLC* v. *Boston Technologies, et al.*" Civ. Act. No. 1:95-CV-3388-MHS (N.D. Ga.) Judgment and Order (dated May 22, 1996).
"*Audiofax IP LLC* v. *Premiere Technologies, et al.*" Civ. Act. No. 1:96-CV-1659-ODE (N.D. Ga.) Answer and Counterclaims (dated Jul. 19, 1996).
"*Audiofax IP LLC* v. *Cisco Systems, Inc.*", Civ. Act. No. 1:01-CV-3369-CC (N.D. Ga.) Judgment and Order (dated Jun. 29, 2002).
"*Audiofax IP LLC* v. *Wildfire Communications, Inc., et al.*" Civ. Act. No. 1:02-CV-1631-CC (N.D. Ga.) Complaint and Demand for Jury Trial (dated Jun. 19, 2002).
"*Audiofax IP LLC* v. *Wildfire Communications, Inc., et al.*" Civ. Act. No. 1:02-CV-1631-CC (N.D.Ga.) Answer and Counterclaim (dated Aug. 12, 2002).
"*Audiofax IP LLC* v. *Wildfire Communications, Inc., et al.*" Civ. Act. No. 1:02-CV-1631-CC (N.D. Ga.) Stipulation of Mutal Dismissal Without Prejudice (dated Oct. 21, 2003).
"*Audiofax IP LLC* v. *Avaya*" Civ. Act. No. 1:03-CV-3066-CC (N.D. Ga.), First Amended Complaint and Demand for Jury Trial (dated Dec. 23, 2003).
Complaint for Patent Infringement, *Catch Curve, Inc.* v. *uReach Technologies, Inc.,* Oct. 6, 2005.
Complaint, *Catch Curve, Inc.* v. *Biscom, Inc.,* Oct. 14, 2005.
Answer and Counterclaims of Biscom (including allegation of unenforceability), *Catch Curve, Inc.* v. *Biscom, Inc.,* Dec. 14, 2005.
Defendant Biscom, Inc.'s Motion to Bifurcate and Stay Discovery and for Protective Order, *Catch Curve, Inc.* v. *Biscom, Inc.,* Feb. 13, 2006.
Complaint, *Catch Curve, Inc.* v. *GoDaddy.com, Inc.,* Jul. 12, 2006.
GammaLink, "GammaLink Announces PC-to-Facsimile Communications", Nov. 18, 1985, PR Newswire, USA.
GammaLink, "Direct PC-to-Remote-Facsimile Communications Package Allows Fast, Low-Cost Transmission of Documents", Sep. 15, 1986, Gale Group, USA.
Postel, J., Summary of Computer Mail Services Meeting Held at BBN on Jan. 10, 1979, printed from Internet on Jan. 11, 2006, alleged date on document—Mar. 1, 1982, pp. 1-8.
Chang, Tawei, UCL Facsimile System, printed from Internet on Jan. 11, 2006, alleged date on document—Feb. 1982, pp. 1-100.
Notice of Motion for Final Order Authorizing Secured Accounts Receivable Financing Agreement, N.D. Ca., Case No. 91-40335T, PRO012484, Mar. 2008.
Pan System/2 Command Card, 1988, PRO011769-72, Dec. 1988.
Pan Network, Produced on CD, PRO011813, Mar. 2008.
OAZ Communications, NetFAX From OAZ, 1989, PRO011829-37, Dec. 1989.
OAZ Communications NetFax Manager Software, Produced on CDs, PRO011838-9, Mar. 2008.
Defendant's Responses to Infringement Contentions of Plaintiff Under LPR 4.2, *Catch Curve, Inc.* v. *Graphnet, Inc.,* N.D. Ga. 1:06-cv-2386-cc, Apr. 28, 2008, pp. 1-67.
Defendant Graphnet's LRP 4.3 Initial Invalidity Contentiosn to Plaintiff's Claims for Patents, *Catch Curve, Inc.* v. *Graphnet, Inc.,* N.D. Ga. 1:06-cv-2386-cc, Apr. 28, 2008, pp. 1-2.
Graphnet's First Supplemental Response to its Patent Disclosures, *Catch Curve, Inc.* v. *Graphnet, Inc.,* N.D. Ga. 1:06-cv-2386-cc, May 9, 2008, pp. 1-105.
Defendant's Supplemental Invalidity Contentions, *Catch Curve, Inc.* v. *Graphnet, Inc.,* N.D. Ga. 1:06-cv-2386-cc, Oct. 3, 2008, pp. 1-59.
Comverse Technology, Inc.—Trilogue Message Management Systems—No Date.
Comverse & Ascom Create a Voice & Fax Messaging Strategic Alliance—Brian Willshire—No Date.
We're Making Headlines With the Marriage of The Century—SpectraFax Corp.— No Date.
The 3M FaxXchange Networks Switch Turns your Fax Network into A Highly Efficient High Volume Communicator—No Date.
US Fax—US Faxsys—Your Business—No Date.
SmarterFax Mailbox Manager Brochure—No Date.
Development of A Multi-Media MHS Based on CCITT X.400 Recommendations—pp. 305-319—1986.
3.6 Electronic Mail Systems—Ketsuke Tomaru—pp. 283-290—1983.
A Facsimile Mail System As Basis For Integrated Mail System—Ozawa et al.—May 1984.
Planning A Nation-Wide Facsimile Store-And-Foward Network—1981 IEEE—pp. F5.1.1-F5.1.5.
AutoFax: A Store-And-Forward Facsimile System—vol. 71—Jan. 1979.
FaxPak Store-And-Forward Facsimile Transmission Service Electrical Communication—vol. 54 No. 3, 1979.
MCI Safe Store-And-Forward Message-Switching System User's Guide—MCI Communication Corp. May 1987.
RCA Fax Forward International Facsimile Service Overview—RCA Global Communications, Inc.—Sep. 1987.
RCA Tries Again With FaxForward—Information Week—Sep. 21, 1987—p. 48.
Design For Facsimile Storage & Conversion Processing in STOC—201—Electrical Communication Laboratories—vol. 33, No. 1, 1985.
While-You-Wait Fax—Newsweek—John Wojno with Robina Gibb—No Date.
Local Entrepreneur's Invention Weds 3 Modem Conveniences—Lorna Collier—No Date.

FAX/PAK Facsimile Transmission Service Universal Compatibility Between Fax Machines.
Kobayashi and Kamae, "A new Nation-Wide Network for Public Facsimile Communication" JTR, vol. 20, No. 4, pp. 276-281, 1978.
Ejiri, "Advanced Facsimile Communication Network", JTR, vol. 25, No. 3, 1983.
Complaint and Demand for Jury Trial and First Amended Complain & Demand for Jury Trial *Audiofax IP, LLC* vs. *Sprint Corp. et al.*
Sprint Corporation and Sprint Communications Company L.P.'s Answer to First Amended Complaint Counterclaim and Demand for Jury Trial (inc. allegation of inequitable Conduct).
Complaint and Demand for Jury Trial—*Audiofax IP, LLC* vs. *Concord Technologies, Inc.*
Concord Technologies, Inc.'s Answer to Compaint, Affirmative Defenses and Counterclaim (including allegation of inequitable conduct).
Complaint and Demand for Jury Trial—*Audiofax IP, LLC* vs. *Jfax.Com, Inc.*
Answer and Counterclaim—*Audiofax IP. LLC* vs. *Jfax.Com. Inc.*
CCITT—Red Book—Data Communication Networks Message Handling Systems—Recommendations X.400-X. 430—vol. VIII—Fascicle VIII.7—1984-1985.
Audiofax IP LLC v. *Delrina Corporation, et al.* Civ. Act. No. 1:95-CV-1052-JTC (N.D. Ga.) Answer of Delrina to Counts IV (¶¶ 29-35, 36-38) 38) of Audiofax's Complaint.
"*Audiofax IP LLC* v. *Premiere Technologies, et al.*" Civ. Act. No. 1:96-CV-1659-ODE (N.D. Ga.) Judgment and Order (dated Feb. 11, 1997).
Faxsav, Inc. v. *Audiofax IP LLC* Civ. Act. No. 97-4393 RWS (D.N.J.) Complaint and Jury Demand (dated Sep. 5, 1997).
"*Faxsav, Inc.* v. *Audiofax IP LLC*" Civ. Act. No. 97-4393 RWS (D.N.J.) FaxSav's Answer and Counterclaims (dated Jun. 1, 1998).
"*Faxsav, Inc.* v. *Audiofax IP LLC*" Civ. Act. No. 97-4393 RWS (D.N.J.) FaxSav's Answer to Counterclaims with Affirmative Defenses (dated Jun. 17, 1998).
"*Audiofax IP LLC* v. *Faxsav, Inc.*" Civ. Act. No. 1:97-CV-2614-RWS (N.D. Ga.) Complaint and Demand for Jury Trial (dated Sep. 8, 1997).
"*Audiofax IP LLC* v. *Faxsav, Inc.*" Civ. Act. No. 1:97-CV-2614-RWS (N.D. Ga.) Answer to Complaint (dated Feb. 17, 1998).
"*Audiofax IP LLC* v. *Faxsav, Inc.*" Civ. Act. No. 1:97-CV-2614-RWS (N.D. Ga.) Judgment and Order (dated Oct. 2, 1998).
"*Audiofax IP LLC* v. *Cable and Wireless, Inc.*" Civ. Act. Nos. 1:98-CV-2712-RWS (N.D. Ga.) Summons and Complaint (dated Sep. 18, 1998).
"*Audiofax IP LLC* v. *Cable and Wireless, Inc.*" Civ. Act. Nos. 1:98-CV-206-RWS (N.D. Ga.) Answer and Counterclaim of Defendants (dated Apr. 5, 1999).
"*Audiofax IP LLC* v. *Cable and Wireless, Inc.*" Civ. Act. Nos. 1:98-CV-2712-RWS and 1:99-CV-206-RWS (N.D. Ga.) Consent Order (dated Jun. 17, 1999).
"*Audiofax IP LLC* v. *Cable and Wireless, Inc.*" Civ. Act. No. 1:99-CV-206-RWS (N.D.Ga.), Judgment and Order (dated Jul. 12, 1999).
"*Audiofax IP LLC* v. *Sprint*" Civ. Act. No. 1:99-CV-2135-RWS (N.D. Ga.), Complaint and Demand for Jury Trial (dated Aug. 20, 1999).
"*Audiofax IP LLC* v. *Sprint*" Civ. Act. No. 1:99-CV-2135-RWS (N.D. Ga.), Judgment and Order (dated Aug. 24, 2001).
"*Audiofax IP LLC* v. *Concord Technologies, Inc.*" Civ. Act. No. 1:99-CV-208-RWS (N.D.Ga.), Judgment and Order (dated Apr. 17, 2000).
"*Cisco Systems, Inc.* v. *Audiofax IP LLC*" Civ. Act. No. 1:01-CV-4350-JL (N.D. Cal.), Summons and Complaint for Declaratory Judgment of Patent Invalidity and Noninfringement; Unfair Competition under California Business & Professions Code §17200 et seq. and Demand for Jury Trial (dated Nov. 20, 2001).
"*Audiofax IP LLC* v. *JFAX.com.*", Civ. Act. No. 1:99-CV-2816-BBM (N.D. Ga.) Judgment and Order (dated Nov. 21, 2001).
"*Audiofax IP LLC* v. *Captaris Inc.*", Civ. Act. No. 1:01-CV-3285-CC (N.D.Ga.) Answer, Affirmative Defenses, and Counterclaim Answers (dated Jan. 17, 2002).
"*Audiofax,P LLC* v. *Captaris Inc.*", Civ. Act. No. 1:01-CV-3285-CC (N.D.Ga.) Judgment and Order (dated Apr. 24, 2002).
"*Audiofax IP LLC* v. *Cisco Systems, Inc.*", Civ. Act. No. 1:01-CV-3369-CC (N.D. Ga.) Complaint and Demand for Jury Trial (dated Dec. 10, 2001).
"*Audiofax IP LLC* v. *Avaya*" Civ. Act. No. 1:03-CV-3066-CC (N.D. Ga.), Avaya's Motion to Dismiss Count II of the Complaint.
Defendant Biscom, Inc.'s Initial Disclosures, *Catch Curve, Inc.* v. *Biscom, Inc.,* Feb. 13, 2006.
Plaintiff's LPR 4.1 Infringement Contentions, *Catch Curve, Inc.* v. *Biscom, Inc.,* Feb. 13, 2006.
Complaint, *Catch Curve, Inc.* v. *Integrated Global Concepts, Inc. et al.,* Jan. 24, 2006.
Defendants'Initial Disclosures, *Catch Curve, Inc.* v. *Integrated Global Concepts, Inc. et al.,* Jun. 30, 2006.
Complaint, *Catch Curve, Inc.* v. *Callware Technologies, Inc.,* Sep. 1, 2005.
Complaint, *Catch Curve, Inc.* v. *Open Text Corp.,* Dec. 15, 2005.
Complaint, *Catch Curve, Inc.* v. *Topcall Corp.,* May 24, 2006.
Complaint, *Esker S.A. et al.* v. *Catch Curve, Inc.,* Mar. 28, 2006.
Complaint, *Catch Curve, Inc.* v. *Esker S.A. et al.,* Mar. 30, 2006.
Answer, Affirmative Defenses and Counterclaim of Esker, Inc. (including allegation of inequitable conduct), *Catch Curve, Inc.* v. *Esker S.A. et al.,* Apr. 20, 2006.
Catch Curve, Inc.'s Motion to Strike Esker, Inc.'s Third Affirmative Defense and Counterclaim for Unenforceability or, in the Alternative, for a More Definite Statement,*Catch Curve, Inc.* v. *Esker S.A. et al.,* May 9, 2006.
Defendant Catch Curve Inc.'s Response to Plaintiffs' Antonius Disclosures, *Esker S.A. et al.* v. *Catch Curve, Inc.,* May 15, 2006.
Complaint, *Catch Curve, Inc.* v. *Smith Micro Software, Inc.,* Dec. 9, 2005.
Answer and Counterclaims of Smith Micro Software, Inc., *Catch Curve, Inc.* v. *Smith Micro Software, Inc.,* Jan. 25, 2006.
Catch Curve, Inc.'s Answer and Affirmative Defenses to Counterclaim of Smith Micro Software, Inc., *Catch Curve, Inc.* v. *Smith Micro Software, Inc.,* Feb. 14, 2006.
Defendant Smith Micro Software Inc.'s Initial Disclosures, *Catch Curve, Inc.* v. *Smith Micro Software, Inc.,* Feb. 24, 2006.

Plaintiffs' Rule 26(A)(1) Initial Disclosures, *Esker S.A. et al.* v. *Catch Curve, Inc.,* May 10, 2006.
CallWave's Preliminary Proposed Claim Term Definitions, *Catch Curve, Inc.* v. *CallWave, Inc.,* Jul. 12, 2006.
Catch Curve's Initial Proposed Construction of Claim Terms, *Catch Curve, Inc.* v. *CallWave, Inc.,* Jul. 12, 2006.
Alleged Excerpt from UF-270 Manual, publication date unknown, pp. 91-99.
Land, Kris, Letter to OAZ Communications, Jun. 7, 1991, PRO011842.
Notice of Debtor's Application for Order Approving Employment and Compensation of Houlihan Lokey Howard & Zukin, N.D. Ca. Case No. 91-40335T, Jun. 10, 1991, PRO011843.
Paradox Development Corporation, Business Plan, Aug. 5, 1990, PRO011844-88.
MHS Provides Key to WAN Communication, PC Week, Jan. 8, 1990, pp. 66, 70-71, PRO011889-91.
Novell, Inc., NetWare MHS, 1989, PRO011892-3, Dec. 1998.
OAZ Communications, Inc., Fax Manager User's Guide, Feb. 1989, PRO011894-941.
West, Larry, Systems Programmer, Apr. 21, 1989, PRO011942-8.
Larry, What's the maximum number of bytes of DTMF codes which may ever be stores at D000:0110?, Apr. 21, 1989, PRO011949-50.
NetFax Manager, 1990, PRO011951-4, Dec. 1990.
Paradox Development Corp., Para-Mail, Nov. 1989, PRO011955.
Dun & Bradstreet, Payment Profile, Jun. 17, 1991, PRO011956-61.
Disk Labels for Produced CDs, PRO0111962-3, Mar. 2008.
Paradox Development Corp., WorK To Be Done, PRO012125-6, Mar. 2008.
Para-Mail Version 2.1, PRO012132, Mar. 2008.
Paraedit( ), 1989, PRO012133-4, Dec. 1989.
The complete E-mail Program for Novell Networks with MHS, PRO012135, Mar. 2008.
Paradox Releases Para-Mail Version with Scanner Interface for E-Mail Market, PRO012169, Mar. 2008.
Paradox Development Corp., Read Me First!, PRO01270, Mar. 2008.
Paradox Development Corp., PM-Remote—Standalone Version of Para-Mail, 1990, pp. 1-4, PRO012171-4, Dec. 2009.
Proof of Claim, N.D. Ca., Case No. 91-40335T, May 21, 1991, PRO012251.
PMenu system, 1989, pp. 1-2, PRO012252-3, Dec. 1989.
Notice of Status Conference, N.D. Ca., Case No. 91-40335T, Jun. 6, 1991, PRO012254.
Notice of Status Conference, N.D. Ca., Case No. 91-40335T, Jun. 6, 1991, PRO012255.
Paradox Development Corp., Para-Mail User Manual, Jun. 30, 1989, PRO012256-435.
Notice of Telephonic Hearing, N.D. Ca., Case No. 91-40335T, Aug. 26, 1991, PRO012436.
Binter, Joe, NotePad: OAZ Communications, PRO012440, Mar. 2008.
Link Your Workgroup to the World With Electronic Mail, PRO012447-52, Mar. 2008.
Fiore, Dave, NotePad: OAZ Communications, PRO012470, Mar. 2008.
Lee, Yvonne, TSR E-Mail for Novell LANS Uses Less Than 13K of Total Memory, PRO012477, Mar. 2008.

* cited by examiner

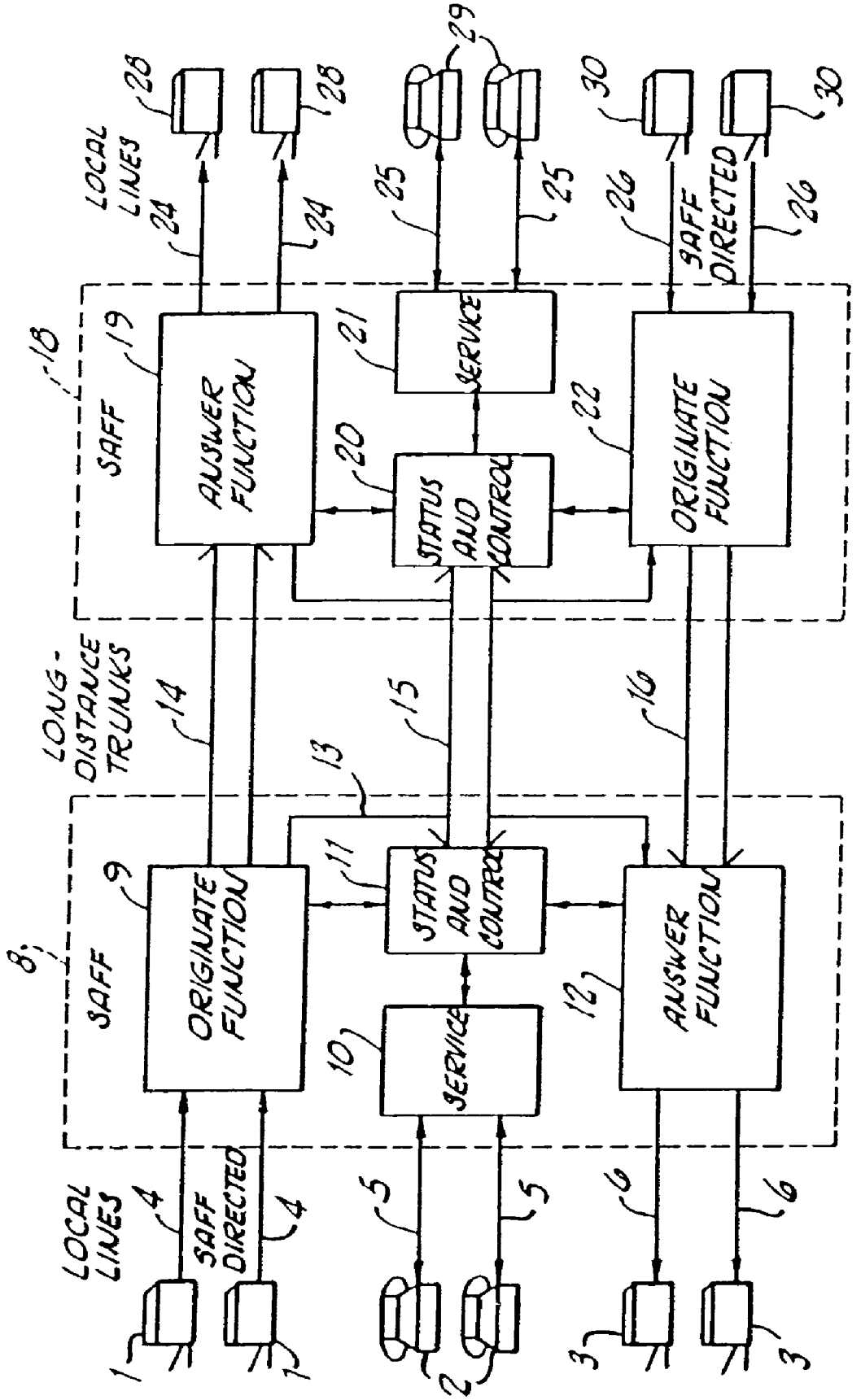
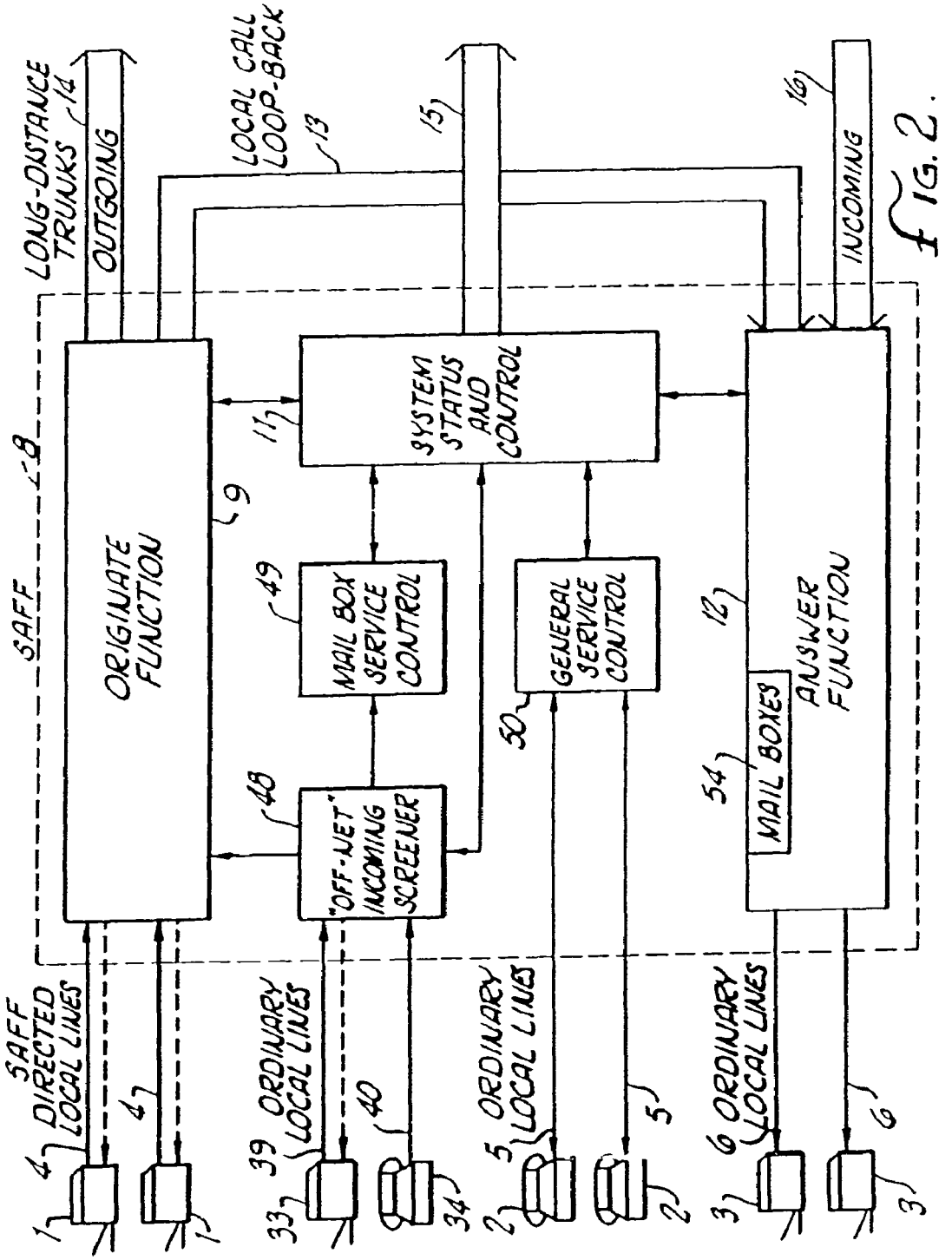

LOCAL LINES
SAFF DIRECTED
ORIGINATE FUNCTION
ANSWER FUNCTION
STATUS AND CONTROL
SERVICE
LONG-DISTANCE TRUNKS
SAFF
1
2
3
4
5
6
8
9
10
11
12
13
14
15
16
18
19
20
21
22
24
25
26
28
29
30

FIG. 1.


LONG-DISTANCE TRUNKS 14
OUTGOING
LOCAL CALL LOOP-BACK 13
15
16
INCOMING
SAFF 8
ORIGINATE FUNCTION
9
11
SYSTEM STATUS AND CONTROL
49
MAIL BOX SERVICE CONTROL
48
"OFF-NET" INCOMING SCREENER
50
GENERAL SERVICE CONTROL
12
54
MAIL BOXES
ANSWER FUNCTION
SAFF DIRECTED LOCAL LINES
4
47
39 ORDINARY LOCAL LINES
33
40
34
5 ORDINARY LOCAL LINES
2
5
6 ORDINARY LOCAL LINES
3
6
1
FIG. 2.

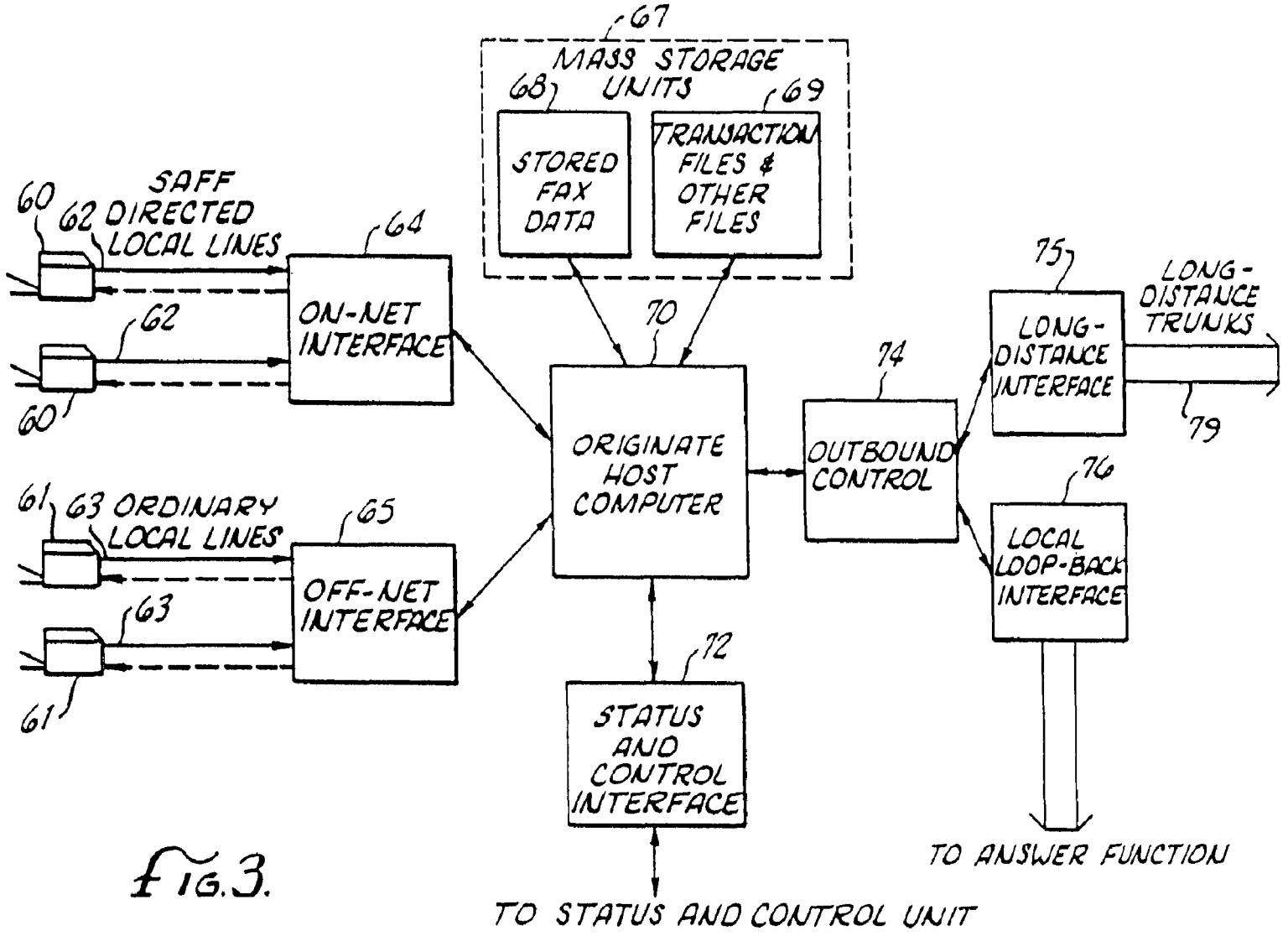

67
MASS STORAGE UNITS
68
STORED FAX DATA
69
TRANSACTION FILES & OTHER FILES
SAFF DIRECTED LOCAL LINES
60
62
64
ON-NET INTERFACE
62
60
70
ORIGINATE HOST COMPUTER
74
OUTBOUND CONTROL
75
LONG-DISTANCE INTERFACE
LONG-DISTANCE TRUNKS
79
76
LOCAL LOOP-BACK INTERFACE
61
63 ORDINARY LOCAL LINES
65
OFF-NET INTERFACE
63
61
72
STATUS AND CONTROL INTERFACE
TO ANSWER FUNCTION
TO STATUS AND CONTROL UNIT

FIG. 3.

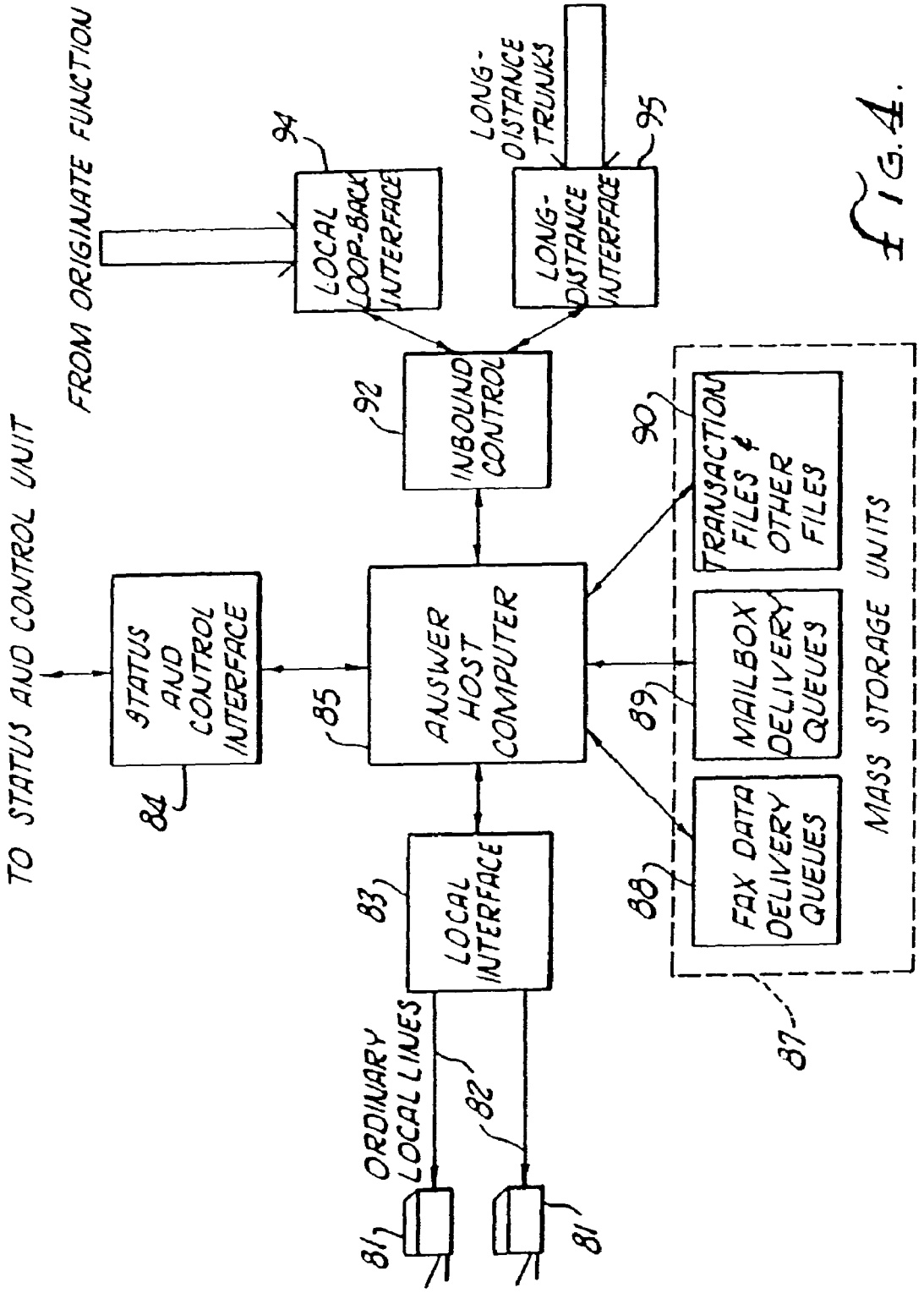

TO STATUS AND CONTROL UNIT
FROM ORIGINATE FUNCTION
STATUS AND CONTROL INTERFACE
84
ANSWER HOST COMPUTER
85
LOCAL LOOP-BACK INTERFACE
94
LONG-DISTANCE INTERFACE
95
LONG-DISTANCE TRUNKS
INBOUND CONTROL
92
LOCAL INTERFACE
83
ORDINARY LOCAL LINES
82
81
81
90
TRANSACTION FILES
OTHER FILES
89
MAILBOX DELIVERY QUEUES
88
FAX DATA DELIVERY QUEUES
MASS STORAGE UNITS
87

FIG. 4.

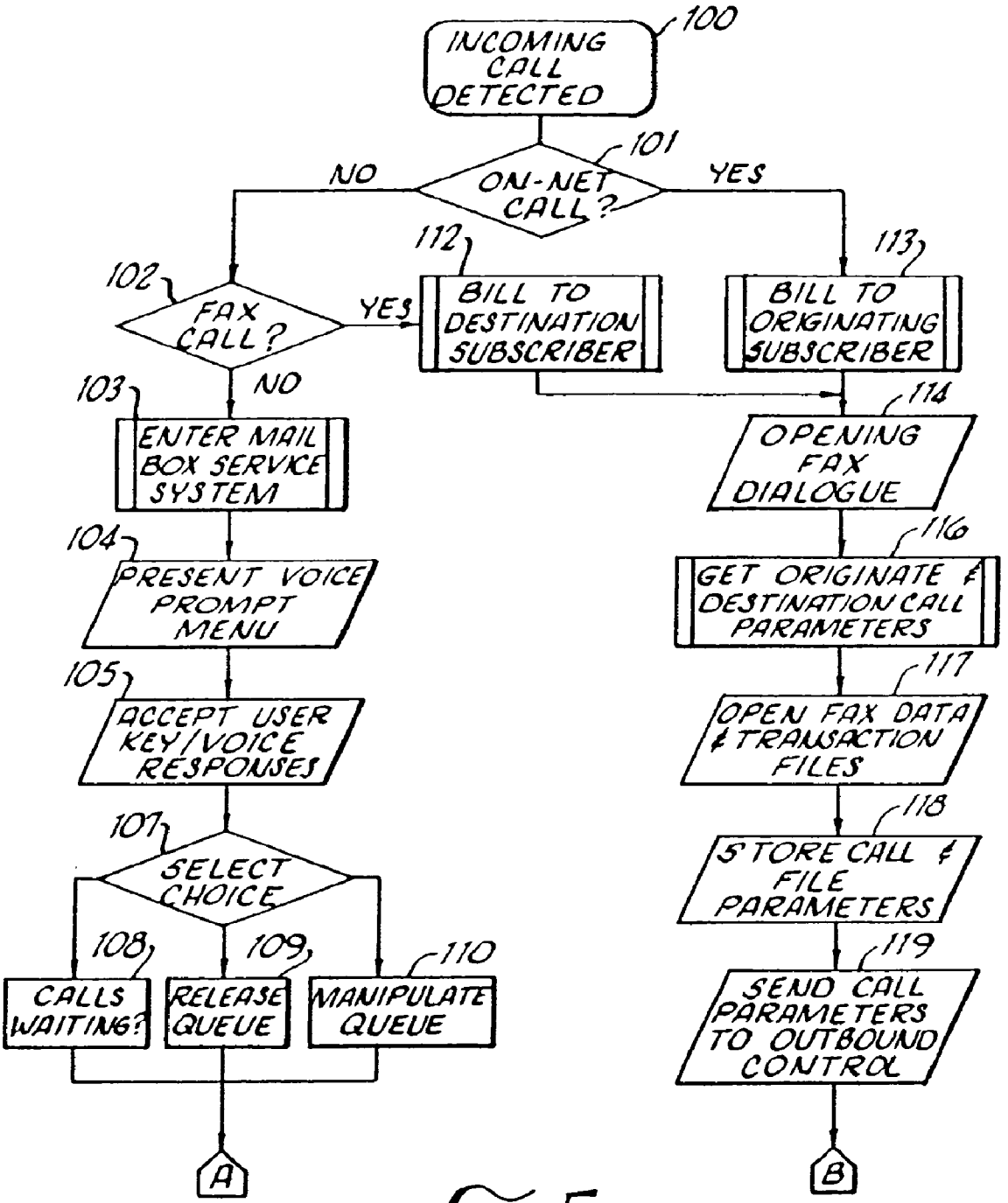

INCOMING CALL DETECTED
100
ON-NET CALL?
101
NO
YES
FAX CALL?
102
YES
BILL TO DESTINATION SUBSCRIBER
112
BILL TO ORIGINATING SUBSCRIBER
113
NO
ENTER MAIL BOX SERVICE SYSTEM
103
PRESENT VOICE PROMPT MENU
104
ACCEPT USER KEY/VOICE RESPONSES
105
SELECT CHOICE
107
CALLS WAITING?
108
RELEASE QUEUE
109
MANIPULATE QUEUE
110
A
OPENING FAX DIALOGUE
114
GET ORIGINATE & DESTINATION CALL PARAMETERS
116
OPEN FAX DATA & TRANSACTION FILES
117
STORE CALL & FILE PARAMETERS
118
SEND CALL PARAMETERS TO OUTBOUND CONTROL
119
B

FIG. 5a.

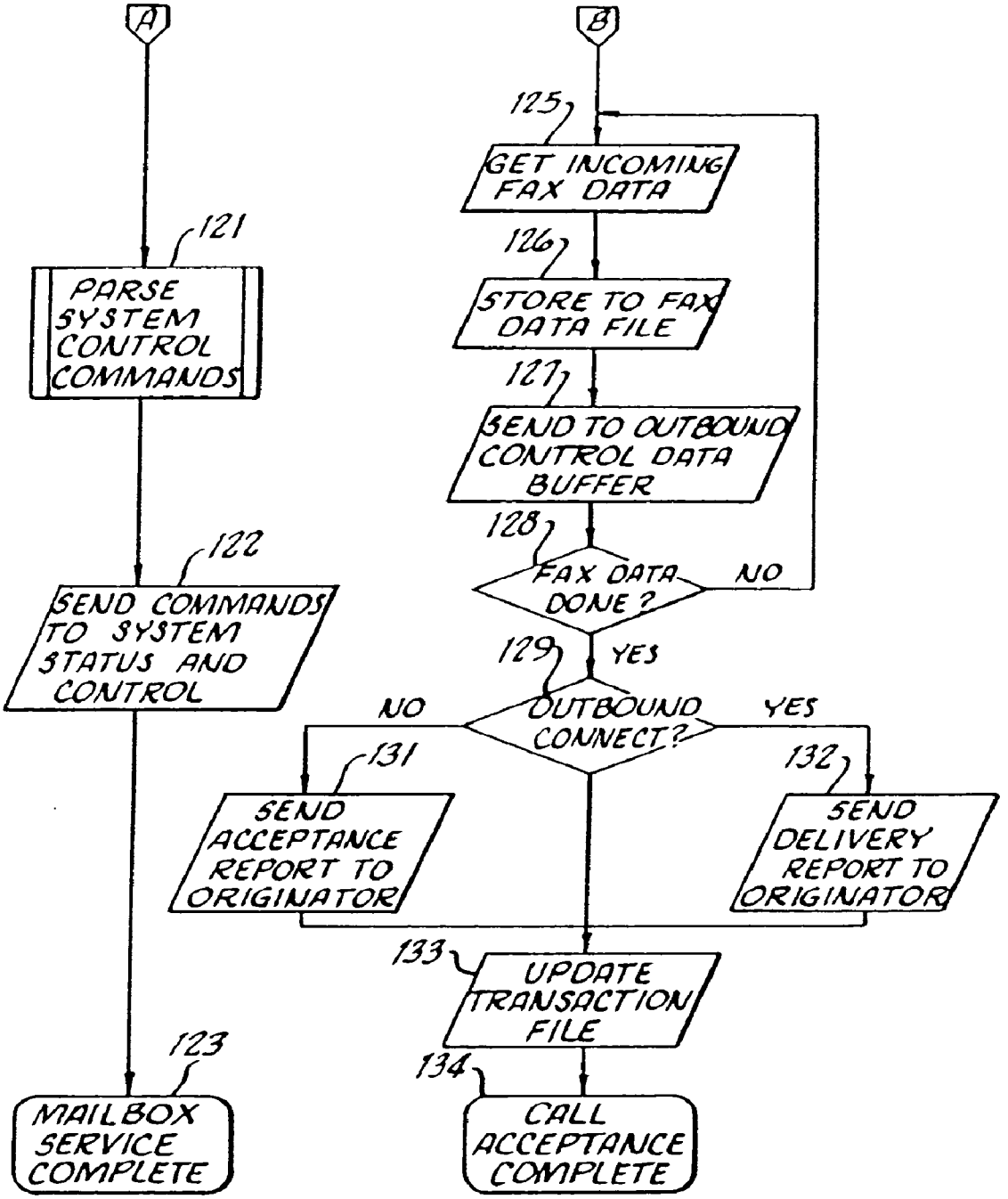

A
B
121
PARSE SYSTEM CONTROL COMMANDS
122
SEND COMMANDS TO SYSTEM STATUS AND CONTROL
123
MAILBOX SERVICE COMPLETE
125
GET INCOMING FAX DATA
126
STORE TO FAX DATA FILE
127
SEND TO OUTBOUND CONTROL DATA BUFFER
128
FAX DATA DONE?
NO
YES
129
OUTBOUND CONNECT?
NO
YES
131
SEND ACCEPTANCE REPORT TO ORIGINATOR
132
SEND DELIVERY REPORT TO ORIGINATOR
133
UPDATE TRANSACTION FILE
134
CALL ACCEPTANCE COMPLETE

FIG. 5b.

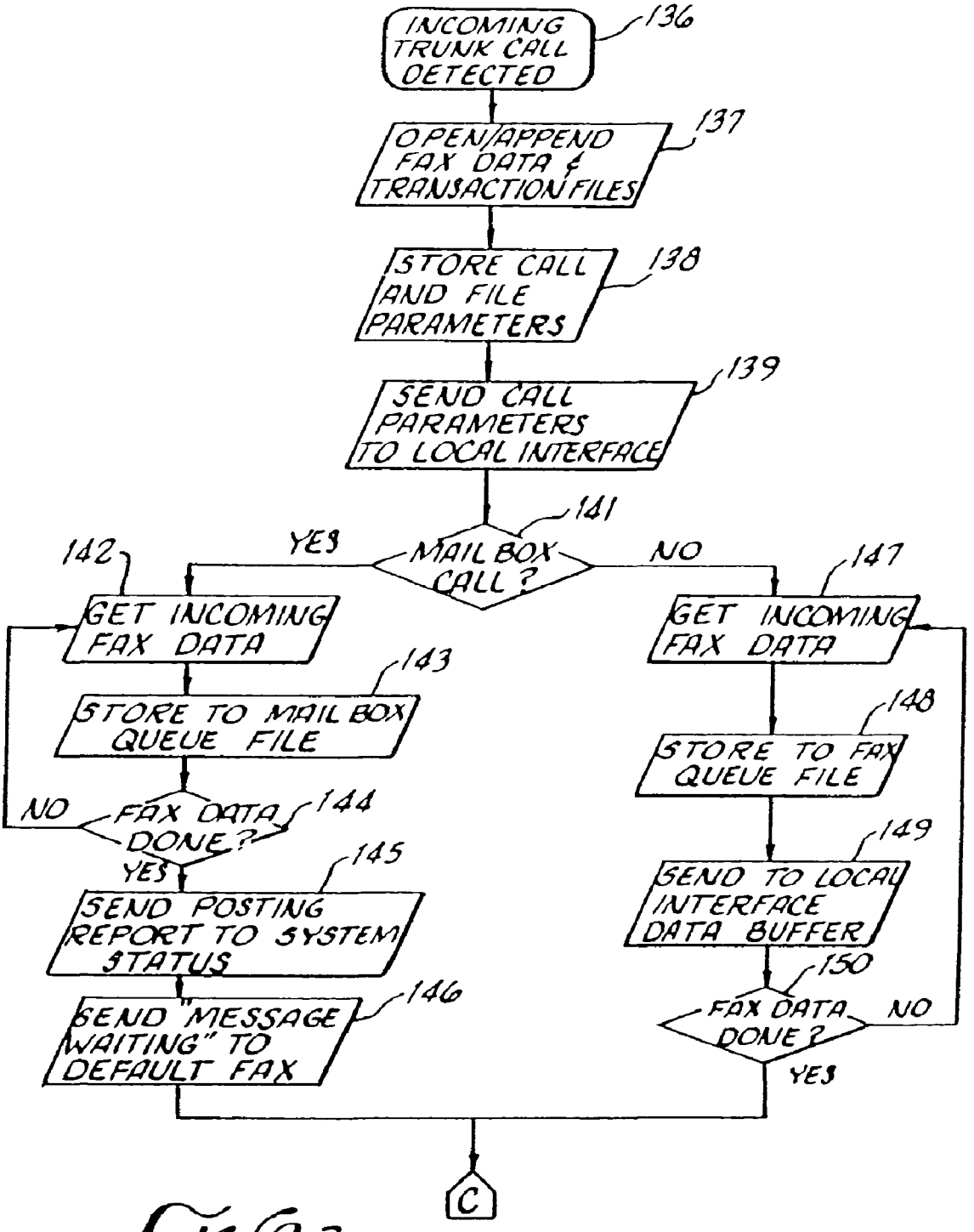

INCOMING TRUNK CALL DETECTED
136
OPEN/APPEND FAX DATA & TRANSACTION FILES
137
STORE CALL AND FILE PARAMETERS
138
SEND CALL PARAMETERS TO LOCAL INTERFACE
139
MAIL BOX CALL?
141
YES
NO
142
GET INCOMING FAX DATA
143
STORE TO MAIL BOX QUEUE FILE
FAX DATA DONE?
144
NO
YES
145
SEND POSTING REPORT TO SYSTEM STATUS
SEND "MESSAGE WAITING" TO DEFAULT FAX
146
147
GET INCOMING FAX DATA
148
STORE TO FAX QUEUE FILE
149
SEND TO LOCAL INTERFACE DATA BUFFER
150
FAX DATA DONE?
NO
YES
C

FIG. 6a.

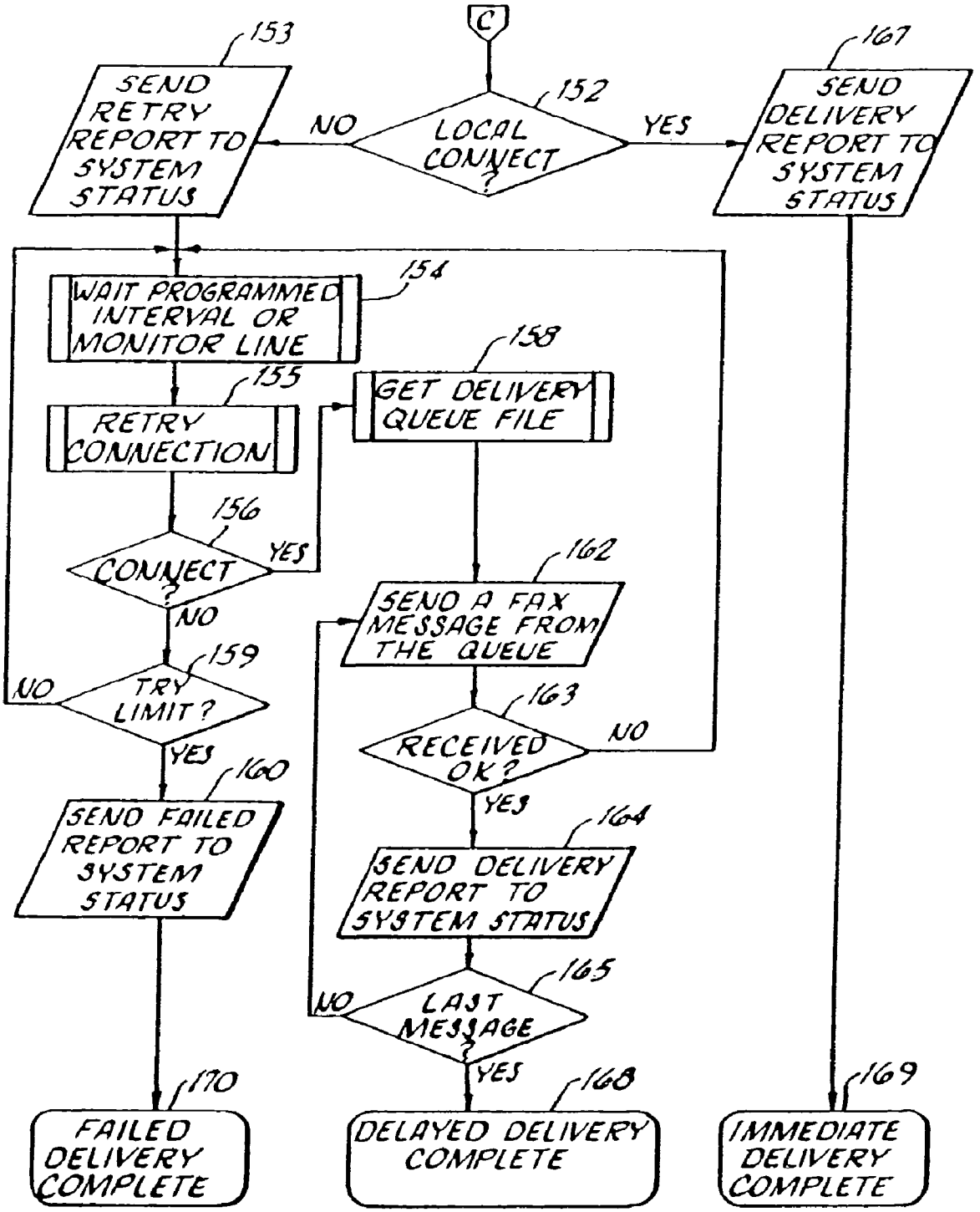

C
152
LOCAL CONNECT?
NO
YES
153
SEND RETRY REPORT TO SYSTEM STATUS
167
SEND DELIVERY REPORT TO SYSTEM STATUS
154
WAIT PROGRAMMED INTERVAL OR MONITOR LINE
155
RETRY CONNECTION
158
GET DELIVERY QUEUE FILE
156
CONNECT?
YES
NO
159
TRY LIMIT?
NO
YES
160
SEND FAILED REPORT TO SYSTEM STATUS
162
SEND A FAX MESSAGE FROM THE QUEUE
163
RECEIVED OK?
NO
YES
164
SEND DELIVERY REPORT TO SYSTEM STATUS
165
LAST MESSAGE?
NO
YES
170
FAILED DELIVERY COMPLETE
168
DELAYED DELIVERY COMPLETE
169
IMMEDIATE DELIVERY COMPLETE

FIG. 6b.

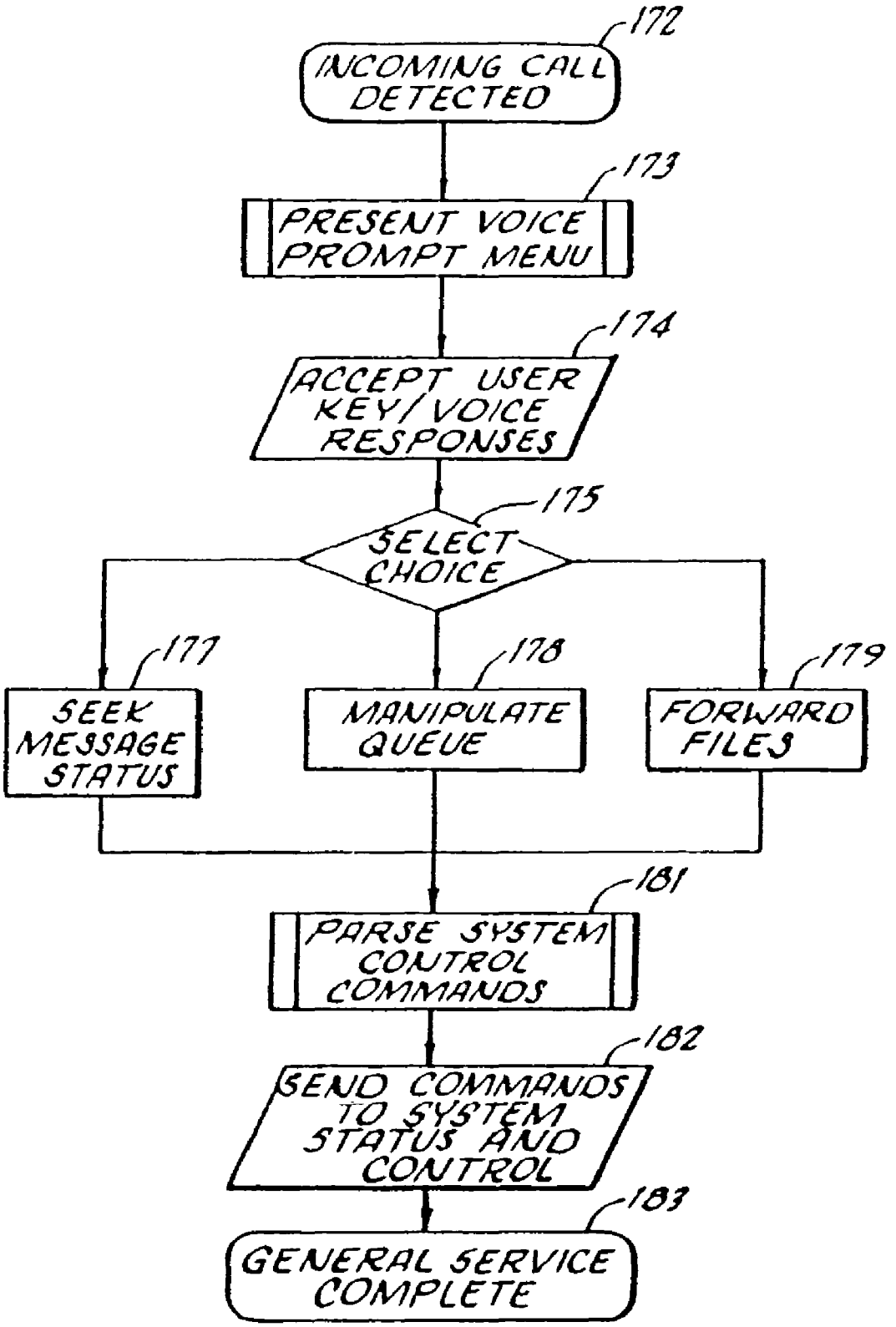

172
INCOMING CALL DETECTED
173
PRESENT VOICE PROMPT MENU
174
ACCEPT USER KEY/VOICE RESPONSES
175
SELECT CHOICE
177
SEEK MESSAGE STATUS
178
MANIPULATE QUEUE
179
FORWARD FILES
181
PARSE SYSTEM CONTROL COMMANDS
182
SEND COMMANDS TO SYSTEM STATUS AND CONTROL
183
GENERAL SERVICE COMPLETE

FIG. 7.

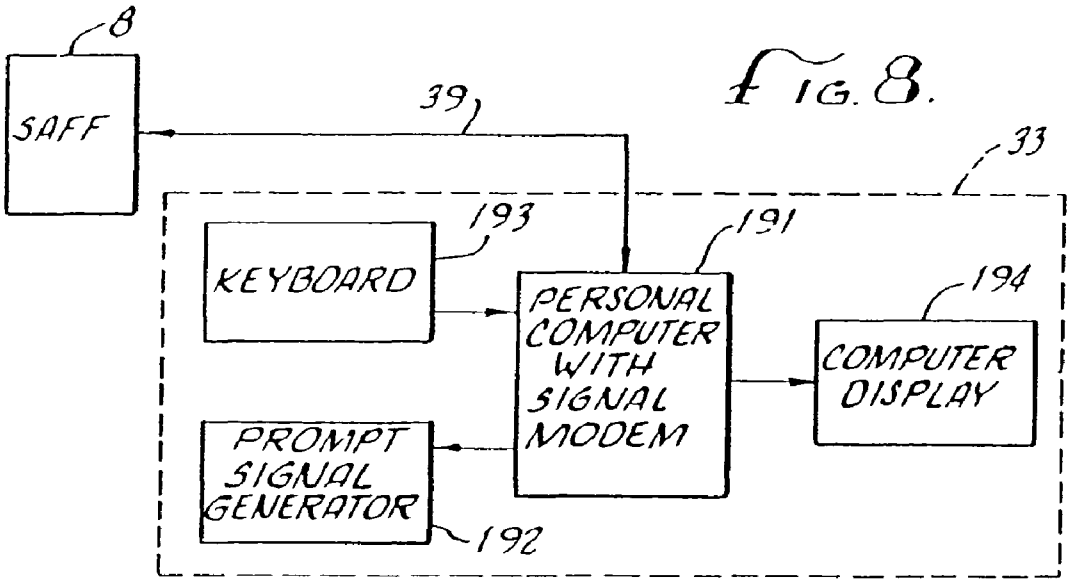

8
SAFF
39
33
193
KEYBOARD
191
PERSONAL COMPUTER WITH SIGNAL MODEM
194
COMPUTER DISPLAY
PROMPT SIGNAL GENERATOR
192

FIG. 8.

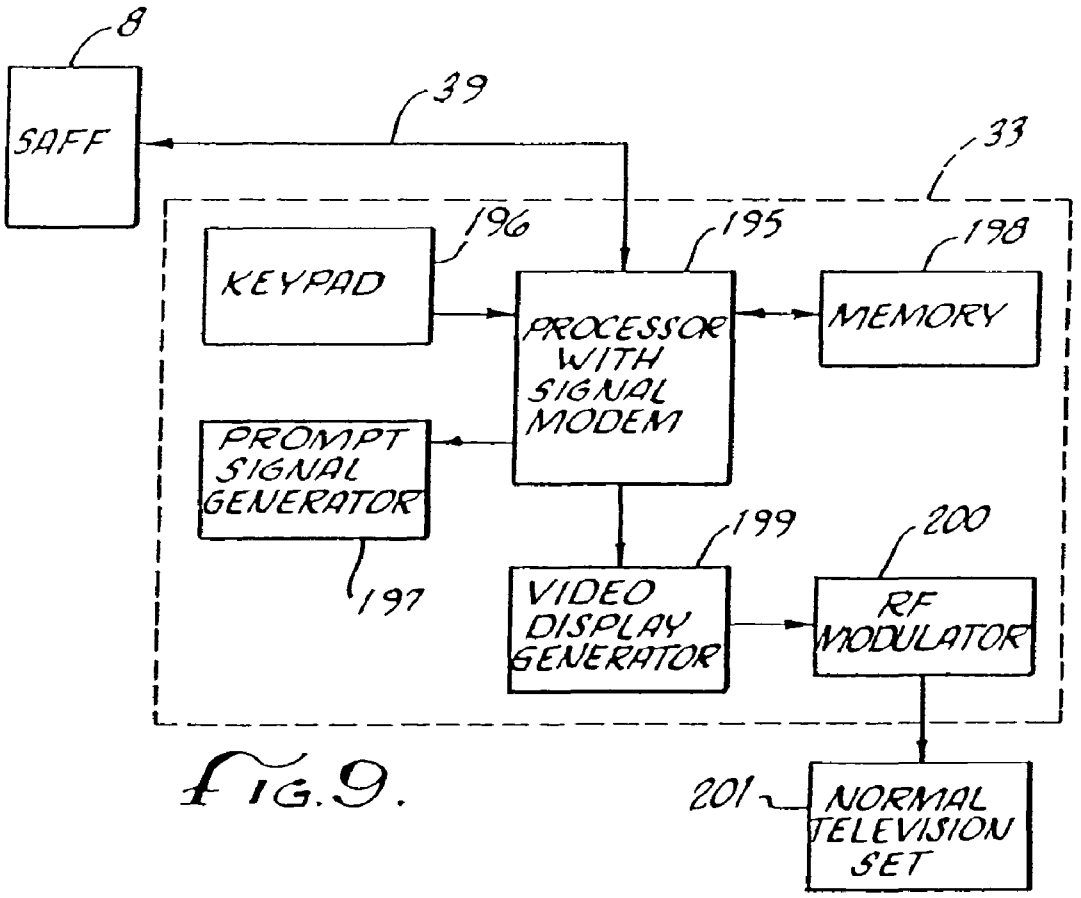

8
SAFF
39
33
196
KEYPAD
195
PROCESSOR WITH SIGNAL MODEM
198
MEMORY
PROMPT SIGNAL GENERATOR
197
199
VIDEO DISPLAY GENERATOR
200
RF MODULATOR
201
NORMAL TELEVISION SET

FIG. 9.

FACSIMILE TELECOMMUNICATIONS SYSTEM AND METHOD

The present application is a continuation of application Ser. No. 11/426,505, filed Jun. 26, 2006; which application is a division of application Ser. No. 10/927,630, filed Aug. 26, 2004, now U.S. Pat. No. 7,202,978; which is a continuation of application Ser. No. 09/717,996, filed Nov. 21, 2000, now U.S. Pat. No. 6,785,021; which application is a continuation of application Ser. No. 09/686,306, filed on Oct. 11, 2000, now U.S. Pat. No. 6,643,034; which application is a continuation of application Ser. No. 08/780,690, filed Jan. 8, 1997, abandoned; which application is a continuation of application Ser. No. 08/395,062, filed Feb. 27, 1995, abandoned; which application is a continuation of application Ser. No. 08/371,842, filed Jan. 12, 1995, now U.S. Pat. No. 5,459,584; which application is a continuation of application Ser. No. 08/166,701, filed Dec. 14, 1993, abandoned; which application is a continuation of application Ser. No. 07/955,833, filed Oct. 2, 1992, now U.S. Pat. No. 5,291,302; which application is a continuation of application Ser. No. 07/654,181, filed Feb. 12, 1991, abandoned. The disclosures of such prior patents and applications are hereby incorporated herein for all purposes by this reference.

FIELD OF THE INVENTION

The field of this invention is telecommunications systems used in connection with facsimile transmissions. More specifically, this invention relates to a system and method for enhancing ease of facsimile transmissions and providing features relative to facsimile transmissions not heretofore available.

BACKGROUND OF THE INVENTION

The electronic transmission of documents by way of facsimile (fax) systems employing public and private switched telephone networks has become both commonplace and, often, an essential component in many business activities. In such a setting, it is very common for the fax terminals (fax machines) to be kept quite busy during a major fraction of the business day. Moreover, where sender and recipient are in different time zones, the "business day" can approach 24 hours, particularly in international activities. It is common for fax users to "broadcast" documents to a number of different recipients, that is, send the same message to several different fax machines. It is also true that the contents of some faxed documents are of such a sensitive nature that the originator or addressee would like to have a measure of control over who might see those documents as they move from the receiving machine to the hands of the actual addressee.

These circumstances present a number of practical problems for a fax user. In order to make a successful fax transmission it is necessary that the receiving machine be available at the time that the transmitting machine attempts to contact it. If the receiving machine is already in use handling another message, the transmitter will receive a "busy" signal. The originator's only recourse is to continue initiating telephone calls until contact can be established. This is a "hit or miss" process at best and can be very wasteful of the originating operator's time.

Some, rather expensive, fax machines have digital memories which will allow them to memorize the document to be transmitted and to be programmed to make multiple redials in an effort to establish contact in an automatic way. However, this is limited to only one or two documents and, more importantly, it ties up the transmitting machine until the effort is successful or abandoned. This is hardly an acceptable solution if that machine has other documents to send or receive.

There are other conditions which can result in a failure to transmit even though a telephone connection has been established. Perhaps the most common of these is the absence of paper in the receiving machine. In such situations, repeated attempts to "redial" will lead to repeated toll charges with each attempt, with no actual success until the receiving machine is serviced (which may be some time if the machine is operating unattended because it is nighttime half-way around the world).

Busy machines which are destined to receive messages are affected by the converse problem. Since they and the prospective transmitting machines must engage in (perhaps, automated) "telephone tag", they are used very inefficiently. When a transmitting machine gets a busy signal, even if it automatically redials, it can only guess at when the receiving machine will be available. Thus, the receiving machine will likely remain idle for some fraction of the time until such an attempt is made.

The practice of broadcasting documents to a number of addressees obviously compounds these problems and adds still others of its own. Even if one does not encounter busy signals or impaired machines, convenient broadcasting demands an expensive memory-type fax machine on the transmitting end. Such machines read in the document once and then proceed to automatically dial the various recipient machines. This process ties up the sending machine and its telephone line and makes them unavailable for incoming calls. This, of course, exacerbates the busy signal problem for those units trying to contact the sending machine.

The security of sensitive documents is still another problem. Once contact is established between two fax machines, the transmission of the document proceeds automatically, irrespective of who may be standing by the receiving machine at the time. In a busy office, the contents of these documents are accessible to the fax operator and anyone else who happens to be in the vicinity.

It is also common for individuals to wish to deliver fax documents to a recipient who is not currently available through a known machine (e.g. a person on a business trip). This is a very inconvenient situation in that it requires that the paper documents be held until the traveler phones in from a remote machine. It further requires that there be someone available at that time who has knowledge of and access to the documents intended for the recipient.

Another concern is related to so-called paperless fax terminals. In recent years, paperless fax techniques allow a computer or a micro-processor equipped with specific software and modem to directly transmit and receive facsimile messages. However, it is also very common that the recipient is not in his or her office (the paperless fax terminal may also be located at home) at the time when fax message is coming. For example, the recipient is out to lunch or otherwise absent from his or her office or home. This requires the sender to retry the communication message delivery again and again if there is no other fax machine available in the office.

Still another concern is adequate accounting control over the billing of calls. Typically, many businesses wish to be able to track the costs of both fax machine use and the associated telephone charges. While telephone charges can be ascertained from telephone company records, in the present environment these must be related to records of the number of pages transmitted per call and so forth, separately maintained by the fax machine or its attendants.

SUMMARY OF THE INVENTION

The objects of this invention are to address these many shortcomings of present fax systems and to provide an integrated system for their solution. Furthermore, the intention is to achieve this in a way which is fundamentally compatible with existing fax terminal machines. The basic approach is to provide special computer-based fax Store And Forward Facilities (SAFF's) as an integral part of a switched telephone network system. All fax transmissions entered into the network are routed to such a facility, typically geographically near the originating machine, where they are temporarily stored or "spooled" by the computer in a mass storage buffer, such as a magnetic disk.

The fax message from the originating machine is intended for a destination machine, which may or may not be in a position to immediately answer the call. If the destination machine is within the service region of that SAFF, the system then proceeds to attempt to call the destination fax-machine. If the destination machine is within the service area of a different SAFF, the system forwards the fax document data to that facility by long-distance lines, in which case this second facility attempts to call the destination machine. In either case, if contact is established and the message is delivered immediately, the system directs a printed report back to the originating fax machine confirming delivery to the destination machine, and other pertinent data.

If, on the other hand, the delivery cannot be completed immediately due to a busy signal, a machine fault (eg, receiving machine out of paper) or any other reason, the spooled document is saved and the system makes periodic attempts to contact the destination machine and complete the transmission.

In the meantime, the system sends a printed report back to the originating machine acknowledging that the message has been entered into the system, indicating the reason the delivery is being delayed, stating the protocol the system will take to deliver the message, and providing a reference number or "Message Code" which identifies the message and may be used at a later time to trace the status of the document.

Placing the delivering spooling system geographically near the destination machine has the advantage of more economical use of any long-distance lines that may be involved. These lines are used only to move the message from the originator to the spooling system in the vicinity of the destination, which is virtually certain to be successful on the first try. Subsequent attempts to contact the destination machine can be handled more or less locally and need not tie up the bulk of the long-distance facilities.

If the delayed delivery is ultimately successful, the system will send a printed delivery report to the originating machine. On the other hand, if the delivery attempt protocol has gone through its whole cycle without success, a report will be sent to the originator indicating that the delivery procedure has failed and requesting instructions as to how to proceed (eg. try again, redirect the message to an alternate number, or delete the message).

An important feature of the system is that it recognizes all of the documents that are spooled in the system at a given time for a given destination machine. These are identified and linked together to form a message queue for that machine. In this way, once contact is established, all of the waiting messages can be "dumped" to that machine in a continuous batch. Furthermore, if new messages arrive while that dump is occurring, they are simply appended to the end of the active queue and are transmitted when their turn comes. This has the advantage of greatly enhancing the utilization efficiency of a busy destination machine.

Since all outgoing fax documents are temporarily stored at the facility near the originating machine, it is also practical to provide for automatic broadcasting of documents to multiple destinations. Lists of "broadcast groups" of phone numbers can be programmed into the facility by users, or a list of destination phone numbers entered "by hand" at the time of a call. The SAFF can then broadcast the message to every machine of the selected list. This is a great advantage to broadcast users in that they need only tie up their machines for one outgoing transmission, the one to the SAFF. The SAFF copies the message to all of the destination machines as outlined above. In the meantime, the originating machine is available for receiving or transmitting other documents.

Similarly, since the documents are stored near the originator, the system can permit messages which have already been sent to be copied to other destinations after the fact, without the necessity of resending the message to the SAFF. Likewise, since the messages are also spooled in a facility near the destination, the system also provides the recipient with the option of forwarding or redirecting documents to still other destinations, as if the recipient were the originator. The system can also accept and store messages destined for a fictitious destination or "Mail Box". Thus, individuals who are traveling can, at their convenience, dial into the system and pick up any waiting documents.

Other services are provided that are particularly useful to individuals who are not at the "home" machines. For example, so-called "paperless" fax terminals, small portable computers equipped with modems and software programs which enable them to emulate fax terminals, are being employed at an increasing rate. The Mail Box system recognizes a variety of these devices and provides interactive features to facilitate their use. In this case, the SAFF can either periodically retry to communicate with the intended paperless fax terminal or transmit the fax message to another paperless fax terminal or fax machine as instructed by the recipient or sender. In addition, the system recognizes a small, highly portable Mail Box Reader that consists of an adapter that can be connected between the user's telephone and a normal television set (for example, in a hotel room), allowing the user to display fax messages received from the Mail Box on the TV screen.

The system is also programmed to provide a fax-to-voice message conversion service which can convert an inbound fax message into a voice mail message and send the message to the intended recipient's voice mail box, such as an answer machine.

Another useful feature is the ability of a fax recipient to send automated-voice replies to fax messages back to the originators (typically directed to a voice mail box). This permits the recipient to select a, generally terse, response from a menu of possible replies. These replies may be selected from a menu of standardized responses provided by the system or from a menu of customized responses, in the user's own voice, that is maintained by the system.

Closely akin to these features is the ability to have the originator of a transmission include the requirement that the recipient provide a security code, such as a PIN number, in order to release the document from the spool to the destination machine. In this case, the SAFF sends a written report to the destination machine advising that a secure message is waiting for a particular recipient and the fax identification of the originating machine. The recipient must then call in to the SAFF and key in the security code to initiate the delivery of

the document. Since the document is spooled, the delivery easily may be delayed until the recipient is available to supply the code.

Finally, since the documents and their delivery are both under the control of the telephone system, as a special service the telephone call accounting system can provide both time and charges for the telephone services rendered and fax information, such as pages transmitted, sorted according to the originator's clients. This can greatly facilitate the fax user who wishes to do cost accounting or to bill clients for costs incurred.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention will be apparent from the following Detailed Description of the preferred embodiments thereof and from the attached Drawings of which:

FIG. **1** illustrates the inter-relationships of the principal elements of a connection between two SAFFs.

FIG. **2** shows a more detailed view of the various systems within a single SAFF, such as those shown in FIG. **1**.

FIG. **3** illustrates the major components of the Originate Function in the SAFFs shown in FIGS. **1** and **2**.

FIG. **4** illustrates the major components of the Answer Function in the SAFFs shown in FIGS. **1** and **2**.

FIGS. **5***a* and *b* show a flow chart describing the general processing steps required to handle a fax or voice message incoming to the Originate Function of a SAFF, as described particularly in FIGS. **2** and **3**.

FIGS. **6***a* and *b* show a flow chart describing the general processing steps required to handle the delivery of a fax message incoming to the Answer Function of a SAFF, as described particularly in FIGS. **2** and **4**.

FIG. **7** shows a flow chart of the general processing steps required to handle a service request in the General Service unit of a SAFF, as described particularly in FIG. **2**.

FIG. **8** shows a block diagram of an embodiment of the paperless facsimile terminal.

FIG. **9** shows a block diagram of another embodiment of the paperless facsimile terminal which can utilize an ordinary television set for display of facsimile messages.

DETAILED DESCRIPTION

Introduction

The preferred embodiment of this invention is a multi-function, interactive facsimile transmission system which is integrated into a switched telephone distribution network, where "network" is taken broadly to mean the entire system required to complete a communication from an originator to an answerer. This embodiment provides a comprehensive computerized fax message management system based on automated fax Store And Forward Facilities (SAFF) embedded in the network. This system requires no modifications to existing facsimile machines, but rather, relies on the network to provide the enhanced services.

The system contains several components which actually transmit the fax messages and related information, provide written fax reports to users about the status of messages within the system, allow user intervention in the sequence of automatic actions of the system, provide an accounting of services rendered for both the customer and the telephone company, and control and supervise all of these activities.

In the preferred embodiment, it is presumed that the SAFF's are placed at the interface between the local telephone delivery system and the long-distance delivery system, as indicated in FIGS. **1** and **2**. In this setting, the SAFF system can be controlled and its services offered by either one. However, it is obvious that useful systems can be constructed where the SAFF exists as close to the user as a component of his or her own in-house telephone system (such as a PBX or Centrex) or as remotely as a single, independent, stand-alone SAFF serving a wide geographical area. It is also obvious that commercially viable systems can be constructed which provide subsets of the features of the preferred embodiment. The choice of site/control setting and service features might be driven by any number of economic, market, or legal considerations, which would militate toward offering the system at an alternate location in the network, or in a "stripped down" form.

To more clearly understand the present invention, it is useful to consider the manner in which a fax transmission occurs in the traditional setting. Here the communication between two machines is initiated when the destination machine answers a telephone-call directly from the originating machine. Typically, there is an exchange of digital data identifying the sending and receiving machines to each other and establishing the fax mode or format to be used. If this exchange is satisfactory, then the actual image transmission takes place. Otherwise, the call is terminated, usually with some form of written diagnostic to the respective users.

Message Interception

In the present invention, all fax transmissions initiated by a subscriber to the fax management system are first intercepted by an "originator" SAFF; that is, the SAFF which directly services the originating fax machine. FIG. **1** shows two exemplary SAFFs **8** and **18**, with interconnections between the SAFFs and with subscriber fax machines being diagrammatically indicated. Thus in FIG. **1**, the SAFF **8** includes an originate function **9** coupled over telephone lines **4** to originating fax machines **1**. Likewise, the SAFF **18** includes an originate function **22** coupled over telephone lines **26** to originating fax machines **30**. Each of the SAFFs **8** and **18** also includes respective answer function blocks **12** and **19** respectively connected over telephone lines **6**, **24** to fax machines **3**, **28**. Each of the SAFFs **8**, **18** also includes service interfaces **10**, **21** coupled via telephone lines **5**, **25** to telephones **2**, **29**. The function and purpose of the service interfaces is more fully explained hereafter, and they are under control of status and control blocks **11** and **21**.

Access to the system of FIG. **1** can be obtained much the same as access to a specific long-distance company's network. That is, subscribers such as **1** in FIG. **1** can dial a unique access code at the time a call is initiated, or a telephone line dedicated to a fax terminal may be permanently routed to the SAFF system, in this case the SAFF **8** of FIG. **1**. Either way, one accesses SAFF Directed Lines **4** and the SAFF **8** itself in the process of dialing the destination fax machine.

The SAFF **8** then answers the phone in place of the destination machine, such as one of **28** shown in FIG. **1** as serviced by SAFF **18**. For the moment, this SAFF **8** near the originator becomes the proxy for the destination machine **28**. While noting the actual destination telephone number, the SAFF **8** engages the originating machine in the same digital dialogue that would have occurred if a direct connection to the destination machine had actually been made. Thus, it echoes back the destination telephone number, to identify the intended destination machine, and agrees to accept the fax format requested by the originating machine.

This causes the originating machine **1** to respond by transmitting the fax document image data. The originating

machine's identification, the destination machine's telephone number, the fax format, and the document image data are all stored on a mass storage device **67** (in FIG. **3**), such as a computer magnetic disk unit. Furthermore, a unique alphameric Message Code is assigned to the block of data to identify it while it is resident in the SAFF system. This Message Code is related to the file name for the stored data.

Delivery

At this point, the SAFF **8** initiates two actions. The first is to generate an "Acceptance Record" of the transaction to this point. This record, in one form or another, will be returned to the originator as will be described below. The second step is to begin to deliver the fax message to the destination machine **28**.

The details of the delivery process depend to some degree on the geographic location of the destination within the network. A single SAFF can, in principle, service a broad geographical area. However, in the preferred embodiment, communications beyond a certain limiting distance involve at least two SAFFs, one **8** near the originator **1** and the other, a "destination SAFF", **18** near the recipient **28** of the document. The choice of one, two, or more SAFFs is determined by network economics, or other considerations, and is not essential to the invention.

For the sake of this discussion, we will define a "local" message to imply that the originating and the destination machines are serviced by the same SAFF. (Although, this does not preclude the possibility that the two machines are some considerable distance apart and connected by a toll call.) On the other hand, we will define a "long-distance" message to mean that the originating and destination fax machines are serviced by different SAFFs and, thus, one SAFF must exchange data with the other, perhaps through intermediaries. Similarly, the term "near" used in connection with a SAFF refers to being within the service area of that SAFF.

Each SAFF **8**, **18** has two clearly defined roles: the "Originate Function" **9**, **22** for handling data with an originating machine, and the "Answer Function" **19**, **12** for handling data with a destination machine. The details of these two subsystems are illustrated in FIGS. **3** and **4** respectively. In the local message mode, the connection between the Originate Function, such as **9**, and the Answer Function, such as **12**, is linked within the single SAFF **8** by way of a Local Call Loop-back connection **13**, between the two Functions. In the long-distance mode, the Originate Function **9** of SAFF **8**, near the originator, is linked to the Answer Function **19** of another SAFF **18**, near the destination, by long-distance lines, such as **14**, or **16** for SAFF **18**. Thus, processing a long-distance message involves the same basic steps as a local message, except that the activity is shared interactively between at least two different SAFFs.

Originate Function

With this understanding of SAFF functions, the following detailed discussion will illustrate the operation of the system in the long-distance case, since it is the more complex, and therefore provides a more comprehensive example. FIGS. **1**, **2**, **3**, and **4** all show elements of the SAFF system in varying degrees of detail and all will be referred to in the following. It will be noted that some critical elements are shown in more than one of the Figures.

As an example, it is assumed that one of the subscribers **1** attached to SAFF **8** wishes to send a fax message to one of the subscribers **28** attached to SAFF **18**. The subscriber **1** places the call to the destination machine **28** which is routed over SAFF Directed Lines **4** to the Originate Function **9** of SAFF **8**. These signals originate within the SAFF system and they are picked up by the On-net Interface **64** which is part of the Originate Function, as shown in FIG. **3**. This Interface signals the Originate Host Computer **70** of the incoming call and the Host responds by directing the incoming data to a Mass Storage Unit **67** where it is stored in a file **68**.

During this storage process, the Host directs two other activities. It creates a call status record file **69** (FIG. **3**) in mass storage, recording the time and date of the origination, the telephone number of the calling machine, the telephone number of the destination machine, any security or other special services requested, various housekeeping information, and it assigns the Message Code number which locates not only the status file but also the fax data file associated with it. The Host also passes the destination machine's telephone number to the Outbound Control unit **74** which proceeds to connect the originating SAFF **8** with the nearest available SAFF **18** to the destination through a long-distance interface **75** over long-distance circuits **79** (**14** in FIG. **1**). In the process of establishing this connection, the Outbound Control unit employs an algorithm which examines the number and kind of available trunk resources and chooses the most efficient combination of these lines for the task required.

Answer Function

The originating SAFF **8** then proceeds to transmit the originator and destination telephone numbers, the stored fax image, the Message Code, and other housekeeping data to the destination SAFF **18**. These data are sent by the most expedient mechanism offered by the long-distance service. For example, if this service employs digital communications, the fax data may well be transmitted at a significantly higher rate than it was originally received into the system.

The fax data is received by the Long-distance Interface **95** (FIG. **4**) in the Answer Function **19** of the destination SAFF. This unit signals the Answer Host Computer **85** of the incoming data. The Host then routes these data to its Mass Storage facility **87**. (It should be noted for later reference that the originator SAFF and the destination SAFF now both have a copy of these data.) The Host notes whether other messages are pending for the destination machine and either opens a Delivery Queue file **88**, or appends the new message to the existing Queue File.

The Host also records the arrival time and other pertinent information about the fax message in a Call Status file **90** in Mass Storage unit **87**, and sends a status update back to the originating SAFF **8** by way of the Status and Control Interface **84**, and the System Status and Control Unit **11** via Long-distance Trunks **15**.

It then signals the Local Interface **83** to dial the destination machine's (**81** in FIG. **4**) telephone number on ordinary outgoing local lines **24**, **82**. If the destination fax's line is available, the destination SAFF now becomes the proxy for the originating fax machine and engages the destination machine in the necessary preliminary digital dialogue.

If this is successful, the document image, including the source and destination identification information, the Message Code, and the entry and delivery times, is played back from storage and delivered to the destination. A "Delivery Record" is then created by the Answer Host **85** which indicates the date and time of delivery, and any other pertinent data. The Delivery Record is sent back to the originating SAFF **8**, again by way of the Status and Control Interface **84**, and the System Status and Control Unit **11**, via Long-distance Trunks **15**. The originator SAFF **8** then appends this information to the Acceptance Record to form a complete "Trans-

action File". The originating SAFF **8** then sends this file, as a delivery receipt or report, back to the originating machine **1**, **60**, as a fax document.

If the destination machine's line is busy, or the contact fails for some other reason, the destination SAFF's Host Computer **85** will enter a sequence whereby it will attempt to contact the destination machine and transmit the document on a predetermined schedule for a specific period of time or number of tries. As this sequence is entered, a "Retry Record" is generated documenting the situation and the system's response to it. This record contains the reason that the delivery was delayed and it indicates which protocol the system will use to attempt to deliver the message. This is transmitted back to the originating SAFF **8**, as described above, and appended to the previously described Acceptance Record to form a Transaction File which is then sent as a fax message back to the originator. The assigned Message Code is a part of every transaction report and may be used at any time to trace the status of undelivered documents, as will be described shortly.

If the retry effort is ultimately successful, a Delivery Record is appended to the Transaction File which is sent back to the originating machine. If the effort fails after reaching the predetermined limit, this is also recorded, appended, and sent back to the originator. In this case, the originator is given the option of dialing back into the system within a certain length of time (typically several hours) and instructing the destination SAFF as to how to dispose of the document (eg. repeat retry sequence, forward to a different telephone number, or delete the message).

This process is handled by using an ordinary touchtone phone to dial a multipurpose (perhaps, toll free) fax system "Service Number"; which will be referred to here and in later sections. This might be a unique number for every SAFF, or it might be a standardized number common to many localities, except perhaps for area code, such as is 555-1212 for calling "Information". This Service Number is answered by the General Service Control units (**10** in FIG. **1**, **50** in FIG. **2**) of the SAFF to which the call is directed. This unit contains an automated voice response system that presents a menu of the available services and prompts the user to select the desired choices by pressing particular numbers on the touchtone keypad. In an advanced embodiment, a computer-based voice recognition system replaces the keypad and accepts verbal commands in a conversational way.

The General Service Control unit **50** can communicate with its own System Status and Control unit **11**, and through that unit, any other such unit **11**, **20** via Long-distance Trunks **15**. Through these connections, both inquiries relating to messages in the system and instructions as to their disposition may be addressed to the entire SAFF system.

Having selected the "failed-connection message disposition" choice, the user is prompted to key in the Message Code. The system verbally repeats the code and the delivery discrepancy for verification, and then presents a menu of disposition options for the user to select with the keypad.

If the user does not take advantage of this "what to do now" opportunity within the time limit, the message is retransmitted back to the originator with a report. It is then erased from both the originator and destination SAFF files after a suitable delay (typically six hours). If the originator wishes to resend the message during this "grace" period, it may be recovered and resent to the original destination or forwarded to another destination(s), as will be described later.

In each of the various cases where the SAFFs automatically direct fax message status reports (such as, the Acceptance, Delivery, or Retry records above), the system can be programmed to accumulate records from all calls over a period of time (eg. an hour) at the originator SAFF and deliver them as a single fax document at the end of the period or upon request by the originator. This has the advantage of reducing the number of report calls and the subsequent burden on the originating fax machine. The originator SAFF will enter a retry sequence if it finds the originator's line busy or the machine unavailable when it attempts to deliver reports. This is a persistent sequence which it will continue trying for direct contact at intervals of an hour or so for a considerable length of time (eg. 72 hours). It also places a copy of the report in the originator's Mail Box (described below) so that the originator may recover it in between SAFF delivery attempts.

It should also be noted that the originator has the option of dialing the Service Number at any time and inquiring about the status of a given message. Here again, the voice response system prompts, presents menus, and uses the Message Code to locate and report on the current location and condition of the message. A written record can be directed to the originating or destination fax machine, if desired.

Another feature of the General Service function (and the Mail Box function described later) is the ability to send an immediate reply to a received fax message. There are many instances where one might wish to provide a personal acknowledgement of receipt and some indication of the future course of action. A collection of such responses is available and may be selected from a menu using the General Service or Mail Box systems. Examples might be: "I received your fax number (Message Code) at (date, time)"; "I am unable to respond at this time"; "I will respond in the next 24 (48, 72) hours"; "I completely agree, proceed as described", "Take no action until you hear from me", and so forth.

In a typical transaction, the system asks the user for the SAFF-assigned Message Code and then presents a menu of these "canned" responses. It will also permit the concatenation of several such responses to form a more complex message. Once the user has made the appropriate selections, the system will replay an automated voice version of the message and permit editing as required. When the user is satisfied, the reply is then transmitted either as a fax message or as an automated voice message to a designated telephone number. That number may represent an active fax or voice number, or it might represent a fax or voice mail box.

When a voice reply is selected, the user can select the sex of the automated voice, or the user can actually employ a personalized menu of custom responses tailored by the user to his or her own requirements and prepared in the user's own voice.

Still another feature of the General Service function is the ability to provide a fax-to-voice message conversion service. This service allows the SAFF system to receive an inbound fax message and then electronically create a voice mail message directed to the intended recipient voice mail box as instructed by the message sender or the intended recipient. The fax message may be stored in a subscriber's mail box in the system which will be fully discussed later. In order to provide this service, the SAFF is equipped with suitable software and voice print database that will permit the system to electronically interpret the facsimile message from printed documents to verbal text. The voice mail message transferred to the instructed voice mailbox may be the whole text of the facsimile message or only a voice message which will verbally identify the originator of the facsimile message, the reading time and the number of papers. The intended recipient can then commence the electronic translation by touch-tone signal and can control the operation in fast forward or reverse through the document by touch-tone command.

Another feature of the system is that the act of accepting and storing an incoming message at the originator SAFF, and the act of dialing and forwarding that message to the destination by the destination SAFF, can overlap in time. That is, if the originator SAFF has lines available, once the initial connection dialogue between the originator and the SAFF is complete, the SAFF may immediately make its first attempt to contact the destination SAFF and, thus, the destination machine, while it is beginning to spool the document.

If this immediate contact is successful, then the message is passed from the originator SAFF **8** to the destination SAFF **18** to the destination machine **28** directly from the Originate Host Computer's memory **70** while the two SAFFs are still in the process of spooling the document to disk. This is facilitated by a "write-through pipeline" whereby the Originate Host **70** passes the incoming fax data through directly to the Outbound Control unit **74** at the same time it is being written to mass storage. It is held in a temporary memory buffer in the Outbound unit until it is clear whether or not an immediate connection to the destination machine is possible. At that point the temporary buffer fax data is either sent and then deleted, or merely deleted. The net effect is that the spooling process only adds a few seconds delay in the message delivery over the traditional direct machine-to-machine contact when the destination machine is readily available.

On the other hand, if lines are limited, the originating SAFF can choose to delay until suitable lines are available. This has the advantage of improving communications resource management and enhancing the efficiency of the telephone system's line usage over the direct contact scheme.

The foregoing describes the basic fax SAFF message handling system and from this discussion several advantages should be apparent. The originating machine always functions as if it makes contact and delivers documents on the first try, thus immediately freeing the machine and the attendant personnel for sending or receiving other transmissions. Likewise, the telephone system only handles one call across its local and long-distance lines from the originating machine to the destination SAFF, since the state of the destination machine has no impact on the call. This significantly improves the efficiency of line usage when messages are addressed to busy fax terminals.

Although some additional calls are needed to deliver the various reports, these require very little long-distance time, as they are transmitted over the circuits as highly compressed coded messages. It is the nearby originating SAFF that translates them into "plain language" for fax delivery as a local message. As pointed out, additional savings in these local messages can be gained by compiling multiple reports and delivering them in bulk as a single call. It should be noted that the delivery of reports to an originator is a cooperative process between the Originate Function and the Answer Function of the originate SAFF. The Originate Function **9** actually generates these reports and passes them through the Local Call Loop-back **13** (**76** in FIG. **3**) to the Answer Function **12** for delivery as an ordinary fax message.

In addition to these basic features, the design of the system also provides for a number of additional services and advantages which are described below.

Message Queuing

As pointed out, all fax messages directed to a particular telephone number are spooled by the Answer Function of the destination SAFF, as detailed in FIG. **4**. The Host Computer **85** controlling this function monitors the incoming messages and links all undelivered messages for a given telephone number into a message Delivery Queue file **88**. The computer also compiles a constantly updated, ordered catalog of the file names of the messages waiting for each fax machine.

Consequently, when messages arrive at a rate faster than they can be delivered, for whatever reason, they are held in this queue for delivery. As soon as the destination SAFF establishes contact with the destination machine, it begins sending the entire queue of messages in a single, essentially uninterrupted transmission. Messages that arrive while the transmission is in progress are appended to the end of the queue.

This scheme eliminates the "trial and error" dial and redial attempts that result from a number of independent incoming calls competing in an uncoordinated way for the single destination line. It can significantly enhance the efficiency of the destination fax machine and the long-distance and local telephone circuits connected to a busy machine.

When the queue exceeds a certain limiting size, the destination SAFF will periodically insert and send a "Queue Report" (as a fax document) to the destination machine showing a list of the waiting messages. This list shows the originating machine identification, the time entered into the originator SAFF, the number of pages in the document, and the approximate time that the message will be delivered based on its position in the queue.

The user can advance a particular message to the head of the queue by calling the fax Service Number and supplying the desired message number, by using the voice response menus. The General Service unit **50** directs these instruction to the System Status and Control Unit **11**, which in turn directs them to the Answer Function Host **85** through its Status and Control Interface **84**.

Alternately, the originator can designate a priority level to a given fax message at the time it is dialed in (eg. by using a different access code). In this case, the destination SAFF will insert higher priority messages ahead of lower priority messages in the queue as they are received. The originator would normally pay a premium price for this service.

Another originator option is the time of delivery. If desired, the originator can specify the time of day which the message should be delivered. In this case the message is forwarded to the destination SAFF directly, but is not entered into the queue until the specified time. This can be used in combination with an assigned high priority to insert the message at the head of the queue at the appointed time.

When messages are finally delivered to the destination machine they are not immediately erased from the spool file **88** at the destination SAFF. Rather, they are maintained in a "Delivered Message" directory **90** for a period of time (typically six hours). A feature offered by this action is the opportunity for the subscribing recipient of a message to make additional copies, redirect, or forward copies of selected messages to other destinations. This is accomplished by calling the Service Number and selecting the appropriate choices from the voice response menus.

Security and Mail Boxes

It is not uncommon for documents of a sensitive nature to be sent by facsimile from place to place. This is often a problem, especially in a busy office or where a machine is nominally unattended during the transmission, in that the originator has no control over who may be standing by the machine when the document prints out, or who may leaf through a stack of faxes piled up in a hopper right after lunch.

This is a problem which others have attempted to deal with in a variety of ways. For example, Bond, U.S. Pat. Nos. 3,594,495 and 3,641,432, discloses a "radio facsimile postal system" which features the direct delivery of documents to

specific addressees by facsimile via communications satellites. In this system, intended as a replacement for or supplement to the ordinary "paper" postal system, fax messages were directed from special public fax terminals operated by the post office to a central satellite earth-station. Here the messages were sorted according to their geographical destination for concentration and uplinking to a satellite servicing that area. The satellite then broadcasts all of the uplinked messages back to Earth.

In principle, anyone with a radio receiver in the satellite's service area could access any of the messages, so Bond built in a "privacy code" which operated with the receiver to allow the message to print out only on the desired machine. In reality, this privacy code was nothing more than an addressing signal which enables the selected fax receiving system. Thus, Bond's system is merely a restricted version of the services presently provided to fax users by the telephone networks. His privacy code function is the same as a telephone number: it selects which of a plurality of fax machines will actually receive the message. Unfortunately, his approach leads to exactly the security dilemma facing telephone fax users.

Chapman, U.S. Pat. No. 4,106,060, has approached the problem in a somewhat different way. He too discloses a facsimile-based mail system. However, in his system, the messages are directed by whatever means to a "paper" post office near the addressee, rather than the addressee's home or place of business. This post office then makes a paper copy of the fax message, places it in an envelope, and delivers it to the addressee as ordinary mail. This is a reasonably effective solution to the security problem, but it can only be relied upon to provide "next day" delivery, and there are a number of other, competing alternatives for document delivery service on that time scale.

In the present invention, the security problem is addressed by a control variation of the destination SAFF queuing system. Messages which the originator wishes to designate as secure are temporarily directed to a auxiliary storage file **54**, **89** in the Answer Function of the destination SAFF called a "Mail Box". Instead of being delivered to the destination machine, a report is sent to that machine indicating that a secure message is waiting for a particular addressee. Optionally, a voice message may be directed to a designated telephone number, such as a voice mail box, by the General Service Control **50**.

This feature works in the following way. Each individual SAFF is assigned its own unique telephone exchange code or codes (typically indicated by the first three digits of a seven digit local number). Thus, the SAFF appears to the world as if it were a distinct telephone exchange(s), separate from all other exchanges in that area code region. All subscriber's to a given SAFF are assigned their fax telephone numbers with that exchange prefix. Subscribing individuals wishing Mail Boxes (typically associated with a "default" fax machine) are issued "fictitious" telephone numbers which actually terminate in fax Mail Boxes, rather than in an actual telephone line.

Mail Box numbers are published so that correspondents may use them. In addition, each individual is also given a secret security code or PIN number which will access his or her box. The host computer managing the SAFF maintains a list that relates each fictitious number with the individual's name, the security code, and the real telephone number of the default destination machine. This default machine is the one to which messages and reports will normally be sent, when appropriate. In addition to a default fax machine, the user may also define a default voice telephone number which may be either a telephone answered by a human or a computer-managed voice mail box, as is known in the art. When such a voice telephone is also defined, a voice version of the various system messages and reports will also be sent to this number.

An originator wishing to send a secure message merely dials the (fictitious) Mail Box telephone number at the time the document is sent. The system directs the message to the Mail Box file **89** in the destination SAFF associated with that number, and the Answer Host **85** sends a "Message Waiting" report to the default destination fax machine through the Local Interface **83**. If a default voice telephone number has also been defined in this report, this report is also sent to that number. The user has the option of programming or instructing the system, through the General Service Control **50**, to have either or both the default fax and the default voice reports forwarded to another number. For example, the person who is traveling could program or require fax or voice Message Waiting announcements to be directed to a hotel fax or telephone number. When voice announcements are made, the system will give the (human) recipient of the call the option of pressing a touchtone key to repeat the announcement as often as necessary to transcribe the message. If more than one message is in the Mail Box queue, then this report lists them all.

In order to get the fax document actually sent to the destination, the security code must be sent back to the destination SAFF. Typically, this would be done by the addressee dialing his or her own Mail Box number. Since this call originates from a "normal" telephone **34** over Ordinary Local Lines **40**, rather than the fax's SAFF Directed Lines **38**, the call is directed to the Off-net Incoming Screener **48** in the (destination) SAFF which functions in conjunction with a mailbox service control **49**. This unit recognizes that the call is not a fax transmission and thus treats it as a voice service request. A voice response system then prompts the caller to key in the security code. When the correct code is supplied, the SAFF system announces the number of messages waiting and, if desired, the message codes of each. Mail Box contents are maintained in a queue **89** just as are "regular" spool files. Thus, the user is also given the opportunity to reorder the messages within a Mail Box Delivery queue, through the System Status and Control units **11**, **20** in the same way as other messages.

The system finally permits the addressee to make a selection of messages for immediate release, and provides an opportunity to "redirect" them to a fax machine **3** other than the default machine over ordinary local lines **39**. The SAFF then releases the selected documents and moves them to the head of the appropriate destination Delivery Queue **88** for immediate delivery. As described earlier, the recipient of the various messages may then choose to provide automated fax or voice replies to selected messages.

When messages are accepted into the SAFF system and arrive at a mail box, The Answer Function of the destination SAFF issues a "Posting Report" which is directed back to the Originator in the manner described for other reports. The report is similar to a Delivery Report, except that it indicates that the message has been received by the mail box. When the Mail Box Queue is actually read by the addressee the Destination SAFF sends an actual Delivery Report to the originator indicating the date and time of delivery and so forth.

Another advantage of the Mail Box system is that it can provide a convenient way for individuals who are away from their "home" machine to still have access to their documents. Such individuals may call in to their Mail Box number to hear from the voice response unit whether they have any messages waiting. By use of the redirection feature, messages sent to a fax Mail Box can be accessed by an individual with the security code from any telephone with a fax machine.

For example, a person on a business trip can have all his or her fax documents directed to their Mail Box. Upon arriving at a hotel that has a fax machine, the traveler places a call to the Mail Box number and supplies the information outlined above, including the telephone number of the hotel fax machine. The SAFF then calls the hotel machine and dumps the queue of waiting documents.

Another aspect of the Mail Box function is support for paperless fax terminals **33**, such as those which provide a volatile display of the fax image on a computer display. Typically, this terminal is shown in FIG. **8** which includes a small, modem-equipped personal computer **191** and a computer display **194**. The terminal can also include a keyboard **193** for entering necessary access code or other information.

In this circumstance, the paperless terminal initiates the Mail Box transaction operating as a computer terminal (rather than a fax terminal), using a computer terminal emulator program such as those well known in the art. The incoming call from an ordinary line **40** is recognized by the Off-net Incoming Screener **48** as not being a fax transmission and is passed to the Mail Box Service Control **49**. This unit recognizes the call as a computer, rather than voice call and enables a computer, rather than voice, response system. The user and the Mail Box Service Control **49** then communicate by way of some computer communications code such as ASCII.

The system presents the same security code requests as the voice system and provides the same basic user options including message queue listings, queue reordering and so forth. Unlike the voice system, however, it is not necessary to redirect the fax messages to another telephone. The paperless terminal software recognizes simple code sequences sent by the Mail Box Service Control **49** and can be switched under Mail Box Service control from the ASCII computer terminal mode to the fax terminal mode. Thus, the user may select messages from the queue in the computer mode and then the Mail Box Service system will automatically switch the terminal to fax mode, send the fax messages, and then return the terminal to computer mode.

In this way, the paperless terminal user can engage in an ongoing dialogue with the Mail Box Service Control, doing queue manipulations, reading faxes, sending automated fax or voice responses and so forth. When a fax message is read by a paperless terminal on a screen, the user may elect to have the message left in the queue for later disposal and to have a cover page added to indicate the date, time and terminal telephone number from which the fax was originally read. The user may also redirect the message to be printed on an ordinary "hardcopy" device, such as a fax device or a printer. In addition, this mode will also permit the trans-mission of outgoing fax messages from the paperless terminal and access to the functions of the General Service Control **50**, all without the need to exit the system and dial in again. This permits a single incoming call over a line **40** to permit the user to access essentially all of the services available from the SAFF.

In another approach, the paperless fax terminal can act as an originating machine and a designation machine, in place of ordinary facsimile machine. In this case, the paperless fax terminal may be used in cooperation with a telephone or provided with a sound or flash light generator **192** or **197** as shown in FIGS. **8** and **9** for prompting the addressee to communicate with the SAFF system for receiving a facsimile message while the SAFF attempts to transmit a facsimile message. The SAFF also provides the other services to the paperless fax terminal as provided to the ordinary facsimile machine. For example, the SAFF will temporarily store the fax message and periodically retry to communicate with the destination paperless fax terminal if the terminal is busy or otherwise unavailable to receive at this time.

A companion aspect of this system is a Mail Box Reader device **33** as shown in FIG. **9** which is an alternative of the paperless fax terminal described above. This device is a relatively low-cost adapter which connects the user's telephone to an available ordinary television set to form a simple paperless fax terminal. The Reader device **33** contains a modem capable of both computer and fax operations, programs for these operations, memory **198** to store an incoming document or documents, a processor **195** for controlling the device, a keypad **196** for the input of user commands, a video display generator **199** and a RF modulator **200** suitable for supplying a display signal to the ordinary television set **201**.

The Mail Box Service Control **49** recognizes the Mail Box Reader as a distinct terminal type and supports abbreviated command sequences from its more limited keypad. In addition, it supports paging through sections of a document so that a user can view documents which may be too large to fit into the Reader's memory in one place.

The Mail Box Reader itself has a "zoom" mode that magnifies the image on the screen by mapping a smaller segment of the Reader's memory to the screen. This permits one to overcome the fact that the resolution of the television set may be too limited for a readable display of some of the finer-detailed features of some fax images. The Reader's keypad **196** permits scrolling through messages, both vertically and horizontally in both the normal and zoom mode. Vertical scrolling is transparently coordinated with the Mail Box Service Control's paging functions so that if one scrolls off the end of the segment of a long document stored in memory, the Mail Box Service Control will automatically supply the next segment.

Broadcasting

The queuing, Mail Boxes, and security codes are all derivative benefits of the spooling of messages at the destination SAFF. There is a counterpart advantage to the originator SAFF's spooling as well. Since the originator SAFF maintains a copy of each message, that copy can be used to broadcast messages to multiple destinations.

This can be initiated in a number of ways. For example, the user can dial in a code prefix indicating that a list of destination numbers is to follow. The numbers are then entered and finally another code is entered to signal "end of list". The Originate Host **70** recognizes these inputs and attaches them to the message which follows. As an alternative, the user can store different numbered broadcast telephone lists in the Originate SAFF mass storage files **69** (entered much as described above) and invoke them simply by dialing a two or three digit "short-cut" code. In either case, from there the fax transmission to the originator SAFF proceeds normally.

Upon reception of the list and the document, the originator SAFF proceeds to open as many local loop-back or long-distance lines as it can to deliver the broadcast message to the various destinations, essentially simultaneously. Although the originator is billed for making a number of different calls, in fact the originating machine is only tied up for the time required to make one call. Furthermore, the full power of the delivery system is asserted for each destination machine, including reporting, redials, queuing, and so forth.

A feature related to broadcasting is the redirection of messages by the originator. Since fax messages are spooled at the originator SAFF and held for a period of time even after delivery (typically six hours), the originator can dial the Service Number any time during this period and direct a copy of the spooled message to be sent to other destination machines.

Communications with Non-Subscribers

Thus far, the discussion has presumed that both the originator and answerer were subscribers to the SAFF system. It is quite reasonable to assume that subscribers will wish to send or receive fax messages with non-subscribers, as well. While the services provided by the SAFF are more limited in such cases, nevertheless, the system both anticipates and enhances communications with non-subscribers for the benefit of the subscribers.

When a subscriber originates a call to a non-subscriber the delivery process is almost identical to subscriber-to-subscriber calls. The fax data is forwarded to the Answer Function of the appropriate destination SAFF and delivery is pursued, all in the usual way. For the benefit of the subscribing originator, the message is stored in the usual way at the destination SAFF until delivery is completed. If multiple SAFF-processed messages arrive before the delivery is complete, a temporary Delivery Queue will be created and used as required. However, since the non-subscriber will have no account in the system, attempts to use the Service Number to manipulate the queue, forward messages, make multiple copies, and use the other special services available to a subscribing answerer, will be unsuccessful.

Calls originated by a non-subscriber directed to a subscribing answerer move by a somewhat different mechanism. As noted, each SAFF appears to the world as a distinct telephone exchange and all subscriber's to a given SAFF are assigned their fax telephone numbers with that exchange prefix. Consequently, all calls directed to a SAFF subscriber eventually end up at the subscriber's SAFF, whether they originated from within the SAFF system network or not. Messages originating "off-network" can arrive by any route. For example, they may be truly local calls, or they may be long-distance calls which arrive over any available long-distance network.

In any case, messages originating from a non-subscriber **33** are delivered to the answering fax machine's SAFF by the local lines **39** provided by the local telephone company. They are answered by the SAFF's Off-net Incoming Screener **48**, which, upon noting that they are fax transmissions, directs the calls to the Originate Function **9** of that SAFF. From that point, the call is treated as if it were a local fax call and it is passed over to the Answer Function **12** via the Local Call Loop-back **13** for delivery to the subscriber.

In this situation, an Acceptance Record will be returned to the originating machine, but no further originator services are provided. On the other hand, the answering subscriber has the full range of Answer Function available.

Charges and Detailed Billing

Normally, the Originate Function of the originator SAFF has ultimate responsibility for the management of outgoing messages. It initiates all connections to the Answer Functions of the various SAFFs with which it must communicate. It is the node to which all reports concerning message status and disposition must flow. It interrogates Answer SAFFs when extraordinary updates are required. Consequently, the Originate Function is also the focus of charging data.

The telephone company presumably charges for all of the various services provided by this system. The method, algorithm, and rates are determined by actual costs and applicable regulations. Typically, the user would be billed for telephone connect time, toll charges, extraordinary services, such as those provided by calling the Service Number, the amount of mass storage space consumed as a function of time, and so forth.

One of the user services for which a special charge might be made is a subscriber's customer specific billing system. In this option the user can "flag" each fax transmission with a keyed-in prefix which contains a user customer, client, or project number. This number is stored as a key field in the Transaction File for that call. Thus, when the telephone bill is prepared, the billing computer can sort the subscriber's bill on this field and present the user with a list of all fax messages, total usage time, number of pages, and related charges, all grouped by the subscriber's own customers, clients, or projects. Furthermore, it can accept the subscriber's particular algorithm for billing calls to customers or clients and generate a column showing what the subscriber will bill for the service (as a separate matter from what the SAFF system and the telephone company have billed the subscriber). This can be of great assistance in attributing costs and billing customers for services rendered.

Software Control

In the preferred embodiment, each of the principal units of the SAFF such as described in FIGS. **2**, **3**, and **4** is controlled by its own computer processing unit or units. These units are interrupt-driven computers which are connected together by the System Status and Control unit **11**. This unit is an electronic switch yard for control communications between the Originate, Answer, and other units within a given SAFF, as well as the other SAFFs in the system through the control long-distance trunks **15**. While there are many tasks which the various control processors must perform to handle fax operations, the primary ones are intercepting incoming calls, either for fax forwarding or service requests, and delivering the fax messages to their destinations. The general software organization of these principal activities is shown in FIGS. **5**, **6**, and **7**. It should be noted that these figures are simplified and intended to be generally descriptive. For example, some procedures illustrated here as sequential (for the sake of simplicity) can actually be performed concurrently. Likewise, not every function of the system is represented in detail. Generally speaking, similar results also can be obtained with a number of other obvious arrangements of the functional blocks.

Broadly speaking, fax messages addressed to the Originate Function of a SAFF arise either through the special SAFF Directed Local Lines **4** (FIGS. **2** and **3**) as a result of direct connection or dialing a special access code, or they arise from Ordinary Local Lines (off-net lines) **39**, **40**, **63**. Those which arrive via off-net lines are processed first by the Off-net Screener **48**, which may direct them to either the Originate Function **9** or to Mail Box Service **49**. FIG. **5**, therefore combines all three of these related functions.

At the outset, one of the two incoming call interfaces **64** and **65** signals the Host Computer **70** that it is beginning to process a call at **100** in FIG. **5***a*. These units have their own buffer capability and can tolerate some delay before the Host responds. Ultimately the Host must decide whether it is responding to an on-net or off-net call **101**. If it is an off-net call there are two possibilities (excluding wrong numbers) **102**: it may either be a fax call, in which case it is from a non-subscriber to a subscriber, or it is a mail box service call. If it is a fax call then the billing for services must be directed to the subscribing destination addressee **112**. From that point it is handled like an on-net call as will be described shortly.

If it is not a fax call, then it is presumed to be a mail box service call **103**, and the system then determines whether it is a computer or voice-based request. The caller is presented with a voice response menu or computer menu **104** for such service, as appropriate. The user responds to these prompts with a touchtone keypad, verbally, or with computer keystrokes **105** and a decision ladder, shown succinctly as **107**

selects the desired implementation routine **108**, **109**, **110** (for brevity only three typical choices are shown, and this element is actually a loop which will permit multiple commands). The chosen routine passes parameters to a command parser **121** (FIG. **5***b*) which prepares a command statement which is then sent **122** to the System Status and Control unit **11**, through the interface **72**. This command will be passed to the Answer Host **85** through its interface **84** for actual action on the Mail Box Queue **89**. If the service requires a response to the caller the transmission path is reversed. When the operation is completed **123** the call is terminated.

If on the other hand, the original call is found at **101** to be an on-net call, billing is generally directed at the originator **113** and the Host **70** begins the opening digital dialogue **114** with the calling machine, acting in place of the destination machine. This dialogue includes gathering and storing the fax identifications, originating and destination telephone numbers and so forth **116**. The Host opens a Transaction File and links it to a data file **117** for the expected data, and then stores all of the call and file information **118** keyed to the Message Code. The destination telephone number and other information are passed almost immediately **119** to the Outbound Controller **74**, which then opens a temporary buffer to hold the fax message in case immediate contact can be established, and it attempts to establish that contact through the destination SAFF.

In pursuing this contact, the Outbound Controller **74** examines the status of available trunks. If trunks are available, it will immediately attempt to connect with the destination SAFF, otherwise it will defer the call until a trunk is available. In the event of a broadcast message, the Outbound Controller will select the number of trunks to use simultaneously based on the percentage of the trunks already in use, in order to avoid tying up all of the SAFF's outgoing capacity with a single message task. Other considerations can affect these usage choices depending on the details of the setting of the system.

The Host then enters a loop which gets the incoming fax data **125** (FIG. **5***b*) from the On-net **64** or Off-net **65** Interface's buffer and stores each byte in the fax data file **126** while sending another copy **127** to the Outbound controller **74** until the incoming data is complete **128**. The Host then checks **129** with the Outbound controller to see if it was successful in making immediate connection with the destination machine. If it was successful and a satisfactory transfer occurred, then a Delivery Report is sent back **132** to the originating machine before it leaves the line. Otherwise, an Acceptance Report is sent **131**, and in either case the outcome is reported **133** to the Transaction File and the call is terminated **134**.

A complementary set of activities occurs in the Answer Function of the destination SAFF as described in FIGS. **6***a* and *b*. Here an incoming call is detected **136** by the Inbound Control **92** (FIG. **4**). The Answer Host Computer **85** then opens a new fax data and Transaction file for the message if there is no current queue for that destination machine, or it prepares to append the data to an existing queue **137**. The various call and file parameters are linked and stored **138** and the call parameters are passed through **139** to the Local Interface **83**, which then decides **141** whether the call is addressed to a "real" fax number, or a fictitious number terminating in a mail box. If the number is real the Local Interface attempts to contact the destination machine for immediate delivery.

The Host then enters a loop where it gets the incoming data **147**, stores it **148** in the fax Delivery Queue, and passes it through **149** to the Local Interface buffer. When the Host determines that the fax transfer is complete **150**, it then checks **152** (FIG. **6***b*) to see if the Local Interface has been able to make immediate delivery. If it has, the Host initiates the transmission of the Delivery Report **167** back through its Status and Control Interface **84** to the System Control and Status unit **11**, which in turn updates the Transaction File and sends it back to the originator SAFF over Trunk **15**. It is this communication which ultimately results in the immediate Delivery Report described previously. The transaction in then terminated **169**.

If immediate connect is not established a Retry Report is sent **153** back through the System Status and Control unit and the Retry sequence begins. The Retry criteria can be varied **154**, both in place and with the SAFF setting. For example, if the SAFF is integrated into a local exchange, the SAFF can actually monitor the desired line and simply wait for it to become available. In other settings it will be necessary for the SAFF to actually redial at prescribed intervals. In any case attempts to connect are made **155** and if they are not successful **156** a counter or timer is checked **159** to see if the retry limit has been exceeded. If not, the process is repeated and if so, a Failed Delivery Report **160** is sent back through the system and the effort terminated **170**.

If the retry effort is successful, the Delivery Queue is retrieved **158** and message by message **162** the queue is dumped, with a pause **163** after each message to confirm receipt, send a Delivery Report **164** and to check for end of queue **165**. If a message fails during the queue dump, the retry sequence at **154** is resumed at the failure point and the process repeated to a conclusion. When the last message has been received satisfactorily, the transaction is terminated **168**.

If it is determined at **141** (FIG. **6***a*) that this is a mail box call, a loop is entered which gets the fax data **142** and stores it **143** in the appropriate Mail Box Queue. When the end of message is detected **144**, a Posting Report **145** is sent back through the system and a Message Waiting Report **146** is sent forward through the system to the default destination machine.

General Service calls always arrive on Ordinary Local Lines **5**. Upon detection and answering **172**, the voice response menu is presented **173** to the user. As with the Mail Box Service, the user keys in responses or gives them orally **174** and a decision ladder **175** identifies the desired service routine such as **177**, **178**, or **179**. Here again only a few of the possible choices have been shown for sake of illustration and looping for multiple service requests is provided. The selected service routine generates command parameters which are parsed **181** as system commands and sent **182** to the System Status and Control unit **11** for execution. Upon completion of all requests the call is terminated **183**.

What has been described are the presently preferred embodiments of a system and method for providing a comprehensive interactive facsimile message management system embedded in a switched telephone network. It should be apparent that many modifications to the system and the method are possible without departing from the true spirit and scope of the invention.

What is claimed is:

1. A method for delivering a facsimile to an electronic mailbox, the method comprising:

a) interfacing with a plurality of communication channels for receiving facsimile messages, wherein each communication channel is capable of supporting a communication session from an originating facsimile machine via a switched telephone network;

b) associating a telephone number from a plurality of telephone numbers on a switched telephone network with an intended facsimile recipient;

c) receiving a telephone call via a selected communication channel from the plurality of communication channels;

d) participating in a communication session with an originating facsimile machine using a facsimile protocol via the selected communication channel, wherein the participating step comprises receiving an inbound fax message for the intended facsimile recipient; and

e) directing the inbound fax message to a mailbox defined in a computer storage and from which the intended facsimile recipient can retrieve the inbound fax message.

2. The method of claim **1**, wherein the received telephone call results from the entry of the associated telephone number at the originating facsimile machine and from the switching of the telephone call to the selected communication channel by the switched telephone network.

3. The method of claim **1**, wherein the directing step comprises the step of storing the inbound fax message to the mailbox.

4. The method of claim **1**, wherein the directing step comprises the step of forwarding the inbound fax message to the mailbox.

5. The method of claim **1**, wherein the directing step comprises the step of determining the intended recipient based upon the associated telephone number.

6. One or more computer readable media storing instructions that upon execution by a computer cause the computer to perform the method of claim **5**.

7. The method of claim **1**, and further comprising the step of transmitting, in response to instructions from a user, facsimile messages stored in the mailbox to a destination designated in the instructions.

8. The method of claim **7**, and further comprising the step of receiving the instructions via a telephone used by the user.

9. The method of claim **7**, and further comprising the step of receiving the instructions via a computer used by the user.

10. A system for delivering a facsimile to an electronic mailbox, the system comprising:

a) interfacing means for interfacing with a plurality of communication channels for receiving facsimile messages, wherein each communication channel is capable of supporting a communication session from an originating facsimile machine via a switched telephone network;

b) storing means for storing facsimile message information;

c) processing means:

i) for associating a telephone number from a plurality of telephone numbers on a switched telephone network with an intended facsimile recipient;

ii) for storing the association of the telephone number with the intended facsimile recipient in the storing means;

iii) for receiving a telephone call via a selected communication channel from the plurality of communication channels;

iv) for participating in a communication session with an originating facsimile machine using a facsimile protocol via the selected communication channel, wherein the participation in the communication session comprises receiving an inbound fax message for the intended facsimile recipient; and

v) for directing the inbound fax message to a mailbox defined in a computer storage and from which the intended facsimile recipient can retrieve the inbound fax message.

11. The system of claim **10**, wherein the mailbox is defined in the storing means.

12. The system of claim **10**, wherein directing the inbound fax message to the mailbox comprises forwarding the inbound fax message to the mailbox.

13. The system of claim **12**, wherein forwarding the inbound fax message comprises digitally transmitting the inbound fax message.

14. The system of claim **10**, wherein the computer storage used to define the mailbox is geographically remote with respect to the system.

15. The system of claim **10**, wherein the processing means comprises means for transmitting, in response to instructions from a user, facsimile messages stored in the mailbox to a destination designated in the instructions.

16. A system for delivering a facsimile to an electronic mailbox, the system comprising:

a) an interface to a switched telephone network, the interface communicating with a plurality of communication channels for receiving facsimile messages, wherein each communication channel is capable of supporting a communication session from an originating facsimile machine via the switched telephone network;

b) a data store capable of storing facsimile message information;

c) a processor comprising one or more processing elements, in communication with the interface and the data store, wherein the processor is programmed or configured to:

i) associate a telephone number from a plurality of telephone numbers on a switched telephone network with an intended facsimile recipient;

ii) store the association of the telephone number with the intended facsimile recipient in the data store;

iii) receive a telephone call via a selected communication channel from the plurality of communication channels;

iv) participate in a communication session with an originating facsimile machine using a facsimile protocol via the selected communication channel, wherein the participation in the communication session comprises receiving an inbound fax message for the intended facsimile recipient; and

v) direct the inbound fax message to a mailbox defined in a computer storage and from which the intended facsimile recipient can retrieve the inbound fax message.

17. The system of claim **16**, wherein the computer storage used to define the mailbox is geographically remote with respect to the system.

18. The system of claim **7**, wherein the processor is further programmed or configured to transmit, in response to instructions from a user, facsimile messages stored in the mailbox to a destination designated in the instructions.

19. The system of claim **18**, wherein the processor is further programmed or configured to receive the instructions via a computer used by the user.

20. The system of claim **19**, wherein the instructions are received using a computer communication mode.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

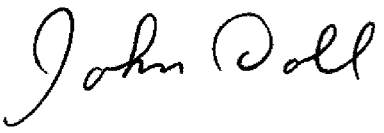
PATENT NO. : 7,525,691 B2
APPLICATION NO. : 11/959570
DATED : April 28, 2009
INVENTOR(S) : Gordon et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Claim 18 at column 22, line 54, delete “claim 7” and insert --claim 16--.

Signed and Sealed this

Sixteenth Day of June, 2009



JOHN DOLL
Acting Director of the United States Patent and Trademark Office