



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

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(54) **MULTIMEDIA COLLABORATION SYSTEM**

**OTHER PUBLICATIONS**

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Rangan et al. "Software Architecture for Integration of Video Services in the Etherphone System," IEEE Journal on Selected Area of Communications, v9, n9, Dec. 1991, pp. 1395-1404.\*

(List continued on next page.)

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(57) **ABSTRACT**

**Related U.S. Application Data**

A multimedia collaboration system that integrates separate real-time and asynchronous networks—the former for real-time audio and video, and the latter for control signals and textual, graphical and other data—in a manner that is interoperable across different computer and network operating system platforms and which closely approximates the experience of face-to-face collaboration, while liberating the participants from the limitations of time and distance. These capabilities are achieved by exploiting a variety of hardware, software and networking technologies in a manner that preserves the quality and integrity of audio/video/data and other multimedia information, even after wide area transmission, and at a significantly reduced networking cost as compared to what would be required by presently known approaches. The system architecture is readily scalable to the largest enterprise network environments. It accommodates differing levels of collaborative capabilities available to individual users and permits high-quality audio and video capabilities to be readily superimposed onto existing personal computers and workstations and their interconnecting LANs and WANs. In a particular preferred embodiment, a plurality of geographically dispersed multimedia LANs are interconnected by a WAN. The demands made on the WAN are significantly reduced by employing multi-hopping techniques, including dynamically avoiding the unnecessary decompression of data at intermediate hops, and exploiting video mosaicing, cut-and-paste and audio mixing technologies so that significantly fewer wide area transmission paths are required while maintaining the high quality of the transmitted audio/video.

(63) Continuation of application No. 08/660,461, filed on Jun. 7, 1996, now Pat. No. 5,802,294, which is a continuation of application No. 08/131,523, filed on Oct. 1, 1993, now Pat. No. 5,689,641.

(51) **Int. Cl.**<sup>7</sup> ..... **G06F 13/00; G06F 15/16**

(52) **U.S. Cl.** ..... **709/204; 345/330**

(58) **Field of Search** ..... 345/326, 329, 345/330, 331, 332, 335; 709/202, 205, 206, 207

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

3,723,653 3/1973 Tatsuzawa .

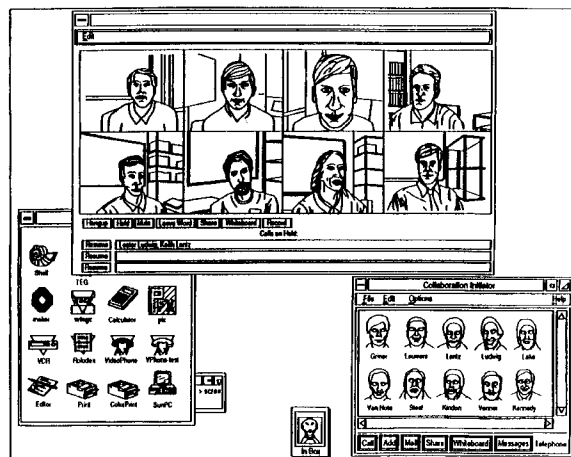
(List continued on next page.)

**FOREIGN PATENT DOCUMENTS**

35 07 152 8/1985 (DE) .

(List continued on next page.)

**44 Claims, 34 Drawing Sheets**



## U.S. PATENT DOCUMENTS

3,873,771	3/1975	Kleinerman et al. .	5,365,265	11/1994	Shibata et al. .
3,974,337	8/1976	Tatsuzawa .	5,367,629	11/1994	Chu et al. .
4,005,265	1/1977	Verhoeckx et al. .	5,373,549	12/1994	Bales et al. .
4,054,908	10/1977	Poirier et al. .	5,374,952	12/1994	Flohr .
4,210,927	7/1980	Yumde et al. .	5,375,068	12/1994	Palmer et al. .
4,441,180	4/1984	Schussler et al. .	5,379,374	1/1995	Ishizaki et al. .
4,451,705	5/1984	Burke et al. .	5,382,972	1/1995	Kannes .
4,475,193	10/1984	Brown .	5,384,598	1/1995	Rodriguez et al. .
4,516,156	5/1985	Fabris et al. .	5,384,772	1/1995	Marshall .
4,529,839	7/1985	Colton et al. .	5,392,223	2/1995	Caci .
4,529,840	7/1985	Colton et al. .	5,392,346	2/1995	Hassler et al. .
4,531,024	7/1985	Colton et al. .	5,404,435	4/1995	Rosenbaum .
4,574,374	3/1986	Scordo .	5,408,526	4/1995	McFarland et al. .
4,645,872	2/1987	Pressman et al. .	5,408,662	4/1995	Katsurabayashi .
4,650,929	3/1987	Boerger et al. .	5,422,883	6/1995	Hauris et al. .
4,653,090	3/1987	Hayden .	5,432,525	7/1995	Maruo et al. .
4,686,698	8/1987	Tompkins et al. .	5,444,476	8/1995	Conway .
4,710,917	12/1987	Tomkins et al. .	5,471,318	11/1995	Ahuja et al. .
4,716,585	12/1987	Tompkins et al. .	5,473,679	12/1995	La Porta et al. .
4,796,293	1/1989	Blinken et al. .	5,475,421	12/1995	Palmer et al. .
4,817,018	3/1989	Cree et al. .	5,485,504	1/1996	Ohnsorge .
4,837,798	6/1989	Cohen et al. .	5,491,695	2/1996	Meagher et al. .
4,847,829	7/1989	Tompkins et al. .	5,506,954	4/1996	Arshi et al. .
4,888,795	12/1989	Ando et al. .	5,515,491	5/1996	Bates et al. .
4,922,523	5/1990	Hashimoto .	5,526,024	6/1996	Gaglianella et al. .
4,931,872	6/1990	Stoddard et al. .	5,550,966	8/1996	Drake et al. .
4,953,159	8/1990	Hayden et al. .	5,553,222	9/1996	Milne et al. .
4,961,211	10/1990	Tsugane et al. .	5,561,736	10/1996	Moore et al. .
4,965,819	10/1990	Kannes .	5,565,910	10/1996	Rowse et al. .
4,977,520	12/1990	McGauhey et al. .	5,581,702	12/1996	McArdle .
4,987,492	1/1991	Stults et al. .	5,594,495	1/1997	Palmer et al. .
4,995,071	2/1991	Weber et al. .	5,602,580	2/1997	Tseng .
4,998,243	3/1991	Kao .	5,608,653	3/1997	Palmer et al. .
5,003,532	3/1991	Ashida et al. .	5,689,553	11/1997	Ahuja et al. .
5,010,399	4/1991	Goodman et al. .	5,864,844 *	1/1999	James et al. .... 707/4
5,014,267	5/1991	Tompkins et al. .			
5,027,400	6/1991	Baji et al. .			
5,042,062	8/1991	Lee et al. .			
5,056,136	10/1991	Smith .			
5,072,442	12/1991	Todd .			
5,073,926	12/1991	Suzuki et al. .			
5,099,510	3/1992	Blinken, Jr. et al. .			
5,130,399	7/1992	Ikeno et al. .			
5,130,793	7/1992	Bordry et al. .			
5,130,801	7/1992	Yamaguchi .			
5,155,761	10/1992	Hammond .			
5,157,491	10/1992	Kassatly .			
5,170,427	12/1992	Guichard et al. .			
5,195,086 *	3/1993	Baumgartner et al. .... 345/329			
5,195,087	3/1993	Bennett et al. .			
5,200,989	4/1993	Milone .			
5,202,828 *	4/1993	Vertelney et al. .... 345/326			
5,202,957	4/1993	Serrao .			
5,218,627	6/1993	Corey et al. .			
5,224,094	6/1993	Maher et al. .			
5,231,492	7/1993	Dangi et al. .			
5,239,466	8/1993	Morgan et al. .			
5,253,362	10/1993	Nolan et al. .			
5,260,941	11/1993	Wilder et al. .			
5,283,637	2/1994	Goolcharan .			
5,303,343	4/1994	Ohya et al. .			
5,315,633	5/1994	Champa .			
5,319,795	6/1994	Hamabe et al. .			
5,333,133	7/1994	Andrews et al. .			
5,333,299	7/1994	Koval et al. .			
5,335,321	8/1994	Harney et al. .			
5,345,258	9/1994	Matsubara et al. .			
5,351,276	9/1994	Doll, Jr. et al. .			
5,353,398	10/1994	Kitahara et al. .			
5,363,507	11/1994	Nakayama et al. .			

## FOREIGN PATENT DOCUMENTS

0 041 902	12/1981	(EP) .
0 190 060	8/1986	(EP) .
0 354 370	2/1990	(EP) .
0 403 118	12/1990	(EP) .
0 414 222	2/1991	(EP) .
0 436 345	7/1991	(EP) .
0 453 128	10/1991	(EP) .
0 497 022	8/1992	(EP) .
0 516 371	12/1992	(EP) .
0 523 618	1/1993	(EP) .
0 523 626	1/1993	(EP) .
0 535 601	4/1993	(EP) .
0 548 597	6/1993	(EP) .
0 561 381	9/1993	(EP) .
0 604 053	6/1994	(EP) .
WO 92/21211	11/1992	(WO) .
WO 94/24803	10/1994	(WO) .

## OTHER PUBLICATIONS

Marskak, Ronni T. "BeyondMail for Windows—epitomizing the mail-enabled application", Patricia Seybold's Office Computing Report, Sep. 1992, v15 n9. (full text copy from Computer Select 1992 CD).\*

Videomatic Switching: Systems and Services, C. Crawford, F. Milone, D. Zoppellaro. Digital Communications, 1988 International Zurich Seminar.

ACM Press, Conference on Organizational Computing Systems, SIGOIS Bulletin, vol. 12, No. 2-3, Nov. 5-8, 1991.

The American Users Forum (Niu-Forum) Aug. 6-9, 1990.

Bellcore News, "IMAL Makes Media Merging Magic," 5(20), Nov. 9, 1988.

- Frontiers in computer communications technology, Sigcom '87 Workshop (Aug. 11–13, 1987).
- Unix 4<sup>th</sup> Berkeley Release 1991 man pages for 'login,' 'http,' 'talk,' and 'who.' Online Internet: <http://www.freebds.org>.
- Ahuja et al., "Coordination and Control of Multimedia Conferencing," IEEE Communication Magazine, 30(5): 38–42, May 1992.
- Ahuja et al., "Networking Requirements of the Rapport Multimedia Conferencing System," Infocom '88, IEEE, pp. 746–751, 1988.
- Biswas et al., "Distributed Scheduling of Meetings: A Case Study in Prototyping Distributed Application," System Integration, 1992 2<sup>nd</sup> International Conference.
- Cohen et al., "Audio Windows: User Interfaces for Manipulating Virtual Acoustic Environments," pp. 479–480.
- Cohen et al., "Audio Windows for Binaural Telecommunication," EIC, Tokyo (Oct. 1991).
- Cohen et al., "Design and Control of Shared Conferencing Environments for Audio Telecommunication," Proceedings of the Second Int'l Symposium on Measurement and Control Robotics (ISMCR '92), Tsukuba Science City, Japan, (Nov. 15–19, 1992), pp. 405–412.
- Cohen et al., "Exocentric Control of Audio Imaging in Binaural Telecommunication," IEICE Trans. Fundamentals, vol. E75–A, No. 2, (Feb. 1992).
- Cohen et al., "Multidimensional Audio Window Management," Int'l Journal of Man–Machine Studie, vol. 34:319–336 (1991).
- Cohen et al., "Multidimensional Audio Windows: Conferencing, Concerts and Cocktails," Human Factors Society Meeting, SF, CA, pp. 1–15, Jun. 12, 1991.
- Ensor et al., "The Rapport Multimedia Conferencing System—Software Overview," Computer Workstation Conference, IEEE, pp. 52–58, 1988.
- Gopal et al., "Directories of Networks with Causally Connected Users," IEEE, pp. 1060–1064, 1988.
- Horn et al., "An ISDN Multimedia Conference Bridge," Tencon '90—1990 IEEE Region 10 Conference on Computer and Communication, pp. 853–856, 1990.
- Kamel, "An Integrated Approach to Share Synchronous Groupware Workspaces," IEEE 1993.
- Kendall et al., "Stimulating the Cue of Spatial Hearing in Natural Environments," Northwestern University, Evanston, IL 60201.
- Klein, Telekommunikation von Angesicht zu Angesicht 2323 Telcom Report 9 (1986) Sep./Oct., No. 5, Erlangen, W. Germany.
- Kobayashi et al., "Development and Trial Operation of Video Teleconference System," IEEE Globecom, pp. 2060–2063, 1999.
- Lake et al., "A network environment for studying multimedia network architecture and control," (1989 Globecom).
- Lantz, An Experiment in Integrated Multimedia Conferencing, Department of Computer Science, Stanford University, Stanford, CA 94305, Dec. 1986.
- Lantz et al., Collaboration Technology Research at Olivetti Research California, Aug. 1989.
- Lauwers et al., Replicated Architecture for Shared Window Systems: A Critique, (Olivetti Research California) Version of Apr. 1990.
- Lauwers et al., Collaboration Awareness in Support of Collaboration Transparency: Requirements for the Next Generation of Shared Windows Systems, (Olivetti Research California) Version of Apr. 1989.
- Leung et al., Optimum Connection Paths for a Class of Videoconferences, Department of Information Engineering, the Chinese University of Honk Kong, Shatin, Hong Kong.
- Maeno et al., Distributed Desktop Conferencing System (MERMAID) Based on Group Communication Architecture, The Transactions of the Institute of Electronics, Information and Comm. Engineers E74 (1991) Sep., No. 9, Tokyo, JP.
- Martens, "Principal Components Analysis and Resynthesis of Spectral Cues to Perceived Direction," Proceedings of the 1987 Int'l Computer Music Conference; Northwestern University, Evanston, IL 60201.
- Masaki et al., "A Desktop Teleconferencing Terminal Based on B-ISDN: PMTC," NTT Review, 4(4) :81–85, 1992.
- NG et al., Systems Integration '90, (Apr. 23–26, 1990).
- Nunokawa et al., "Teleconferencing Using Stereo Voice and Electronic OHP," IEEE, 1988.
- Ohmori et al., "Distributed Cooperative Control for Sharing Applications Based on Multiparty and Multimedia Desktop Conferencing System," IEEE, 1992.
- Pate, "Trends in Multimedia Applications and the Network Models to Support Them," Globecom's 90: 1990.
- Perkins, "Spider: An investigation in collaborative technologies and their effects on network performance".
- Ramanathan et al., Optimal Communication Architectures for Multimedia Conferencing in Distributed Systems, Multimedia Laboratory Dept. of Computer Science and Engineering, University of San Diego, La Jolla, CA.
- Rangan et al., "Software architecture for integration of video services in the etherphone system," IEEE J. on Selected Areas in Comm., 9(9) :1395–1404, Dec. '91.
- Rangan et al., "A Window–Based Editor for Digital Video and Audio," System Sciences, 1992 Hawaii Int'l Conference (1992).
- Sakata, "B-ISDN Multimedia Workstation Architecture," IEEE, 1993.
- Sakata et al., "Development and Evaluation of an In–House Multimedia Desktop Conference System," NEC Research & Development, No. 98, pp. 107–117, Jul. 1990.
- Stefik et al., "Beyond the Chalkboard: Computer Support for Collaboration and Problem Solving," Communications of the ACM, vol. 30, No. 1, Jan. 1987.
- Vin et al., Hierarchical Conferencing Architectures for Inter–Group Multimedia Collaboration, Multimedia Laboratory Department of Computer Science and Engineering University of California at San Diego, La Jolla.
- Vin et al., Multimedia Conferencing in the Etherphone Environment, Computer Magazine, vol. 24, Issue 10, pp. 69–79, 1991.
- Watabe et al., "A Distributed Multiparty Desktop Conferencing System and Its Architecture," IEEE, 1991.
- Watabe et al., "Distributed Desktop Conferencing System with Multiuser Multimedia Interface," IEEE, 1991.
- Weiss, Desk Top Video Conferencing—An Important Feature of Future Visual, Siemens AG—Munich—West Germany.
- Zellweger et al., "An Overview of the Etherphone System and Its Applications," Computer Workstations Conference, 1988.

\* cited by examiner

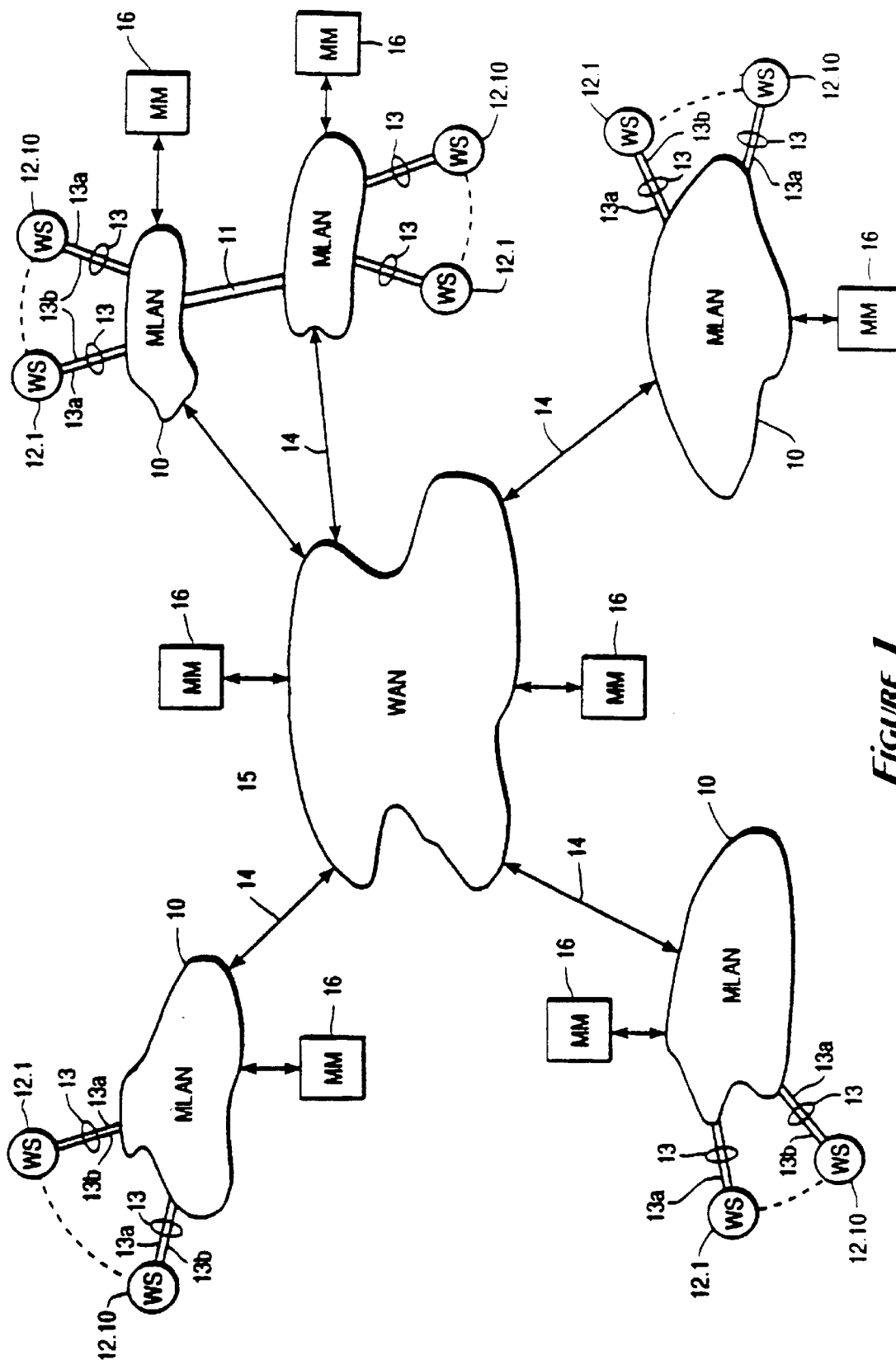


FIGURE 1

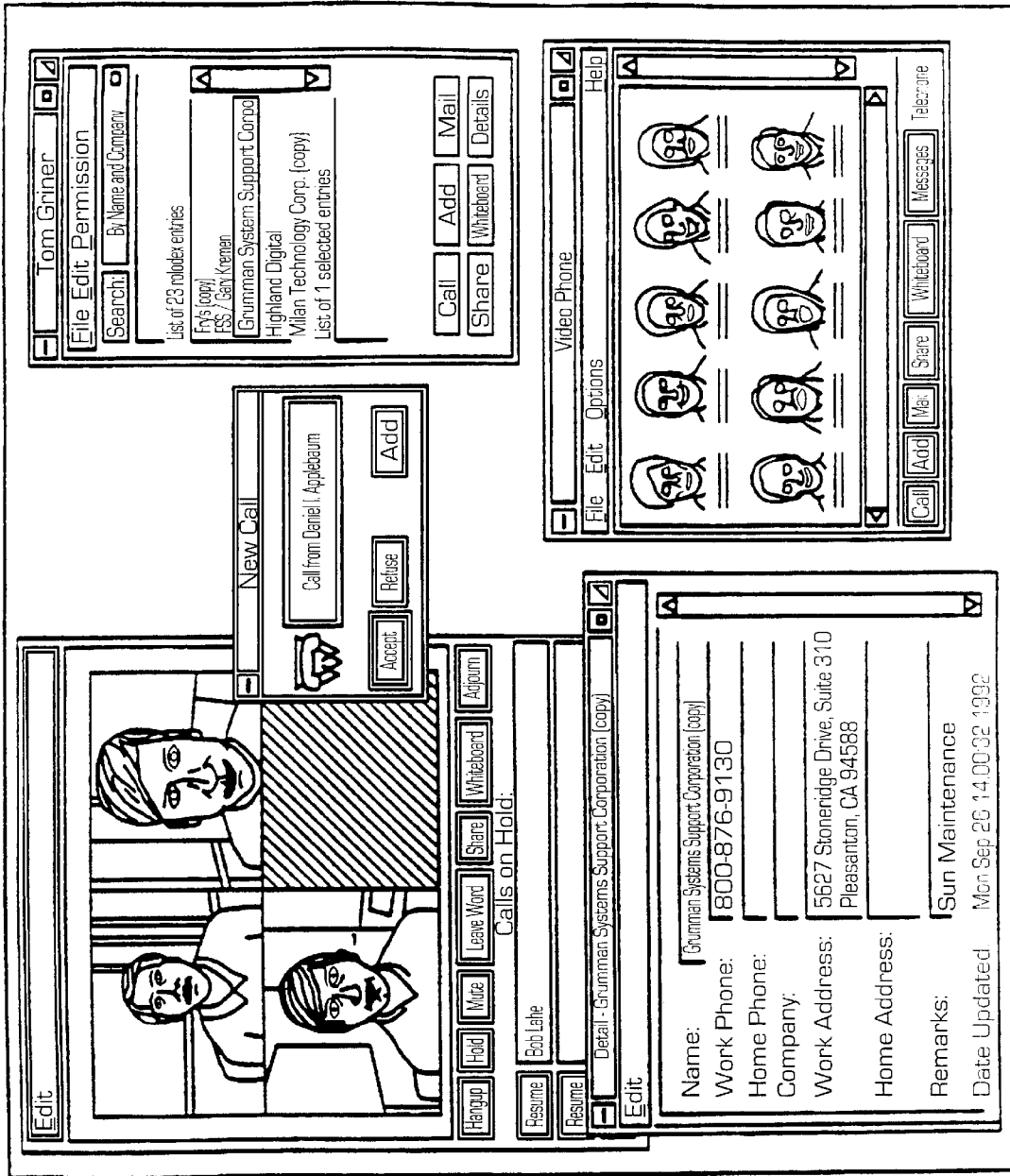


FIGURE 2A

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