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OCT 24 1994

FEDERAL COMMUNICATIONS COMMISSION

HENRY M. RIVERA
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October 24, 1994

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

EX PARTE OR LATE FILED

Re: PR Docket 93-61
Ex Parte

Dear Mr. Caton:

On behalf of Metricom, Inc., the attached ex parte letter was delivered to Chairman Reed Hundt on Monday, October 24, 1994.

If you have any questions, please call me.

Sincerely,


Henry M. Rivera

Attachment

No. of Copies rec'd
List A B C D E

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HENRY M. RIVERA
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HAND DELIVERED

October 24, 1994

Hon. Reed Hundt
Chairman
Federal Communications Commission
Room 814
1919 M Street NW
Washington, DC 20554

EX PARTE
PR DOCKET NO.93-61

Dear Reed:

Prior to your departure for the USTA meeting, I wrote asking you to try to make time in your schedule to see a demonstration of the Metricom wireless system when you were in Northern California. Unfortunately, because of your busy schedule, you did not have the time.

At the time I asked you to try to squeeze Metricom into your schedule, I had no idea you were going to Cupertino nor did I have any idea you were visiting the Stevens School there. As it happens, you did witness a demonstration of the Metricom "Ricochet" Network. It was providing wireless access to a new version of America Online from school computers. I am told that you were very impressed with the wireless access provided by the Metricom system. I have enclosed some literature on the system for your information.

Commissioner Chong, in her remarks at USTA, talked about "Tele-Education" and how the state of California is concerned about the cost of providing tele-education. She noted: "Wireless systems or systems using existing cable lines in the schools could be the most cost effective."

* The Metricom wireless "Ricochet" Network is very cost effective. Metricom is providing unlimited use of a "Ricochet" network on the Stanford Campus to the students for \$20 per month.

Metricom is able to be so cost effective because its radios are Part 15 devices. Metricom can deploy a wireless network quickly and inexpensively due to its unlicensed status. Students benefit from these economies as demonstrated by the pricing structure at Stanford.

You should be aware that many applications of Part 15 devices, including Metricom's "Ricochet" Network, are gravely threatened by the Commission's proposals in PR Docket 93-61, Automatic Vehicle Monitoring. Damage to the vast Part 15 industry and to the American consumer and student body to provide another vehicle location service would be policy making at its worst.

Now that you have seen a small part of what the Commission wrought by nurturing and fostering the Part 15 industry, I hope you will do what is necessary to protect that industry from the trauma PR Docket 93-61 harbors.

I am causing a copy of this letter to be filed with the Secretary of the Commission to be made a part of the record in PR Docket 93-61.

Sincerely,



Henry M. Rivera

cc: Ruth Milkman, Esq.
Jane Mago, Esq.
Mr. Bruce Franca
Mr. Ron Netro
Rosalind Allen, Esq.
Mr. William Caton



Metricom[®]

Leading the way in wireless intelligence



Prices

Effective 6/28/94

Service	Speed ¹ (Kbps)	Access (\$/month)
Economy	2.4	2.95
Standard	9.6	9.95
Executive	19.2	19.95
Premier	unrestricted	29.95

¹ Maximum network access speed.

Activation fee	\$95
RF Modem rental ²	\$20/month
RF Modem purchase	\$495

² Not available under Economy service.

Optional Services and Accessories

Internet access ³	\$15/month
PSTN access ⁴	\$5/month
Extra battery (NiMH)	\$79.95
Extra AC adapter	\$59.95
Extra 18" serial cable	\$9.95
Extra 10' serial cable	\$19.95
Replacement antenna	\$9.95

³ PPP connection. TCP/IP software required. Not available under Economy service.

⁴ Dial-out access to the public switched telephone network. Toll charges for long distance calls not included. Not available under Economy service.

By purchasing/renting two RF Modems under Metricom's **virtual office connection** plan, you may access your desktop computer from a portable computer by dedicating one RF Modem to each; additional **remote control/remote access software** is required. The total monthly service access fee under this plan is only 50% greater than for a single modem (virtual office connection is not available under Economy service).



Metricom, Inc.
980 University Avenue
Los Gatos, CA 95030

For Immediate Release

Contact:
Metricom, Inc.
Mark Cooley
(408) 399-8133

Metricom Provides Wireless Access For Users Of Oracle in Motion

Los Gatos, Calif., September 12, 1994 — Metricom today announced that the company's Ricochet™ wireless data communications service, which operates in both metropolitan and campus network settings, now provides wireless access to users of Oracle's new client/server product, Oracle in Motion™. Oracle in Motion is the first mobile client/server product that makes corporate data accessible to laptop computer users via LANs, telephone lines and wireless networks. When used together, Oracle in Motion and the Ricochet service create a convenient, flexible and reliable way to work with important corporate data while away from primary desktop computers.

"Oracle in Motion is an ideal product to extend corporate computing to the growing number of mobile workers", said Brian Salisbury, president of Metricom's Wireless Services Division. "The untethered freedom of wireless connectivity is a natural companion to this exciting, new software product."

Paramount among benefits for users of Oracle in Motion, when used with Ricochet service, are cost savings, high data rates and standard user interfaces. Ricochet service is billed on a flat-rate basis — one price for an entire month's usage regardless of volume of data accessed or frequency of use. Further, Ricochet is fast; the raw over-the-air data rate is 77Kbps. Since a Ricochet modem uses the same interface as a telephone modem, there are no special scripts required or complicated adjustments to communication software. This means that an Oracle in Motion user can use Ricochet on a "plug-and-play" basis.

— more —

Telephone: 408-399-8100 FAX: 408-354-1024

About Metricom and Ricochet

Metricom's commercial Ricochet service, launched in June of 1994, is a wireless data communications service operating over its MicroCellular Data Network™ (MCDN™) system. It allows users of desktop and laptop computers and PDA devices to access a wide variety of information available on both private and public networks. Ricochet subscribers are able to wirelessly send and receive e-mail from co-workers, connect to on-line services such as America Online and eWorld or communicate peer-to-peer, bypassing the network infrastructure. The Ricochet wireless modem supports the AT command set and PPP for direct Internet access, giving end-users, network managers and Internet service providers an easy-to-use wireless solution. Ricochet service is currently available in the Silicon Valley area of California, with a national roll-out planned throughout 1995 and 1996.

Founded in 1985, Metricom (Nasdaq: MCOM) is a leader in digital, wireless data communications networking technology. The firm, headquartered in Los Gatos, California, has developed license-free, high performance, low-cost regional data network systems that can be used in a broad range of personal computer and industrial applications. The Ricochet customer service department can be reached at 800-556-6123.

— 30 —

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Oracle is a registered trademark of Oracle Corporation. Oracle in Motion is a trademark of Oracle Corporation.



Metricom, Inc.
980 University Avenue
Los Gatos, CA 95030

For Immediate Release

Contact:
NetManage
Donna Loughlin
(408) 973-7171

Metricom, Inc.
Mark Cooley
(408) 399-8133

Chameleon TCP/IP Applications Accessed Anywhere With Metricom's Wireless Technology

Cupertino, Calif., August 24, 1994 — NetManage, the leader in TCP/IP applications for Microsoft Windows, announced today that the Chameleon product family is interoperable with Metricom's Ricochet™ wireless data communications service which operates over Metricom's MicroCellular Data Network™ (MCDN™) system. Now Chameleon users have even more flexibility in accessing corporate networks and the Internet by subscribing to Metricom's Ricochet service.

According to Business Research Group, there are 1.5 million mobile computing users today and the number will increase to 6.8 million by 1998. NetManage's Chameleon has become popular with this growing number of mobile users because of the product's easy-to-use TCP/IP applications suite. Chameleon applications include SMTP mail with multi-media attachments, FTP file transfer, Telnet, TN3270 and TN5250 terminal emulation, Internet News Reader, Gopher client and navigation utilities such as Whois, Finger and Ping.

NetManage's Chameleon applications used in conjunction with Metricom's Ricochet wireless data communications service allow mobile TCP/IP users to access information over Metricom's MCDN system, bypassing the standard telephone network. The MCDN system is based on spread-spectrum radio technology utilizing a packet switched network which transmits data at a raw, over-the-air data rate of 77 Kbps.

"Chameleon's interoperability with Metricom's Ricochet service provides mobile users more freedom in accessing data from a LAN or the Internet. Now, Chameleon users have a choice in using dial-up or wireless technology with Chameleon." said Bob Williams, NetManage's vice president of marketing.

— more —

About Metricom and Ricochet

Metricom's commercial Ricochet service, launched in June of 1994, is a wireless data communications service allowing users of desktop, laptop and PDA devices to access a wide variety of information available on both private and public networks. Ricochet subscribers are able to wirelessly send and receive e-mail from co-workers, connect to on-line services such as America Online and eWorld from Apple or communicate peer-to-peer, bypassing the network. The MCDN system implements the AT command set and PPP for direct Internet access, providing end-users, network managers and Internet service providers with an optimal amount of computing choices. Ricochet service is currently available in the Silicon Valley area of California, with a national roll-out planned throughout 1995 and 1996.

Founded in 1985, Metricom (Nasdaq: MCOM) is a leader in digital, wireless data communications networking technology. The firm, headquartered in Los Gatos, California, has developed license-free, high performance, low-cost regional data network systems that can be used in a broad range of personal computer and industrial applications. The Ricochet customer service department can be reached at 800-556-6123.

About NetManage

NetManage, Inc. develops, markets and supports an integrated set of TCP/IP connectivity applications and development tools for Microsoft Windows that facilitates communications and administration of personal computers across dissimilar networking environments. The company's Chameleon product family was the first to specifically target Microsoft Windows inter-networking. The company's products are sold by NetManage's own direct sales organization and through distributors internationally. NetManage is a public company, whose shares are traded on the Nasdaq under the ticker symbol NETM. NetManage is located at 10725 De Anza Blvd. Cupertino, CA 95014, USA. Phone 408-973-7171 Fax: 408-257-6405.

Metricom ® is a registered trademark of Metricom, Inc. MicroCellular Data Network™, MCDN™ and Ricochet™ are trademarks of Metricom, Inc.



Metricom, Inc.
980 University Avenue
Los Gatos, CA 95030

FOR IMMEDIATE RELEASE

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408-399-8200

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William Orrange
Janis Ulevich
Ulevich & Orrange, Inc.
415-329-1590

**RI-COCHET™ WIRELESS DATA NETWORK REACHES CUPERTINO;
INTRODUCTORY AND VIRTUAL OFFICE NETWORK
PRICING AND INTERNET TRIAL ANNOUNCED**

LOS GATOS, Calif., June 28, 1994 — Metricom today announced first commercial availability of its Ricochet MicroCellular Data Network™ in Cupertino, California. The Ricochet network provides wireless access to computers and wired networks at speeds significantly greater than currently available wide-area wireless networks. For the first time mobile computer users can communicate wirelessly at a price and performance comparable to traditional wired telephone modem alternatives. Metricom also announced Ricochet pricing which provides for service access fees ranging from \$2.95 to \$29.95 per month and portable wireless modem rental for \$20 per month. Ricochet optionally provides wireless data access to the public switched telephone network and will also provide connection to the Internet. Additionally, Metricom described its virtual office connection, a solution which provides subscribers the ability to communicate wirelessly from their home or portable computer to their office desktop computer.

Ricochet Reaches Cupertino:

The Cupertino introduction of Ricochet commercial service marks the first installation of Metricom's MicroCellular Data Network. Full service in Cupertino is now available. Service will be expanded to other cities in the San Francisco Bay Area and other selected locations during the balance of 1994. Metricom plans to have Ricochet operational in 30 metropolitan areas across the country by the end of 1996.

Wireless Mesh Architecture with Wired Access:

The Ricochet network transmits data wirelessly over a mesh network of microcellular radios located on street lights, utility poles and buildings. The network's mesh architecture allows for increased system reliability because data is dynamically routed through the network. Further, the Ricochet network contains wired access points which allow wireless connection to the public switched telephone network. This access provides Ricochet subscribers with instant wireless connections to company networks and to services such as America Online, CompuServe, eWorld and Prodigy.

Telephone:
408-399-8200

FAX:
408-354-1024

Faster Than Telephone Data Rates at Less Expense:

Ricochet service is available in four performance and price levels. Service fees are flat rate, per month charges which are independent of network usage and the amount of data transmitted. The service pricing levels are:

Service	Network Access Speed	Service Access Fee
Economy	2.4 Kbps	\$2.95 per month
Standard	9.6	\$9.95
Executive	19.2	\$19.95
Premier	Unrestricted	\$29.95

Subscribers to the Standard, Executive and Premier plans may rent a Ricochet portable wireless modem for \$20 per month. Alternatively, subscribers to any service level may purchase modems for \$495. There is also a one-time activation fee of \$95.

Enhanced services available for Standard, Executive and Premier customers include public switched telephone access for a flat fee of \$5 per month and access to the Internet for a flat fee of \$15 per month.

Internet Access Initiated:

Metricom is initially offering wireless Internet access through the Ricochet network on a trial basis to a limited number of subscribers. When it communicates through a Ricochet portable wireless modem, a subscriber's computer will act as a PPP node on the Internet.

Virtual Office Pricing Established:

The Ricochet network permits those who use a home or portable computer to achieve wireless access to their desktop computer. With two Ricochet portable wireless modems and appropriate application software, subscribers have wireless access to all the data on their office computer. Customers who wish to take advantage of this virtual office solution may purchase or rent the modems at standard rates and are entitled to network access for the second modem at 50 percent off the applicable single subscriber rate.

Founded in 1985, Metricom (Nasdaq: MCOM) is a leader in digital, wireless data communications networking technology. The firm, headquartered in Los Gatos, California, has developed a license-free, high performance, low-cost regional data communications network system that can be used in a broad range of personal computer and industrial applications.

BUSINESS ISSUES IN TECHNOLOGY

Computer Letter

Published by Technologic Partners

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Campus Capers

Mounting a challenge to the wireless establishment

We've assumed, along with most of the world, that there are essentially two ways to build a wireless data network. One is to go for high data rates in the limited confines of a single building, providing the wireless equivalent of a wired local area network. That's what **NCR**, **Proxim**, **O'Neill Connectivity**, and **Windata** have done with indoor networks that hit speeds of several megabits per second. The other approach is to emphasize national or regional coverage, sacrificing speed for the reach of a wide area network such as those operated by **Ardis** and **Ram Mobile Data** and planned by the major cellular telephone carriers. The effective speeds of these networks — in the range of 600 to 2,400 bits per second — are too slow and expensive for many dial-up applications. Neither approach solves all the communication problems that a new generation of mobile devices will present. There ought to be a way, one would think, to connect wirelessly to the corporate network from home or a local restaurant and exchange files at something like network speeds for a modest cost.

Metri who?

In fact, there soon will be such a method if the claims being made by a small company called **Metricom**, based in Los Gatos, Calif., can be taken seriously. Metricom's President Bob Dilworth says he can put together a remarkably inexpensive microcellular network for a campus or metropolitan area and deliver effective data rates as high as 56,000 bps, charging no more than \$20 per month for unlimited use. It all sounds too good to be true, but we do take Mr. Dilworth seriously — in part because a number of people we know to be well-informed and disinterested observers of the wireless scene do so. We respect the fact that Metricom's wireless technology has been developed with the help of \$30 million in research and development funding from some of the nation's largest utilities. We're also impressed by the experience of **Apple Computer**, which has been serving as a guinea pig for the general-purpose use of Metricom's networking system for the past month and, so far, finds that it works pretty much as advertised.

Underdog credentials

All of which doesn't alter the fact that Metricom as a company has yet to turn a profit and last year reported its biggest loss yet — \$4.5 million on revenues of \$6.4 million. After installing 20 pilot networks to test the concept of remotely monitoring meters and managing power loads, Metricom finally signed a contract with Southern California Edison for its first full-scale utility installation late last year. Clearly, the company lacks the financial and managerial resources that many wireless networking contenders can boast.

Competition in computer networking is likely to be stiff as both LAN and WAN carriers target the opportunity to serve university and corporate complexes and metropolitan areas. There are also serious questions that have to be answered about Metricom's business plan and a pricing model that appears to generate too little revenue. Nevertheless, we believe the Metricom technology will make a significant difference in the wireless networking arena because it overcomes what are regarded as major obstacles facing the industry and, by extension, the concept of mobile computing.

(Continued on Page Two)

METRICOM

Continued from Page One

One problem for the companies that have been busy evangelizing the concept of nationwide wireless networks is that the cost of infrastructure has been high. Installing a single Ram or Ardis transceiver runs about \$100,000, and the cost for a cellular base station is between \$800,000 and \$1 million. Real estate must be bought or leased, a tower erected with a bank of radios, and the entire structure connected over leased phone lines to the regular phone system. To help pay for the substantial capital costs they are incurring, Ardis and Ram impose monthly user fees of \$25 to \$30 plus usage charges of 5 cents to 10 cents per packet of up to 512 bytes. In all, subscriber costs can run easily to \$100 or more per month. Using the systems to transfer large files is prohibitively time consuming and expensive. A one page fax document of 50 Kbytes, for example, would take more than three minutes to send at 2,400 bps and cost almost \$10 at 10 cents per packet.

Metricom's approach could fill a niche between high-speed local networks and slower wide area systems.

Smart radios

Metricom concluded that the very low-cost wireless technology it had developed for the utilities could find a place in campus-wide or citywide networks for companies and universities. The company revved up its spread-spectrum radio system to 56,000 bps and wrote software that would allow the network to run such off-the-shelf remote networking packages as **Lotus Development's** cc:mail Remote. The goal is to provide wireless networking capability that is faster than any available wide area network, easier to use — and far cheaper. Metricom's plan is to charge only a monthly fee, based on the data throughput required. Charges would start at \$3 a month for 2,400 bps service, rising to \$20 for 56,000 bps. There would be no packet fees, although Metricom will restrict the number of packets that can be sent in an hour.

Metricom is able to charge such low

rates in part because its network operates in the unlicensed 900 MHz band, which doesn't require the hefty licensing fees paid by Ardis and Ram. In addition, Metricom's microcellular mesh network is far cheaper to deploy than the star-shaped network usually used in radio communications. In the star topology networks, a powerful radio at the hub is needed to

BUSINESS ISSUES IN TECHNOLOGY ComputerLetter

A Technologic Publication

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Technologic Partners

The mesh layout provides a low-cost way to cover a campus or metropolitan area.

direct traffic and relay messages between smaller transceivers. Metricom's mesh design is like a checkerboard, in which the intelligence is distributed across every square of the network. Each radio transceiver, the size of a shoe box but with an outdoor range of 2 to 5 miles, costs only \$700 to make and install and can be hung throughout a city from lampposts or the sides of buildings. All the radios are assigned an exact geographic location, which allows them to route messages automatically anywhere in the mesh without help from a central intelligent hub to direct them.

To avoid interference from other devices operating in the 902-928 band, which is widely used for commercial applications as well as scientific and medical instruments, Metricom uses the variation on spread-spectrum technology known as frequency hopping. In spreading their signals over a wide band of frequencies, Metricom's radios "hop" from frequency to frequency in a random manner. But instead of hopping together as the radios in a wireless LAN do to create one big channel, the Metricom radios hop independently. This asynchronous hopping limits the data rate available to any one user but makes much more efficient use of the available radio spectrum. Because no two radios occupy the same frequency, multiple communications can take place simultaneously.

Fan club

We're no experts on radio technology, but several of those who are give Metricom's approach high marks. Ira Brodsky, president of Datacomm Research; Elbert Ashbaugh, director of OEM strategic alliances at **Ericsson GE**, which makes radio equipment for wireless data networks; and Bill Stevens, wireless networking staff engineer for Apple's Advanced Technology Group, are unanimous in praising the technology. Mr. Brodsky points out that even the forthcoming generation of Personal Communications Services, due to emerge in 1994 and 1995 when new radio frequencies are released by the Federal Communications Commission, will not solve the cost problem as effectively as Metricom's approach might.

Although PCS services are supposed to provide low-power, low-cost, metropolitan

area wireless networks, they too are designed around costly cellular-telephone models. But instead of having only 20 to 30 cells covering a city as a cellular phone system would, the PCS microcellular designs would need thousands of cells, meaning thousands of real estate locations and thousands of radio systems.

Test driver

We're particularly interested in Mr. Stevens' reaction because Apple is the only company outside the utility industry with hands-on experience with the Metricom network. When he first installed the trial network, Mr. Stevens tells us, his concerns centered on how the network "felt" in terms of responsiveness and speed and whether Metricom's claims for in-building coverage could be substantiated. As far as the "feel" of the network goes, Mr. Stevens says he can't tell the difference between using the Metricom network to access AppleLink and using his wired desktop connection. As for building penetration, Apple finds that radios sited atop a four-story building provide good coverage for the third and fourth floors but start to lose signal on the first and second floors. The solution: installing another radio inside the building to serve the first two floors.

It's still too early, of course, for Apple or anyone else to render a final judgment on the Metricom network. But Metricom is moving ahead with plans to outfit a northern California university and another computer company with trial systems. Mr. Dilworth expects to have the entire Bay Area networked by December and to begin offering commercial service early in 1994. Then he wants to spend \$100 million over the next two years to deploy networks in the top thirty to forty metropolitan areas, assuming that money can be raised and the right partners lined up. Metricom obviously can't do this alone and is talking to communications companies, hardware manufacturers, and big corporations with networking needs as potential investors and strategic partners.

The emergence of Metricom has drawn strong reactions from the wireless LAN and WAN companies, which question not only its technical claims but its market focus and business strategies as well.

Some of these criticisms, we think, are well taken. Wen Lin, president of O'Neill Connectivity of Horsham, Pa., raises the issue of channel congestion and interference within the unlicensed bands. O'Neill's LANs use the same 902-928 band, but the interference in the confined space of an office building is far less than in a metropolitan area. At some point, Mr. Lin predicts, the 900 band will be as congested as the 49-MHz band where garage door openers, cordless phones, and baby monitors cause widespread interference. While this seems likely, Metricom hopes to avoid interference by expanding its service to another unlicensed band at 2400-2483 MHz, which is less congested.

Greg Hopkins, chairman of Northboro, Mass.-based Windata, also questions Metricom's claims that its radios can penetrate buildings within a half-mile range and that all floors in a building will be covered. The concrete in buildings tends to absorb radio signals, diminishing reception, and Mr. Hopkins speculates that issues such as dealing with multiple reflections will make it difficult for Metricom to provide reliable service inside buildings. On the other hand, Apple's experience to date seems to show that adding additional radios can solve the penetration problem and that the service has proved reliable.

Expanding the LAN

A significant question is whether a market in fact exists between the high-speed in-building LAN and the nationwide WAN. Mr. Hopkins doesn't think it does; at least, he says, his customers haven't requested that kind of service. Nonetheless, Windata and other wireless LAN companies are expanding their product lines to include a campus concept that links wireless LANs located in separate buildings. Windata's offering, to be announced later this year, won't provide all the mobility of a Metricom network, which allows access from cafeterias, parking lots, walkways, and nearby buildings. Rather, Windata will offer a 10-Mbps wireless "pipe" that will connect LANs in separate buildings. NCR already offers a campus version of

its WaveLAN network that links wireless local networks.

Air wars

Metricom's toughest competition may come from the cellular operators led by **McCaw Cellular Communications**, which we expect to roll out their initial Cellular Digital Packet Data networks in limited metropolitan-wide areas, rather than nationally, beginning this month. If so, they will be angling for the same customers that Metricom is going after: corporate campuses, hospitals, universities, and service companies with communication needs concentrated in a given geographical area. Metricom will have significant advantages in speed and low cost, if it can achieve its goals. But radio equipment manufacturers are already developing low-cost "minicells" that condense the amount of equipment needed for a cellular base station. In part by implementing in software functions that previously required hardware, **Steinbrecher** of Burlington, Mass., expects to cut the cost of cell sites about in half and provide further savings over time by eliminating the need to upgrade cell-site hardware.

Actually, Metricom isn't likely to compete directly with the cellular companies because its network has no capability for handing off users from one cell to another and so can't be used by drivers to send data from moving vehicles.

Back to school

The likeliest market for a network like Metricom's might be college campuses, where a few radios can reach a large population of computer users. Analysis by the company indicates that a single transceiver can support 100 subscribers, so 10 radios should suffice to cover a 10-square-mile campus and serve 1,000 students and faculty members. The capital investment would amount to \$14,000 — for the radios and ancillary equipment — and could be expected to generate \$27,000 in annual revenues if all the subscribers paid for the cheapest service and used it nine months of the year. That is a fast recovery of capital costs, even without counting the \$500,000 or so from selling 1,000 modems.

Cellular operators will be seeking the same customers as they roll out their first packet-data networks.

Metricom must seek the business skills needed to run large public networks.

But is it a business? Certainly it is a far different business from most wireless networks, which need substantial subscriber revenues to justify a huge infrastructure investment. Metricom figures it can generate revenues of more than \$1.7 million per year by installing networks on only 52 campuses, with minimal operating expenses. But it would take far greater revenues to justify the \$100 million investment Mr. Dilworth is contemplating. This will probably require constructing and operating large public networks in major metropolitan areas, a business that, at this point, Metricom lacks the organizational structures and expertise to handle.

Help wanted

Operating a public communications service company is a very complicated business, and much of that complexity has

nothing to do with technology. Rather it has to do with the ability to put sophisticated systems in place for billing, accounting, customer support, marketing, and network analysis and management. Metricom, historically a product company, will either have to recruit the people who can do those things or — more likely — strike alliances with companies that already do them.

Whether or not Metricom succeeds in its quest, we're gratified to see the emergence of technology that has the potential to bring down the cost of wireless communication while raising the bar on performance. While we have no doubt that the emerging class of mobile computing devices will eventually be widely accepted, the revolution will come a lot faster if communication to and from the field can be made cheaper and faster. □



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data solutions

F R O M M E T R I C O M™

Wireless Data for the Real World

A NATION OF NOMADS

Everybody's on the run. We're in the field and on the road. One day we work from home. The next day we're at the office. Nobody stays put anymore. Yet we need to keep the show going as if we did.

Cellular phones help. Pagers make a dent. But what if we could get our hands on all our data – text or graphics – no matter where our scattered lives take us?

An exciting new service, Ricochet,™ can deliver those real-life wireless data solutions to you right now.

ACCESS TO ALL YOUR DATA

Ricochet gives you portable two-way access to your E-mail, corporate files, and collaborative groupware. It is also compatible with your favorite on-line services like CompuServe, AOL, eWorld,

Prodigy and the global Internet. You can even communicate modem to modem and bypass the main Ricochet Network.

Ricochet challenges the industry premise that wireless has to cost more than wired. How did Metricom topple industry prices that seemed to be carved in stone?

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Metricom developed an innovative frequency-

hopping technology based on a spread-spectrum network first created for military security. The beauty of the MCDN™ (MicroCellular Data Network™) is that it doesn't require costly tower-based infrastructures. Advanced intelligence is embedded throughout the secure network, which can be expanded by simply adding toaster-sized radios on poletops or buildings.

FREEDOM IS A PORTABLE MODEM

We've developed a small modem that wirelessly connects

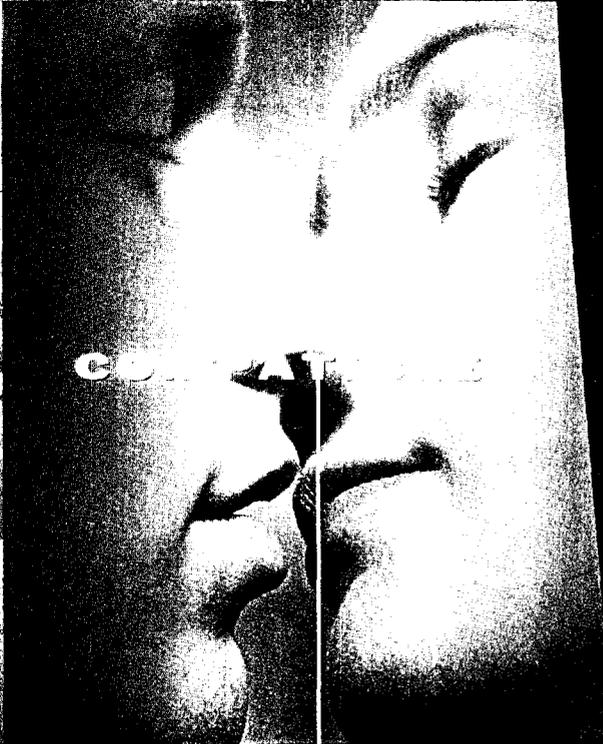
to the Ricochet Network and plugs directly into your desktop, laptop, or palmtop.

You can collapse time zones. You can keep more business relationships going at once. You can even run a credit card through a wireless

card reader at a city fair. In short, you can take care of business wherever you are.

There is nothing new to learn or re-configure because Ricochet works with your existing software.

And here's the juicy part. Ricochet is available today.



FLEET

COMBAT

Not Maybe. Not Later. Now.

BUSINESS AFFILIATES

Ricochet is poised to prove itself in business today.

Several factors contribute to the growing need for wireless data communications within the business community today. There is an increase in the mobility of employees within corporate campuses, and many of them require access to company data wherever they are. A critical mass of field

"Ricochet gives us flexibility and speed we've never had in a wireless text environment."

-Wally Dean,
Mayor Pro Tem,
City of Cupertino

technicians, field sales forces and mobile professionals also need data on-the-spot. And the requirements for fast, flexible and cost-effective communications for financial transactions such as credit card authorizations are burgeoning.

HEALTH CARE AFFILIATES

Ricochet earned its stripes in the mission-critical utilities industry. Rugged system integrity perfected for that market is well-adapted to health care affiliates.

Wireless data access can improve communications between doctors, patients, labs, insurance companies and pharmacies – and ultimately drive down costs.

ACADEMIC CAMPUSES

University campuses and their far flung facilities are one of the obvious markets for Ricochet. Students, faculty and administrators spend a good deal of time accessing libraries, university computer centers, on-line services – and each other.

More than almost anything, young people value their freedom. Access to wireless data frees up college students to live life on the go.

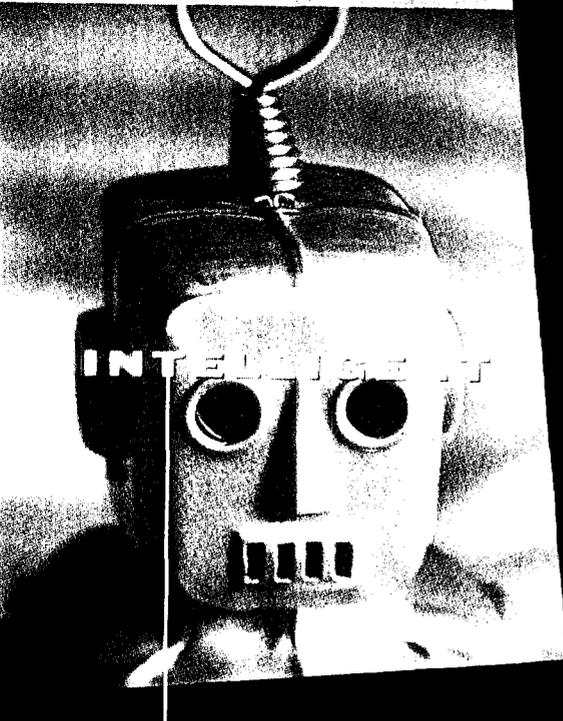
STATE AND LOCAL GOVERNMENTS

Many cost and efficiency conscious governments appreciate fast wireless data. Permits, tickets, and licenses can be processed much faster than using traditional phone lines.

Electronic bulletin boards and town meetings can improve the democratic process.

WHEN CAN YOU GET RICOCHET?

Now we serve the greater Bay Area and can access any U.S. public or private network. We will be in thirty key metropolitan areas by 1996. Please call 1-800-556-6123, fax or Ricochet us for more information.



AVAILABLE

INTELLIGENT

Innovations and Specifications

HOW DOES THE TECHNOLOGY WORK?

Ricochet uses an advanced spread spectrum, packet-switched radio technology. Your digital data speeds across our micro-cellular network at 77 kilobits per second to intelligent radios, which then route your data to its destination.

Within Metricom's frequency-hopping, spread spectrum network, data packets are transmitted on randomly selected channels throughout the 902-928 MHz band of the radio spectrum. MCDN radio transceivers form an interconnected mesh network topology that provides extremely robust and reliable performance. If interference, a busy channel, or an out-of-service radio is encountered, MCDN's intelligent routing software

chooses an available radio on another channel to complete data transmission.

WHERE ARE THE SAVINGS?

Metricom can install its toaster-sized radios on poletops or buildings and eliminate costly tower-based infrastructures and real estate. Also, because Ricochet operates in the FCC's unlicensed 902-928 MHz radio frequency range, there are no regulatory cost add-ons.

What's more, our data speeds save time. At 77 kbps we are probably 3-5 times faster than your present wired modem.

HOW DO YOU ACCESS THIS NETWORK?

You only need one new item: Ricochet's light, portable modem. That's it. No surprises.

HERE ARE THE SPECS:

MODEM: SIZE: Pocket size at 7 5/8" x 2 3/8" by 7/8". Weight is 13 ounces. **BATTERY LIFE:** 6 hours, depending on usage. **INTERFACE:** Standard AT command set, RS-232 serial interface. **COST:** Modems are under \$500.

SERVICE: **COMPATIBILITY:** IBM PCs and compatibles, Macintosh PCs, and PDAs with serial ports, on-line services like AOL, eWorld, CompuServe, Prodigy, and the global Internet. **COST:** Service is charged at a flat fee per month, depending on data rates and other options selected. **COVERAGE:** Extended campuses, surrounding neighborhoods and greater metro regions. **DISTRIBUTION:** Initial distribution through Metricom. Near-term plans for local/national reseller channels.



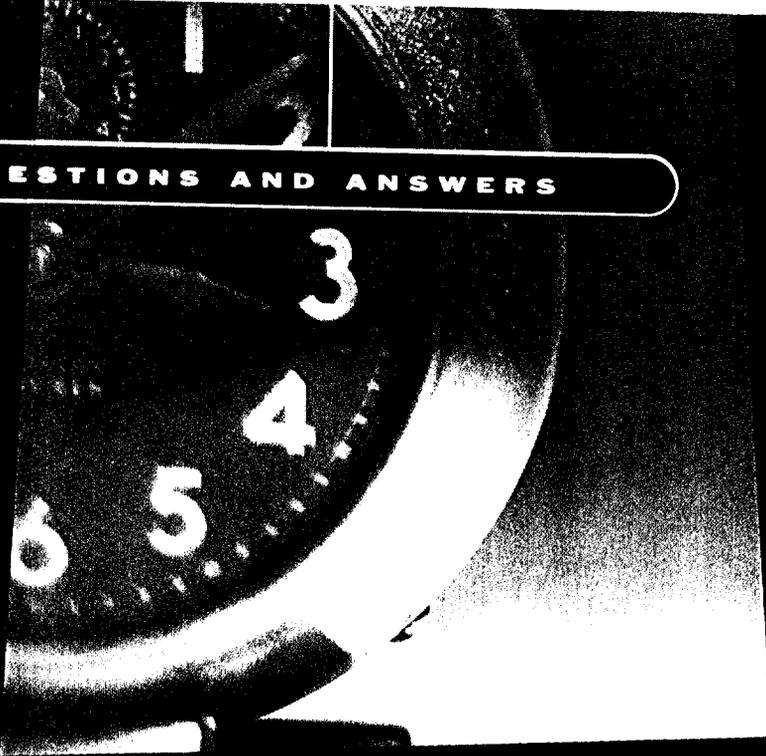
1-800-556-6123

METRICOM, INC. 980 UNIVERSITY AVENUE LOS GATOS CALIFORNIA 95030-2375

TEL: 408-399-8200 FAX: 408-354-5147 INFO@METRICOM.COM



QUESTIONS AND ANSWERS



F R O M M E T R I C O M ®

R I C O C H E T

Q: *What are MCDN™ and Ricochet™?*

A: MCDN stands for MicroCellular Data Network™ and is the underlying system that enables Ricochet. Ricochet is the name of Metricom's wireless data communications service. With Ricochet, customers are able to establish wireless connections to local area networks and a variety of regional, national and international networks and network users from desktop, laptop and PDA devices.

Q: *What do I need to use Ricochet?*

A: First, you need to purchase or rent a Ricochet portable modem with accessories for your computer (desktop/laptop/PDA). For a network connection, the next step is to initiate a service account with Metricom. With a service account you can use the Ricochet network to connect to a variety of computing destinations. Without a service account, you can still connect directly to other users with Ricochet modems in the immediate vicinity.

Q: *How can I subscribe?*

A: You need to contact Metricom at 800-556-6123, or by FAX at 408-354-5147 to order the modem and subscribe to Ricochet.

Q: *What can I do with this service?*

A: You can wirelessly communicate with other Ricochet customers, both in your local service area and in other Ricochet service areas (where available). You can also connect to a variety of third party services and networks such as America Online, eWorld, CompuServe and the global Internet.

Q: *What computers can I use?*

A: All Apple desktop and laptop computers, IBM PC and compatible desktop and laptop computers, and a growing number of PDA devices (e.g., Apple Newton and HP 100LX).

Q: *What Modems do I use?*

A: You use a Ricochet portable radio modem.

Q: *How much does it cost to use the Ricochet service?*

A: After a one-time activation fee, the service is billed at a flat monthly rate based on data speed and features desired. At an additional cost, customers may purchase wireless access to the global Internet and/or the public telephone network for inter-regional communications.

Q: *Where is the Ricochet service available?*

A: Ricochet service areas are being planned and installed on a prioritized schedule. The latest information about service areas is available upon request.

Q: *What makes Ricochet different from other wireless services?*

A: Ricochet is real—today—at speeds faster than other wireless networks, at prices far lower than other wireless providers and with standard interfaces to existing computer hardware and software products and on-line services.

SERVICE DETAILS

Q: *When will the service be available?*

A: Service is currently available in selected cities in the Silicon Valley area of northern California. Metricom will offer Ricochet service in at least 30 other domestic major metropolitan areas by 1996.

Q: *Where can I use Ricochet?*

A: You can use the portable modem for network access in any established Ricochet service area. Additionally, you can communicate peer-to-peer when one modem is within range of another modem, anywhere and anytime.

Q: *How is billing handled?*

A: Depending on the level of service you choose, Metricom will either charge your credit card or bank account on a monthly or annual basis.

Q: *May I electronically access more information about Ricochet?*

A: Yes! You can access Metricom's worldwide web server at www.metricom.com/ricohome.htm. You may also request information by sending mail to Metricom's Internet mailbox, info@metricom.com.

Q: *How do I contact someone for post-purchase service and support?*

A: You can contact Metricom customer support by calling 800-556-6123.

TECHNICALLY SPEAKING...

Q: *What technology is Ricochet based on?*

A: Ricochet operates over MCDN, a unique spread spectrum, asynchronous frequency hopping system that sends data packets across a mesh-like network of fully intelligent radio nodes. Data packets are transmitted on randomly selected channels throughout the license-free 902-928 MHz band of the radio spectrum.

Q: *What is the over-the-air data rate?*

A: Ricochet has a constant over-the-air data rate of 77Kbps - up to 4 to 10 times faster than other wireless networks. The effective user data rate will average 20-30 Kbps.

Q: *How long will the battery in the modem last?*

A: A Ricochet modem will operate for an average of 6 hours between recharges, depending on usage.

Q: *How does my computer communicate with my Ricochet modem?*

A: The Ricochet modem supports the industry standard AT command set as well as the Point-To-Point Protocol (PPP) for Internet access.

