

# Focus

## On Broadband Wireless Internet Access

Steve Stroh, Editor

June, 2001

Issue 1A

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*Focus On Broadband Wireless Internet Access* is founded upon two tenets: (1) The trend towards “Broadband Internet, Everywhere” is irreversible... and profound! and (2) That *the* primary method of Broadband Internet Access is very likely to be wireless- Broadband *Wireless* Internet Access.

*Focus on Broadband Wireless Internet Access* is written in an informal, easy-to-read style, with an emphasis on clear explanations of why a particular company, product, or development is significant. Each issue contains a number of original, in-depth articles and news stories (*not* regurgitated vendor press releases). *Focus* is a just-in-time, short-lead publication, using Adobe Acrobat (.pdf) format, and email distribution. *Focus On Broadband Wireless Internet Access* is published by:

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### The Problem With Fiber

I really couldn't have asked for a better segue with which to begin *Focus on Broadband Wireless Internet Access*. In the Monday, June 18, 2001 issue of The New York Times (National Edition), a front page story by Simon Romero (nicely illustrated with a color photo of multi-color fiber conduits being installed) titled *Once-Bright Future of Optical Fiber Dims* made a telling point. In the second paragraph, Romero stated “There is a glut of capacity of high-speed, long-haul information pipelines, but a shortage of the high-speed, local-access connections that consumers and businesses need to connect to the Web. It is as if superhighways stand nearly empty while traffic backs up at the Holland and Lincoln tunnels.”

What I found most instructive was that Romero, having outlined the problem so quickly and elegantly, doesn't do any justice to potential answers to the problem, such as (you guessed it...) Broadband Wireless Internet Access. The thrust of Romero's article is that so much money has been lost, by so many companies, that much of the installed fiber may never be lit. I hardly think that's the case- there's ample evidence that there's enormous pent-up demand for Broadband services... if the last-mile problem can be solved.

*Focus on Broadband Wireless Internet Access* is all about trying to fill the information gap displayed by Romero's lack of mention of Broadband Wireless Internet Access, and the solution that it represents in solving the last mile problem and actually *accomplishing* widespread deployment of Broadband Internet Access.

The referenced article can be found online at: [www.nytimes.com/2001/06/18/technology/18MELT.html](http://www.nytimes.com/2001/06/18/technology/18MELT.html)



### Upcoming, In the July, 2001 Issue

- In-depth coverage of WCA's Broadband Now! conference
- A new player enters the Broadband Wireless Internet Access market with an incredible price/performance breakthrough – a *Focus* exclusive!
- *Focus On Broadband Wireless Internet Access'* List of Vendors to Watch

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# *Focus on Broadband Wireless Internet Access*

## **Why (I Think) Wireless Will Win**

My Thanks to Bob Wieneke of Clearwire Technologies for the inspiration for one of the first articles in this first issue of *Focus*. Near the end of ISPCon Fall 2000 in San Jose, Bob and I were discussing the relatively clueless press coverage of the broadband wireless field and I told Bob that I was planning to write an article with the above title, and a bit of what I planned to say. Bob lapsed into a very thoughtful look and a long pause, and then said "I would *really* like to read *that* article!" Bob's encouraging words stayed with me.

A friend of mine, Ed Mitchell, in an article published in January, 1999 titled "The Great Broadband Network Hoax" ([www.hamradio-online.com/1999/jan/hoax.html](http://www.hamradio-online.com/1999/jan/hoax.html)) brought into focus the many significant problems with consumer and Small Office / Home Office (SOHO) broadband services, such as cable modems and Digital Subscriber Line (DSL). Basically, in many, arguably *most* areas, consumer and SOHO broadband services are simply unavailable. This is especially true in smaller urban, suburban, and rural areas.

**Cable** systems have to be nearly completely rebuilt for cable modem service to be offered. Where cable modem service is offered, downstream speeds are impressive at first, but then degrade as more users are added. By all accounts I've read, reliability of cable modem service is terrible, time-to-repair is measured in days, and upstream bandwidth is very jealously guarded. For example, use of a small mail server, a completely legitimate, relatively low bandwidth use by a Small Office / Home Office (SOHO) user is cause for termination of service.

This last factor is why I think that cable modem service will ultimately fail. A highly asymmetric network model (lots of capacity downstream, minimal capacity upstream) doesn't work when you want to do things like run your own server. Increasingly, folks (and this includes "ordinary" folks) *do, in fact*, want to run their own server. They turn on the web server features in Windows so the kids can get some practice building web pages. They begin taking lots of photographs and want to put them online for Grandma to see. When you're doing web page work on the same PC that's the server, it's really easy. It's also cheap, and there's plenty of capacity for pictures (see how long the typical 5 or 10 Mb limit on a cable server lasts when you're trying to display pictures. There's no easy fix for cable systems that were built to be highly asymmetrical. Likely, they'll have to be rebuilt to more closely resemble a Local Area Network architecture. I'm skeptical that they'll get the money to be able to rebuild the cable infrastructure a second time to accommodate peer-to-peer. I think cable modem service will sell well enough in the absence of any serious competition, but if there's another option that allows servers, I think the SOHO users will desert cable.

**DSL** has severe distance limitations- it only works within short distances from a telephone company Central Office (CO). Telephone companies are highly selective where they choose to install DSL equipment. Partially that's due to the high cost of the Digital Subscriber Line Access Multiplexer (DSLAM), but it's also a function of the "relative importance" of a particular market to a telephone company. Verizon, Qwest, and SBC all inherited lots of little towns in their service areas. If those towns were being served poorly by the Incumbent Local Exchange Carrier (ILEC) *before* being merged into a mega-ILEC, it simply doesn't stand to reason that these (now *very* tiny) parts of the ILEC's empire are even *on the map* of the mega-ILEC, let alone slated for new capital investment. Some Competitive Local Exchange Carriers (CLECs) such as Covad and New Edge Networks have deployed DSL equipment to COs where the telephone companies have not, but those are relatively few, and subject to distance limitations. "Longer range" versions of DSL are promised (as well as repeater / extender technology). The "longer range" DSL will be yet another capital investment, and still requires *enough copper pairs*, of *high-enough quality* for DSL to be an option. In a lot of communities, there's not enough copper pairs available, and what is available isn't high enough quality.

Consumer / SOHO **satellite** broadband services such as Starband and DirecPC can potentially offer broadband services to customers located outside coverage areas of cable modems and DSL. It's too soon to tell whether the systems can scale gracefully and maintain their promised speed and responsiveness. The first version of DirecPC, which was downstream only (typically a dialup modem was used for the upstream connection) proved to not be scalable. Many users who tried to use DirecPC at something close to the 400 Kbps that was promised had their connections "throttled back" for "abuse".

It would seem that the best thing that the satellite broadband providers could do would be to price satellite service significantly higher than cable or DSL to keep their user base at a manageable level, and performance on their system reasonably high. Gilat and Hughes, Starband and DirecPC's founding companies, respectively, claim that they've anticipated the "too many users" problem and have developed mechanisms to scale gracefully. We'll have to see. The reports I've heard to date from Starband users, especially those who had no broadband options, is that Starband works reasonably well. I note that Starband / Gilat has begun advertising its new Skyblaster 360 satellite modem, claiming download speeds of 50+ Mbps. Look for an in-depth article on Starband and the Skyblaster 360 in a future issue.

If we lived in a more perfect world, our respective ILECs would have anticipated the need for broadband service and we'd all have **Fiber to the Home** (FTTH). Some of us do have FTTH, but apparently it's the wrong kind of fiber, or it's attached to the wrong device - like a Class 5 telephone

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switch. The Class 5 handles phone services very well (there's likely no limit to the number of services that you could command from your touch-tone pad...), but that's not what we want now. Bad news is that apparently many FTTH technologies can't be shared between (the fiber equivalent) of a DSLAM and a phone switch. This absurd situation reached its apex when Sol Trujillo, former CEO of ILEC US West, was quoted as saying that his home was served with fiber, so "Even I can't get DSL, and I'm the CEO of US West".

The other problem with FTTH is that if a company *does* install it, at considerable cost, that company has total say over what services they provide over it. It certainly is not the case that once you've attained the "nirvana" of FTTH that you have ultimate choice of Broadband services. If the cable company brought you FTTH... oops, all you can get on that fiber is what the cable company chooses to sell you. Etc.

**T-1** is an old telephone company technology for data circuits. At 1.544 Mbps, it's fast enough for now, but not for the next few years. One pundit declared that if state Public Utility Commissions (PUCs) were to just deregulate the T-1 market, we'd all be able to have T-1's. That's not the case- like DSL, a T-1 requires "clean" copper pairs. Unlike DSL, a T-1 does not have significant distance limitations. But, T-1 service costs approximately \$1200 / month for the circuit itself. The price for the circuit doubles if a T-1 crosses between two telephone company service territories because each telephone company gets *their* cut. Then, the Internet Service Provider has to provide Internet bandwidth to the T-1. T-1s are pricey, and they're still mostly a commodity product.

Finally, we arrive at the **Wireless** option. Wireless has a number of advantages. (1) It's, um, wireless, as in doesn't need wires. So, there's no concern that the copper pairs aren't available or of sufficient quality to support Broadband service. (2) Because it doesn't need wires, it's largely removed from the machinations of the ILECs. (3) If you're not using the ILEC's wires, likely you're not paying the ILEC; you're keeping the majority of your revenue. (4) With wireless, likely your service area is greater than with DSL or other wireline Broadband technologies. With wireless, if you can "see" the customer, you can likely provide them service. (5) It's arguable that the cost of deployment is cheaper than that of DSL. I watched one startup Wireless ISP deploy their very first base station, and to begin providing 1 Mbps service to their first customer cost them approximately \$10,000 in equipment and labor to get antennas mounted and radios online. (6) Upgrades are cheaper. If the customer wants faster Internet access, the truck comes and replaces the radio... instead of running an entirely new pair of copper between the central office and the customer. (7) The service provider (can) control the entire network, end-to-end. In many cases, the a service provider using DSL doesn't have any visibility into the ILEC's network to

troubleshoot problems. They have to "hand off" the customer's problem for the ILEC to (hopefully) troubleshoot. (8) Wireless equipment is on the right end of the technology curve. Incredible investments are being made in wireless technology as a result of cellular phones; Wireless Internet Access equipment is benefiting from better Radio Frequency (RF) semiconductors, better Digital Signal Processors (DSPs) and better RF design tools. (9) It's possible for small service providers to get into the Broadband Wireless Internet Access using relatively inexpensive equipment using license-exempt spectrum – no spectrum acquisition costs. (10) Wireless is inherently a mobile technology, and it's fully expected that the benefits of "Fixed" Broadband Wireless Internet Access will rapidly materialize for mobile users.

My assessment is that the primary issues in the deployment of reasonably-priced, reasonable-performance broadband services to consumers and SOHO is that there is a distinct lack of vision, no small amount of greed, and near-total arrogance on the part of ILECs and cable television companies. Instead of the flawed, inadequate systems they're currently deploying, they *could* be deploying reasonably-priced, reasonable-performance broadband services to consumers and SOHOs.

But for whatever reason, they're not. For the moment, that's working because consumers and SOHO users have few options. I truly believe that won't be the case for very long, as enlightened service providers use Broadband Wireless Internet access to break the ILECs and cable television "stranglehold" for Broadband services... including telephony services.

It's my belief that, in the end, broadband wireless is going to be the most cost-efficient and efficient-to-deploy technology to provide broadband services to residential and small business customers.

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[My apologies to the readers, but I didn't record the source for this item. Please see the Editor's note below]

### Appellate Court Remands FCC Decision Classifying DSL Services

[April 20, 2001- ed.] The U.S. Court of Appeals for the District of Columbia Circuit has vacated and remanded an FCC order that required incumbent local exchange carriers ("ILECs") to provide their competitors with access to their digital subscriber line ("DSL") facilities. The reason for the remand was the Court's rejection of the FCC's classification of DSL-based service as either "telephone exchange" or "exchange access" service. Classification as one or the other triggers the access requirement. The Court found that the FCC's reasoning in making the classification was based on an earlier decision that the Court had also rejected. That rejection came in the Court's

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vacation and remand of the FCC's "reciprocal compensation" order, in which the Court found fault with the FCC's classification of calls to Internet service providers terminated by local exchange carriers as "exchange access."

For more information go to:  
[pacer.cadc.uscourts.gov/common/opinions/200104/00-1002a.txt](http://pacer.cadc.uscourts.gov/common/opinions/200104/00-1002a.txt)

[I was very surprised that this didn't get much press. The way I read this announcement is that, essentially, the ILECs are no longer required to make space available to Competitive Local Exchange Carriers in their Central and Remote Office facilities. Less clear is if "digital subscriber line facilities" includes the copper pairs necessary to provide DSL service. There would be room for negotiation between the CLEC and the ILEC, of course... but what conceivable leverage would a CLEC have at this point? The ILEC can now charge whatever they want (doesn't have to be reasonable) or simply deny access. To me, this was an announcement of the death of that part of the CLEC industry that has *any* dependence on "fair pricing" for the use of ILEC facilities. -Ed.]

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### **BreezeCOM, Inc. President Changes July 1**

[In general, you'll see very few "personnel" articles in *Focus on Broadband Wireless Internet Access*. I thought that this particular personnel change could very well change the direction of a key company in the Broadband Wireless Internet Access industry, and for that reason I include it here - Ed.]

A well-placed source has informed me that as of July 1, 2001, BreezeCOM, Inc. President Bernard Herscovich will be replaced by a new person from outside the company. BreezeCOM, Inc. is the US branch of BreezeCOM Ltd. of Tel Aviv, Israel.

BreezeCOM offers a wide range of Broadband Wireless Internet Access with its BreezeNET, BreezeACCESS, and most recently BreezeACCESS II product lines for the 2.4 GHz Industrial, Scientific and Medical (ISM) band, 2.5 GHz Multichannel Multipoint Distribution Service band (MMDS), and European 3.5 GHz band. BreezeCOM.

This change is significant, coming on the heels of the announced merger of Floware Wireless Systems Ltd., which is expected to be completed in third quarter 2001.

Under his leadership, Herscovich put much of BreezeCOM Inc.'s resources into aggressively pursuing relationships with large service providers. Some say that this focus on large service providers has come at the cost of BreezeCOM's excellent reputation and market share in the small-to-medium Internet Service Provider market.

Using BreezeCOM equipment, small to medium Internet Service providers have been able to offer wireless-based Internet Access at speeds comparable to DSL. However, BreezeCOM's customers have asked repeatedly for numerous improvements in the BreezeCOM product line and feel that the comments have mostly fallen on deaf ears. This despite BreezeCOM inviting more than forty Internet Service Providers to a conference in November, 2000 to hear exactly what their concerns were. Some of the attendees at that meeting complain that of all the suggestions made (the most universal of which was support for RADIUS user authentication), none of the requested (and promised) product improvements have appeared to date.

Price reductions in customer premise equipment (CPE) is another frequently-heard request that BreezeCOM has largely not addressed (though lower-cost CPE devices are claimed to be close to introduction).

Because its products are so widely used in the Internet Service Provider industry, BreezeCOM is in an excellent position to offer "official" credible statistics about the size and breadth of the Wireless Internet Service Provider industry, but has largely declined to do so, despite repeated promises to do so.

Many BreezeCOM customers and at least some BreezeCOM personnel lay the blame for these problems on the policies that Herscovich has pursued since becoming president. They claim that Herscovich has a "carrier mentality" and would prefer that BreezeCOM have only a few large customers that are relatively easy to service, rather than a very widespread customer base of smaller customers.

Among the improvements that BreezeCOM's critics hope to see are:

- Dramatically improved flow time of product improvement and new product development between BreezeCOM's headquarters in Israel and the US market
- New products with lower costs and customer-installable to compete with Digital Subscriber Line (DSL) products
- Vastly improved Public Relations support of the small and medium ISP market with such benchmarks as number of cities where wireless ISPs are operating, increase in unique customers month to month, and other measures that would allow telecommunications industry and governmental regulatory observers a "snapshot" of how well the Wireless ISP industry is actually doing.

We certainly wish Bernard Herscovich well in his future endeavors and hope that BreezeCOM, Inc.'s new President can address some of the lingering issues that will allow BreezeCOM to become an even stronger, more influential contributor to the Broadband Wireless Internet Access industry.

# Focus on Broadband Wireless Internet Access

## Editorial - Why *This* Newsletter?

As the cover story in this issue indicates, the “good news” about Broadband Wireless Internet Access isn’t exactly penetrating into the public’s, and especially the news media’s consciousness.

One of the biggest problems about Broadband Wireless Internet Access is confusion about just *what*, exactly, we’re talking about. What we’re *not* talking about is “Internet access via wireless phone” – and current-generation mobile Internet technologies, such as Cellular Digital Packet Data (CDPD), Cingular Interactive (formerly BellSouth Wireless Data, and before that Mobitex) and Motient (formerly ARDIS).

We’re also not talking about (generally) about Wireless LAN technology, which is largely confined to in-building, very short range use. However, the line is blurring, with the emergence of Public Wireless Access Points (PWAPs), the widespread deployment of which is just beginning.

Surprisingly, we’re not talking (much, anyway) about “fixed microwave services” – the big dish, point-to-point links that use licensed microwave and millimeter-wave spectrum.

What we are talking about, at least what I’m talking about, when I refer to Broadband Wireless Internet Access is an entire range of wireless technologies that *touch* all these elements, but mix-and-match techniques and technologies from all of them in innovative ways.

Graphics are a bit beyond my capabilities in this first issue, but imagine a large triangle, with one point labeled “Mobile Internet”, another point labeled “Wireless LANs” and the third point labeled “Fixed Microwave”. “Broadband Wireless Internet Access” would be the inside of the triangle, consisting of elements of each of these well-understood sectors of wireless technology. As you’ve no doubt surmised from the above verbiage, this isn’t exactly an easy concept to communicate in print. But we’re certainly going to try to do so here in the pages of *Focus on Broadband Wireless Internet Access*.

I’ll admit to a certain level of frustration as at least partial motivation for starting *Focus*. There’s a lot of really bad writing about wireless Internet. Some of it’s the “gee whiz” approach (Isn’t it amazing that you can get Internet without a phone line?!?!). Another common problem is lack of knowledge of the Broadband Wireless Internet Access industry. A major “popular technology” magazine featured an “in-depth” article about Broadband Wireless, and managed to mention only two of the approximately ten companies that were in the particular market segment being profiled. But my favorite example of bad writing is when the author just, simply, gets the facts out-and-out *wrong!*

So, where does *Focus on Broadband Wireless Internet Access* depart from this dismal state of writing? First, I’ve been researching it and writing about it since 1997. Second, I have a more comprehensive view of the Broadband Wireless Internet Access industry than most,

since I’ve been able to structure my career to allow me to follow the Broadband Wireless Internet Access industry pretty exclusively. Third, I’m an independent voice, unaffiliated with any particular vendor, publisher, or organization.

I’ve been threatening to start this newsletter for a couple of years now, and several things have converged to finally make it a reality. First and foremost is the unflagging support of my wonderful wife, Tina. Not only has she helped me position myself to write and publish *Focus*, she’s actively assisting me in doing so by officially assuming the role of office manager, and handling the endless, but essential administrative tasks. Time that I’m not spending on handling the administrivia is time that I have available to write, confer, consult, and travel.

Last year I predicted that 2001 would be a breakthrough year in Broadband Wireless Internet Access. There will be breakthroughs... but not nearly as many as I previously expected. The downturn in the stock market and capital markets has been especially devastating for startup Broadband Wireless Internet Access companies. Some of the stories I’m hearing about trying to get initial or ongoing venture funding are chilling. Companies that have obtained funding are just trying to hold on. Still others have a product that’s compelling enough to actually “break through” into widespread use.

The potential for Broadband Wireless Internet Access is immense; there are going to be fortunes made. The as yet unanswered questions are which companies will make those fortunes, and exactly when it will happen. I don’t know the answers, but I’ll do my best to share my knowledge about to who, and when, it *will* happen.

A brief word about Broadband Wireless *Internet Access*. You may wonder why I don’t use the more popular phrase “Broadband Wireless”. I don’t do so because I feel strongly that the Internet is *the* reason for Broadband services, and that any service provided by Broadband will be an Internet service. Movies, for example, will be downloaded from the Internet. Streaming video will be another Internet service that largely displaces “dedicated” video distribution systems. Needless to say, this view isn’t necessarily widely shared, but I truly believe that all “services” – “telephone”, “television”, etc. will rapidly become *Internet* services, and that this will occur in a synergistic relationship with Broadband Wireless Internet Access- the more access there is to Broadband Internet, the more demand there is for Broadband Internet services... etc.

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## My Letter To The Editor Of Boardwatch Magazine

This letter was in response to a column by Bruce Kushnick in the January, 2001 issue of Boardwatch

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Magazine titled "The Bell Monopolies Are Killing DSL, Broadband, and Competition". The column appears online at:

[www.ispworld.com/bw/jan01/Tales\\_Baby\\_Bells.htm](http://www.ispworld.com/bw/jan01/Tales_Baby_Bells.htm). Additional columns on this theme appeared in subsequent issues of Boardwatch. My letter (which I copied to Kushnick, who did not reply) didn't appear in print, and I was not given a reason. Length may have been one reason, and it may have been a bit "sticky", editorially, for one columnist to be taking another to task, and doing so through the letters page.

In his columns, Kushnick provides an exhaustive inventory of the anti-competitive behavior of the Incumbent Local Exchange Carriers (ILECs) and proposes additional regulations.

I'm reprinting this letter here, because I don't think that many people have made the "leap" that the ILECs have, effectively, become a law unto themselves, that with their huge legal budgets, ability to influence regulatory processes, and ability to simply stall, they simply *can't* effectively be regulated and that the only real remedy is *effective* competition. Neat trick- effective regulation, but how? Read on! In the letter below, the only changes are minor formatting changes for publication; what you're about to read is what was emailed to Kushnick and Boardwatch. Letter begins:

To: Bruce Kushnick <[bruce@newnetworks.com](mailto:bruce@newnetworks.com)>  
From: Steve Stroh <[steve@strohpub.com](mailto:steve@strohpub.com)>  
Subject: Wireless as an alternative  
Cc: Boardwatch Letters To The Editor  
<[letters@boardwatch.com](mailto:letters@boardwatch.com)>

Bruce:

Enjoyed your column in the January, 2001 issue of Boardwatch. For the most part, I agree with your conclusions... as far as they go.

But, I think you've fallen into yet another trap set by the telcos and that's to ignore wireless as an up-and-coming alternative to wireline services. The popular perception is that "Fixed Wireless is a promising technology, but not quite there yet". I'm not sure when it *will* finally "be there" in most people's minds, but increasingly, factually, wireless *is* available as an alternative to wired Internet service.

1. Your point 1 - "the primary phone wire into the home is still controlled by the Bell companies" is correct. It's a monumental hurdle to get over that point. And it's unlikely that use of that wire will ever be truly competitive. The only way it could is if the "copper plant" were to be divested from the "services", allowing you to dictate what goes over *your* wire. In that scenario, CLECs and the telco would truly be on equal footing for the use of the wire. In reality, I just cannot see that happening. It would be a rational thing to do from a policy perspective, but the Bells

can fight a delaying action for years, effectively rendering the point moot.

But think outside the box a bit - what if you don't *need* the wire? Increasingly, that's the case. This IS happening; it's not off in the distant future, it's here, now. One example of this is, (and I say this with no small amount of irony) is AT&T's Fixed Wireless Broadband system (formerly known as "Project Angel"). It's operational in three cities - Dallas / Fort Worth, San Diego, and Anchorage, with two additional major markets by March. With a small antenna on the side of the house, you can get up to 4 phone lines and Internet access bursting up to 1 Mbps. Your entire connection - every bit of it, does *not* involve the local the Bell monopoly.

2. Your point 2 - "The majority of America's 7,000-plus ISPs have had to spend massive amounts of staff time just to handle the problems being caused by the Bells." is also correct.

Wireless ISPs, of which there are hundreds, likely thousands, don't have this problem. They *own*, and more importantly, *manage*, the entire path between their POP and their customers. They can see problems begin to occur before the customer notices. If there's a problem, the customer has only one number to call - the ISP. In an increasingly common scenario, the ISP, instead of developing their own (expensive, painful) wireless expertise can turn to a "Wireless CLEC" such as Clearwire Technologies, now providing DSL-like services in numerous markets. Again, the entire connection - every bit of it, does *not* involve the local the Bell monopoly.

3. Your point 3 - "The person who orders DSL from an ISP does not want to have problems getting the advertised service." is again, correct. DSL (and in fairness, a number of fixed wireless systems) require a visit from a skilled technician to make it work.

In a limited number of wireless systems *now*, and sharply increasing in 2001, such "truck rolls" won't be necessary at all. The customer will buy the "access point" at retail, and bring it home to begin using it. An example of this available now is Metricom's 128 Kbps Ricochet wireless Internet access service, available from a number of resellers nationwide. You walk into a retail store, buy the Ricochet wireless modem, bring the package home, select a service provider, plug it into your computer, and at that point you're online. Granted that 128 Kbps service is considered to be on the trailing edge of "broadband" services (it's surprising how fast it "feels"), but it's likely that the speed will increase in the near future, and Metricom won't be alone for long in providing ubiquitous wireless broadband services. And Yes, yet again, the entire connection - every bit of it, does NOT involve the local the Bell monopoly.

4. Your point 4 - "Since virtually all competitors must use the Bell-owned wires into the home, the underlying flaw in the competition model continues to be the Bell's prices to competitors." Agreed.

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Another feature of ISPs and CLECs using wireless instead of wireline is that they get to KEEP most of their customer revenues - they're not paying "ransom" to the Bells for "using the wire". Given the same price points for equivalent services, the ISP or CLEC using wireless is at a very decided *advantage* that they are, for the most part, in *control* of their costs. They control the cost of the equipment, and the "line charge" doesn't exist (except for the case of an ISP using the services of a wireless CLEC). Yes, it does cost more for a wireless modem than a DSL or cable modem, but those prices are coming down very rapidly as new, more highly integrated silicon makes significant cost reductions possible, and new equipment vendors with innovative new technology enter the market. Sprint, with their Broadband Direct fixed wireless system, has been very open that, using first generation equipment requiring truck rolls, is not profitable enough. Sprint is very encouraged by new technology that will be available in 2001 that will be less expensive, not require truck rolls, and enable it to offer profitable services such as voice, likely transforming Sprint Broadband Direct into "very reasonably profitable". By now, you've guessed it - the entire connection - every bit of it, does *not* involve the local the Bell monopoly.

5. Your point 5 - "The Bells have no incentive to work with CLECs or ISPs", with a supporting list of sins summarized as lack of response to CLECs and ISPs. Again, on target.

One ISP using wireless that I interviewed several years ago uses the "Bell attitude" to great effect, including on a list of bullet points (to the effect of) "... and in conclusion, a final differentiating factor is that *we* are *not* the phone company, nor do we depend in *any* way on *their* services to provide you with Internet access". A number of ISPs have told me that point alone has closed many sales; people *are* fed up with the Bell mantra (epitomized by Lily Tomlin's beloved character Ernestine the Operator's (always spoken in a delightfully nasal twang) "We're the Phone Company. We don't care. We don't *have* to. We're the Phone Company."

One of the most surprising things I've learned in my writing about Broadband Wireless Internet Access is that in most areas, wireless Internet access is an easy sale. If the price and capabilities are at least roughly equivalent, many companies are *delighted* to "jump ship" from the local Bell. In a surprising number of cases, wireless ISPs are offering services that simply *don't have* a wireline equivalent. One example of this is e-xpedient from CAVU, Inc. that is offering 100 Mbps Internet access service in high-rise buildings in downtown areas. CAVU makes very effective use of wireless to provide bandwidth to the building, and then distributes 100 Mbps Internet access throughout the building with Layer 2/3 switch/routers and Category-5 local area network cable. Their prices for 100 Mbps service start at \$100/month. And, of course, it does NOT involve the Bell monopoly.

I agree with you with the litany of sins committed by the Bell companies. Where we part company is what to DO about it. Punish them? Yeah, but that doesn't seem to work. Regulating them... well, they have more lawyers on the payroll than the public utilities commission and all the CLECs (though, I recall an infamous quote from the founder of MCI in the heat of the battle between MCI and AT&T, to the effect of "... R&D? No, we don't have an R&D department, but we have a one hell of a Legal department".

I say "get over it". Let the Bells *have* the wires and do whatever they want with them. The competition IS coming. Increasingly, as in the case of a customer of AT&T Wireless' Fixed Wireless System, the wires will simply be run to the side of a house and left unconnected - no revenue at ALL to the Bell company for THAT customer. Likely the litany of sins will persist, providing ample opportunity and motive to both customers and alternative service providers. If the Bells have an epiphany and begin to provide competitive, reliable services backed with good customer service, then the competitors will have to work that much harder and the customer will be served well.

My guess is that, even if the Bells *wanted* to, they couldn't. The price of maintaining that incredible "mess" of copper will rapidly become a noose around the necks of the Bells, as more and more customers defect to alternative service providers. The Bells will try to respond... and simply won't be able to, because the alternative service providers will be using FAR more cost-effective technology to deliver FAR better services, and the Bells simply won't be able to catch up.

How to fix the problem is to look for, and increasingly FIND the alternative service providers (many of whom will be using wireless), and vote with your wallet.

Steve Stroh

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Independent Technology Writer

Specializing in Broadband Wireless Internet Access  
(end Letter)

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### eHarbor Goes On The Rocks

I'll admit that this is a tough story to write because I was rooting for eHarbor to succeed. eHarbor was a Wireless Internet Service Provider that specialized in providing high-speed wireless Internet access to boaters. The idea was that a boater would enter a port that has eHarbor service, turn on their laptop with an 802.11b (Wi-Fi) wireless LAN card, see the eHarbor sign-on page in their web browser, and pay a modest amount for a fixed period

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of high-speed Internet access. I'm not (yet) a boater, but when I first heard of eHarbor, I fantasized about being anchored down in a small harbor on my small boat, casually surfing the Internet via high-speed wireless Internet access.

By definition, eHarbor's target audience has a large amount of discretionary income and easily able to afford wireless Internet service from their vessel, and most vessels now make use of a laptop for shipboard duties such as navigation, reception of weather faxes and bulletins, and even email via HF radio while at sea.

eHarbor's biggest problem was that because of its limited startup funding, it was only available in a few locations- Ann Arbor, Michigan, Annapolis, Long Beach, and Miami, and potential customers wanted the ability to use eHarbor anywhere they were likely to roam with their vessel. EHarbor founder Dennis Mitchell explained the situation as being akin to "... trying to sell cell phones when you've only got four cell sites operational."

After six months of intensive fundraising with no success, eHarbor, Mitchell has decided to call it quits and sell eHarbor if he can find a buyer.

eHarbor has ceased operations in Annapolis and Long Beach and is not investing additional funds, nor soliciting new customers. eHarbor's formerly informative and interesting web page ([www.eharbor.org](http://www.eharbor.org)) is now stark, with only an eHarbor logo and Mitchell's email address.

Last year, Mitchell had plans to leverage the technology developed for eHarbor to go after another highly mobile, high-discretionary income target market- full time Recreational Vehicle (RV) owners. (To be clear, we're not talking about the small "pop-up" campers that are used on weekends and two weeks in the summer. We're talking about well appointed, self-contained units built on a commercial bus chassis costing more than \$100,000. These "vehicles" have sufficient living space that an increasing number of people have no other home but their RV.)

eHarbor was able to secure an agreement with Kampgrounds of America (KOA) to install six test systems. KOA has over 500 campgrounds and a total of more than 50,000 campsites. eHarbor quickly discovered that the test campgrounds were located remotely from any Internet infrastructure, and the cost of new T-1 and other high-speed data wireline (if available at *all*) was prohibitive. eHarbor then began developing a system that would use satellite connectivity, rather than wireline, as its backbone connection. The resulting product was a standalone, solar-powered "kiosk", and it generally worked as advertised. All authentication (as with eHarbor) was done remotely on the Internet, so the onsite system could be relatively simple.

Unfortunately, in the time that it took eHarbor to develop its kiosk, another wireless Internet access provider had talked to KOA and convinced them that *they* could deploy a wireless Internet access system at KOA. Immediately, the second vendor ran into the same problem as eHarbor-

wireline backbone connections (if available at all) are prohibitively expensive.

When eHarbor announced to KOA that their new satellite-based system was ready, KOA revealed that their (disappointing) experience with the second vendor, and revised the agreement with eHarbor such that eHarbor would be forced to bear the full installation cost of each kiosk and infrastructure. The good news was that KOA would no longer insist on revenue sharing.

At that point, Dennis Mitchell decided to try to sell eHarbor.

eHarbor's demise appears to be mostly a case of bad timing, requiring additional investment in the midst of a venture capital drought, and being slightly ahead of its time. Within two years, it's likely that the idea of Public Wireless Access Points (the subject of a major story I'm working on) will be completely familiar to the laptop-toting public. Unfortunately, eHarbor could hardly have gotten started much earlier, as it had to await standardized, well-accepted wireless technology such as 802.11b (Wi-Fi) for its customer base to use.

eHarbor consists of a fair amount of intellectual property: eHarbor's user authentication and payment system, the design for the satellite/wireless kiosk, and well developed logos, marketing materials, and several good domain names including eHarbor.org, eWays.org (intended for use with campgrounds) and eAirport.org.

If you're interested in eHarbor, contact:

Dennis Mitchell

P.O. Box 452

Dexter, MI 48130

734-475-3242

k8ur@ieee.org

To be clear, I have no personal, financial or other interest in eHarbor now, or as the result of a sale. My *only* purpose in writing about eHarbor is I feel that eHarbor's story is interesting and instructive to the readers of **Focus**.

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### Boeing Brings Broadband To The Skies

Lest anyone believe that demand for broadband services isn't intense, Boeing proposes to provide Broadband Internet Access to all passengers of selected plane flights.

In a landmark announcement on June 13, 2001, The Boeing Company and American Airlines, Delta Airlines, and United Airlines jointly announced the formal launch of the Connexion by Boeing service. Connexion by Boeing (the formal name of the service) will be jointly owned, invested in, and revenue shared by Boeing and the three airlines. In a separate announcement on June 17, 2001, Lufthansa became the fourth airline, and the European Connexion service launch customer, to commit to Connexion.



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Connexion service is expected to commence in the second half of 2002. The initial service area for Connexion is routes within North America. Connexion's service area will be extended to overseas flights and Europe and Asia in phases.

Connexion will offer real-time (not cached) broadband Internet access via satellite connection. Raw access speeds are quoted as 5 Mbps downlink, 1 Mbps uplink shared between all users, with each passenger guaranteed a minimum downlink speed of 56 Kbps. Cost per user is estimated at \$20/hour. The satellites that will be used are current-generation geostationary satellites on which Boeing will lease transponders for Connexion service. Boeing will lease multiple transponders on multiple satellites. Although Boeing is a satellite manufacturer and launch provider, the satellites that will be used will not necessarily be built or launched by Boeing. The use of geostationary satellites is made possible by Boeing's unique phased array antenna technology that it has been developing for use in military aircraft that need satellite capability, such as Airborne Warning And Control System (AWACS). The satellite antenna is best envisioned as a "bump" in the contour of the upper fuselage. On a plane, it's critical to minimize drag, and the low profile and no moving parts of a phased-array antenna fulfill that requirement well.

Also of interest is Boeing's statement that Connexion systems will not be limited to installation only on Boeing aircraft. Although it might appear that the primary influence for this decision was the partner airlines, it's more likely that this "planebuilder-agnostic" philosophy stems from Boeing's long-range plans to obtain significant portions of its revenue from services. In that role as a service provider, it cannot be seen as unfairly "locking out" a competitor's planes. Undoubtedly another factor in being "planebuilder-agnostic" is that if Boeing hoped to operate Connexion in Europe, European authorities would balk at licensing Connexion should Airbus planes be excluded.

Left unstated was exactly *how* Connexion would work inside the cabin. Emailed questions requesting clarification on this point, sent to listed press contacts for Connexion, have gone unanswered. The only clue came from Boeing's Connexion Media Kit, which stated: "Subscribers simply plug in and boot up their devices as they normally do and promptly access Connexion by Boeing."

There's ample cause to suspect that Boeing plans to implement a wireless LAN in each Connexion-equipped plane. One key factor in introducing new equipment on planes is the weight penalty that it induces, and the weight of a bundle of Category-5 (or equivalent) cable to each and every seat (the American Airlines representative claimed this would be American's plan) would be considerable. Additionally, an Ethernet switch with numerous ports would be needed – more weight, expense, and complexity (imagine a child sticking a wad of gum in the exposed

Ethernet jack). In addition, the technical support requirements of a wired connection (ring the call button because you forgot your Ethernet jumper cable?) would also be considerable.

A single (or perhaps two, in the case of a 747) 802.11b (Wi-Fi) Wireless Access Point would be able to provide Connexion service to all passengers without the weight penalty and support headaches of using wired Ethernet.

The problem, of course, with using wireless inside a plane in flight is that it's currently not allowed. All "intentional radiators", such as cell phones, and even many "unintentional radiators" such as radio receivers are not currently allowed to operate while a commercial plane is in flight. Widespread use of Bluetooth is likely to force this issue, as Bluetooth will be used for non-data purposes as a wireless link between a handheld DVD player and high-quality headphones. Most users of such a system won't really understand that they are, in fact, operating an "intentional radiator" when they use their wireless headphones on a plane.

In addition to Bluetooth, a number of Personal Digital Assistants (PDAs) such as Compaq's very popular IPAQ (with optional PC card adapter) and Handspring Visor (Xircom 802.11b for the Springboard slot) have 802.11b (Wi-Fi) capability, but no Ethernet capability.

There is considerable incentive for Connexion other than passenger convenience (which, in the news conference, was highly overstated. The airline representatives tried to convey that lack of real-time connectivity was the main complaint of passengers- totally ignoring such issues as horribly cramped seats, flight delays, etc.). Connexion will deliver considerable value in the airlines' internal operations. For example, Boeing's 777 is sometimes described as "a network, with wings" because of the amount of computing power present on the 777. All operations in the 777 are "fly by wire"- there are only a few mechanical / hydraulic linkages between the pilot's controls in the cockpit and the plane's control surfaces. A 777 pilot's main instruments are displayed on flat panel displays, with only a few very critical indicators that are not computer controlled. The 777's onboard computers monitor every subsystem and in the case of a failure in a minor system and a redundant system takes over, the pilot typically isn't notified (the information is accessible from a maintenance display). Upon landing, a mechanic checks the 777 maintenance display for problems, and handles any issues that the computer has identified. Clearly Boeing built the 777 in anticipation that such routine information could be communicated to ground maintenance personnel so that appropriate parts and expertise could be available upon landing, for faster turnaround.

It was also claimed that Connexion would make it possible for the flight attendants to assist passengers in their travel plans and problems, for example likely missed connections in the case of a flight whose departure was delayed. This possibility bolsters the "wireless theory"

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somewhat as I can't envision a flight attendant running up and down the aisle between a passenger with travel problems and a stationary computer terminal, nor can I envision a flight attendant asking a passenger to "come forward to my terminal and we can get your problem sorted out. Instead, I *can* envision a flight attendant moving up and down the aisles with a handheld computer equipped that's wirelessly connected, helping passengers with travel issues as they sit in their seats. On second thought, is it realistic, in these days of "service with a snarl" on so many airlines, that flight attendants will be able to rise to this new demand placed upon them?

Connexion will also be used to provide streaming video services to passengers not using data- programming such as news channels, sports, etc. At the news conference, a question was raised about filtering "questionable" web sites that a Connexion customer might view, offending a seatmate. The Connexion speaker was non-committal, but admitted that "inappropriate use" is definitely a concern, likely for liability reasons.

Reaction from Tenzing Communications, who currently offers limited in-flight connectivity (and is also based in Seattle), and Boeing archrival Airbus was swift. On June 14, the day after Connexion's announcement, Tenzing announced that Airbus had bought a 30% share in Tenzing.

Tenzing's approach is considerably different than that of Connexion. Tenzing currently uses narrowband connectivity from both ground-based radios and satellites. Users can access the headers of their email for a flat fee, and then pay by the "page" to retrieve their email. Tenzing caches web pages for fast retrieval onboard the aircraft. The web pages are only semi-static, as the cache of selected web pages are periodically updated while in flight. Tenzing has plans to upgrade to broadband connectivity as it becomes available commercially. Tenzing's airline partners include Cathay Pacific, Singapore Airlines, SAS, Virgin Atlantic, Air Canada, and Varig.

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### Book Review

#### **Wireless Spectrum Finder, Newton's Telecom Dictionary, and Two Useful Books For Those In The Broadband Wireless Internet Industry... and A Incredible Bookstore**

[Book reviews won't be a monthly feature in *Focus on Broadband Wireless Internet Access*, mostly because there *aren't* that many books that are genuinely useful for those working in the Broadband Wireless Internet Access industry. There are plenty of wireless books, and plenty of broadband books... but few that pertain to Broadband Wireless. For the next few months, I'll be playing catch-up

and reviewing a number of books that I consider useful and informative. -Ed.]

This month's first book review is *Wireless Spectrum Finder: Telecommunications, Government and Scientific Radio Frequency Allocations in the US 30 MHz - 300 GHz*, by Bennett Z. Kobb, ISBN: 0071375066, published in 2001. *Wireless Spectrum Finder* has come full circle. It was originally published as *SpectrumGuide* in hardcopy, then published as an electronic book, and has now reverted back to hardcopy, published by McGraw-Hill. I was permitted to see a review copy of *SpectrumGuide*, and while it was tremendously useful to have the ability to do keyword searches, I like the book format of *Wireless Spectrum Finder* even better than I liked *SpectrumGuide*.

*Wireless Spectrum Finder* is an annotated list of the various spectrum allocations in the US. In that role, it's extremely valuable to see Kobb's notes on how a particular chunk of spectrum came into use (and often what use it served prior to being reallocated), how it is encumbered, and what "special features" it has. Kobb basically works his way through the spectrum, and handles what could be a dry and dull job with grace and humor. In the sections of particular interest to me, such as 902 - 928 MHz, 2.4 to 2.485 GHz, etc. Kobb does a very credible job of explaining the varying (and at times conflicting) uses of a particular chunk of spectrum. At one point I offered some feedback that Kobb didn't make particular note of the fact that 2.4 - 2.485 GHz was heavily used by ISP's using Part 15 equipment, and that comment was included in the next issue of *SpectrumGuide* (and was incorporated into *Wireless Spectrum Finder*). Of particular note is that Kobb maintains an online errata list on his web page, [www.spectrumfinder.net](http://www.spectrumfinder.net). This is particularly welcome for a reference work.

I *highly* recommend *Wireless Spectrum Finder*. It's an excellent reference work and I find it indispensable in my work as a writer dealing with wireless issues. It has found a permanent home on the "gotta be within easy reach" top shelf of the bookcase behind my desk.

The second book review of the month is a classic in the telecom industry, *Newton's Telecom Dictionary* by Harry Newton and Ray Horak, ISBN: 1578200695, published in 2001 (17<sup>th</sup> edition). I actually have the 16<sup>th</sup> edition, which I review here. Harry Newton has been putting out *Newton's Telecom Dictionary* practically since there was a telecom industry, and that depth really shows. I've been a fan of Harry's for a number of years since he published an obscure, but revered magazine called *Computer Telephony Integration* (since sold off to a publishing conglomerate, allowing Harry to cash out with a very nice retirement.) CTI was the absolute bible of integrating computer systems into telecom systems for automated voice response, etc. and Harry tested some of the earliest Voice Over Internet Protocol (VoIP) systems and always found them wanting in various ways... until one day he said that he'd finally heard one that really impressed him. I knew

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that, at that point, VoIP was really on its way, and it was time to start paying attention because it wasn't just a hobbyist toy any longer.

I've yet to come up with an acronym related to the telecom industry that doesn't have an entry in Newton's Telecom Dictionary. Newton's isn't as well known in the wireless industry as it is in the telecom industry, but Newton does a very credible job of including wireless-only terms (quick- what does MMDS stand for? Answer at the bottom of the article.).

I *highly* recommend Newton's Telecom Dictionary. It's an excellent reference work and I find it indispensable in my work as a writer dealing with wireless issues. Like Wireless Spectrum Finder, it has found a permanent home on the "gotta be within easy reach" top shelf of the bookcase behind my desk.

The "Bookstore Review of the Month" (and this is definitely a first, and likely only) is Powell's Technical Bookstore, 33 NW Park Avenue, Portland, Oregon 97209 USA, 800-225-6911 (toll-free in the US), or 503-228-3906. Powell's Technical Bookstore does not have a significant part of Powell's main web page devoted to it, so the web address is: [www.powells.com](http://www.powells.com) and look for references to the Technical Bookstore.

Powell's City of Books is an absolute institution. It is, quite literally, a city-block of connected buildings that make up an incredibly complete, but incredibly eclectic bookstore. I'm unaware of anything like Powell's anywhere else in the world. Powell's shelves used books next to new books so that when you're browsing, it's a pleasant surprise to find books that you didn't know existed because they've gone out of print. Where the chain bookstores will devote a row or perhaps two to a topic, Powell's will typically devote an entire aisle. I burned up almost an hour browsing through the Small Business section (as distinct from the General Business section).

Powell's Technical Bookstore is a physically separate building from Powell's City of Books (but in order to comprehend the former, you had to know about the latter). Both are located in downtown Portland, Oregon in a very pleasant area of the city.

If you're a techie and visit Powell's Technical Bookstore, come prepared to drop some serious money. I've never been able to leave for under \$100, and in a visit earlier this month (after not shopping there for a couple of years) I set an embarrassing new "personal best" expenditure, and walked out with a paper shopping bag so full of books that the clerk insisted on doubling it up.

My quick gauge of how good a bookstore's computer section is to see how extensive their selection of Forth books; and Powell's Technical Bookstore passes this test easily. (Not much has been published of late about Forth, but what has been published is reasonably well represented.) Almost any computer topic is well represented, with a complete line of books from many

industry publishers that you don't normally see on bookshelves such as Cisco Press, IBM Press, etc.

As I expected, there were only a few books that touched on the topic of Broadband Wireless... but then I found one that looked pretty promising. At first I put it down- too pricey. But then I went back and leafed through it, and sure enough it was a pretty decent reference for topic such as Local Multipoint Distribution Service (LMDS), so that went into the stack (it's deductible- not only is it a good reference book for my line of work, but I'll review it here in the next few months). I'd simply not seen, or heard of that particular book previously (despite having a "search" running on Amazon.com that notifies me of "Broadband Wireless" books as they become available.

Bottom line is that Powell's Technical Bookstore is an absolutely *required* stop if you're a techie and you're anywhere *near* Portland, Oregon. In fact, if you're trying to master a new technology and need to acquire some good books to get yourself up to speed, you could do a lot worse than to take a weekend trip to Portland (even if you have to fly) to visit Powell's Technical Bookstore. Really - it's *that* good, and *very highly* recommended!

(Answer to the pop quiz above: MMDS - Multichannel Multipoint Distribution Service)

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### The Broadband Wireless Exchange

Robert Hoskins is the energy behind a new resource in the Broadband Wireless industry- The Broadband Wireless Exchange (BWE). BWE ([www.bbexchange.com](http://www.bbexchange.com)) is "neutral ground" for public relations material from vendors in the Broadband Wireless industry. By doing so BWE is providing a badly-needed service to the industry.

The problem that BWE is attempting to solve is that most writers are completely unfamiliar with the Broadband Wireless industry, and when they are called upon to write a story involving Broadband Wireless, they don't know where to turn. Often they'll rely heavily on one industry source involved in the subject of the story, with the usual result- a biased or inaccurate article. BWE attempts to provide writers with "one stop shopping" for information on Broadband Wireless. Vendors are listed, Service Providers are listed, and recent press releases from related companies are available online.

BWE is, quite simply, a fantastic resource for anyone in the Broadband Wireless industry. I note that advertising is available on BWE, and it seems a bit odd to me that the small amount of advertising available on BWE wouldn't be badly oversubscribed, especially by small companies hoping to break into the Broadband Wireless industry.

The Broadband Wireless Exchange is very highly recommended. It's a key resource to me, and I use it on a very regular basis.

# *Focus on Broadband Wireless Internet Access*

## **Metricom – Bruised and Bloody (But Not Dead)**

Many analysts and many in the Broadband Wireless Internet Access industry have written off Metricom and their Ricochet mobile wireless Internet access service as “good as dead”.

In February, 2001, Metricom announced its Fourth Quarter, 2000 results as dismal. Revenues were down year-to-year, and subscriber growth was unimpressive. Metricom stated that it had enough cash to last until later in the year, but would require additional capital to continue operations past that point. Most analyst coverage latched onto those indicators and declared the company all but dead. Almost all ignored the fact that the primary reason for the dismal results was that Metricom was spending heavily to commence service in new major markets such as Los Angeles. Another overlooked part of the announcement was that Metricom had sold Utilinet, the wireless meter-reading portion of its business (upon which Metricom was originally founded) to focus on its core mission of providing wholesale Mobile Wireless Internet Access. A minor factor in the poor results was that Metricom had ceased offering its original 28 Kbps service in Washington DC, San Francisco, and Seattle where it has been well received.

Since the 4Q00 announcement, Timothy Dreisbach has resigned as CEO and Chairman of the Board. Dreisbach was replaced by Board Member Ralph Derrickson of Watershed Capital. In March, Metricom announced the layoffs of nearly twenty-five percent of its staff. In April, Metricom announced its 1Q01 results, which showed improvement, although a substantial part of its loss was “related to capital expenditures in certain markets that are currently not expected to be placed into service.”

I feel strongly that Metricom’s major problem has been its marketing. Creating a new brand is very hard work, and Metricom is plowing new ground in not only creating a new brand, but also creating a new category – mobile broadband Internet access. Potential customers have, of course *heard* of mobile Internet access because of advertising by mobile phone companies, but those customers then think of mobile Internet access as being associated with phones. So, Metricom has a lot of marketing and user education to do. It was an open question as to whether Metricom understood this point... and could afford the steep costs required for such marketing.

The preliminary answer appears to be Yes, on both points. Since the announcement, the Ricochet 128 Kbps service has garnered a string of good press, including:

- A good review in March in the LA Times
- A good review in April of the AirCard 400 PC Card wireless modem for Ricochet on MSNBC
- A mention in the April issue of Scientific American

- In May, Computerworld “outed” Ricochet “128 Kbps” as being capable of considerably faster speeds
- Ricochet was awarded 2000 Best Wireless WAN of the Year by Network Magazine

I’ve been told by sources in San Diego that Metricom is advertising heavily on radio and television with ads that are catchy and interesting, and that they appear to be having the desired effect. More and more Ricochet modems are being noted in areas such as coffee shops, public areas, and anywhere laptops are expected to be in use.

A welcome change in marketing focus is that Metricom appears to now be targeting the “stationary” market as well as the mobile market. In the past, Metricom has marketed Ricochet exclusively as a mobile system, leaving readers of their advertisements with the impression that it’s a solution that’s suitable only for laptops. Metricom appears to have finally realized that within their coverage areas there is a large population who want faster-than-dialup Internet access, but not covered by high-speed options such as cable modems and Digital Subscriber Line (DSL). Ricochet works great in those situations, especially if you can attach an extension cable to it and get it “up in the clear” where the antenna can function better (instead of being obstructed by the monitor, computer case, etc. when placed on the desktop).

Although marketing was Metricom’s primary problem, a close second was pricing. At around \$80/month there’s reason for pause and hesitation, and I’m on record as stating that I think that the “magic” price point is around \$50/month at which point there’s no pause and hesitation-if you think you need mobile broadband Internet access, and it’s available in your area, \$50/month seems reasonable.

Metricom is at least experimenting with pricing. In San Diego, Ricochet 128 Kbps service is being offered for a limited time for \$44.95/month (with no roaming service outside the San Diego system). In San Francisco, Ricochet service is being offered at 64 Kbps for \$39.95 (no roaming service outside the San Francisco area).

A particularly welcome development was the introduction this Spring of the Sierra Wireless AirCard 400 for Ricochet earlier this year. In contrast with previous Ricochet modems, the AirCard 400 is more a network card than a modem. As such, does not suffer the bottleneck of the Dial-Up Networking in Microsoft Windows, nor the hardware limitations inherent in serial devices. Instead, the AirCard 400 (whenever it’s plugged in to the laptop) connects to a Ricochet network as soon as the laptop boots up and stays connected continuously. This comes at a minor cost of battery life, but the tradeoff is that the AirCard offers notably better performance, approaching the same level of usability as a DSL connection.

The Ricochet 128 Kbps technology and network appears to be holding up well, and as noted previously,

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considerably higher speeds than the quoted 128 Kbps are now being reported regularly.

Metricom still faces numerous challenges. It has not announced any additional sources of investment. Its Seattle and Washington DC systems remain (officially) at only 28 Kbps, with many unsatisfied, loyal customers in those areas. (Despite Metricom's official stand, the Seattle 128 Kbps network is at least partially operational, and one Ricochet reseller is quietly marketing 128 Kbps modems in the Seattle area). Its national deployment is stalled, awaiting additional capital. It's lost a considerable amount of the talent it needed to continue deployment of the service.

But, there's certainly reason for optimism. It's reasonable to expect that an additional investment in Metricom will happen. Metricom is a "pure play" mobile wireless Internet system at a time when there is effectively no competition for its high speeds for mobile service (and blanket "no excuses" coverage of urban areas where cable modem and DSL aren't available). Consumer confusion over wireless telephone "3G" services is at an all-time high, with the fastest Internet access via wireless telephone stuck at (theoretical) 20 Kbps.

Microsoft, AOL, and other broadband content providers have made no secret of their impatience for broadband access to become more ubiquitous so that they can begin selling their broadband content. Ricochet offers Internet access considerable faster than dial-up modems can offer, and investing in Ricochet would be a quick route to faster-than-dial Internet access for potential customers.

The Ricochet technology has proven capable of scaling to considerably higher speeds, especially if a collaboration with National Semiconductor announced several years ago to deliver lower-cost, higher-speed chip sets for Ricochet ever comes to fruition.

[Disclaimer – I have been a Ricochet customer of their 28 Kbps system for a number of years in the Seattle area. – Ed.]

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### FCC Proposes Major Changes to Part 15 License-Exempt Rules

On May 10, 2001 the US Federal Communications Commission (FCC) released ET Docket No. 99-231, a proposal to substantially change major portions of its Part 15.247 ("Part 15") rules that relate to the operation of wireless communications devices that, by complying with the rules of Part 15, don't require an FCC license to operate. The Part 15 rules dictate the technical and operational characteristics of wireless devices.

The proposed changes (summarized) are:

- Allow modulation techniques other than Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS)

- When using DSSS, no processing gain requirement will be specified
- When using FHSS, (as few as) 15 hopping channels of (as narrow as) 1 MHz channels will be permitted

The change to allow other modulation techniques was driven by an appeal from Wi-LAN, Inc. when Wi-LAN was denied FCC type acceptance for a new Wi-LAN product that incorporated Orthogonal Frequency Division Multiplexing (OFDM) technology. The FCC rejected Wi-LAN's request because Part 15 specifies DSSS or FHSS only, and OFDM's characteristics are not similar enough to either of those two modulation techniques. In its proposal, the FCC wants to encourage continued innovation within the scope of Part 15, including new modulation techniques such as OFDM, for which Wi-LAN claims lower spectrum occupancy, increased performance (speed), and improved non-line-of-sight (NLOS) characteristics. The FCC is aware of other modulation techniques in development that are similar to Spread Spectrum, including Packet Binary Convolutional Coding (PBCC) which is being developed by Texas Instruments.

Similarly, the FCC now sees little reason to continue to mandate processing gain for DSSS. With the introduction of new modulation technologies, it's become increasingly difficult to accurately measure processing gain of various systems... or even agree on *how* to measure processing gain on various systems.

In its proposal, the FCC seems to feel that there is adequate market incentive – the combined requirements of price, performance, and "robustness" of a product, for manufacturers to continue to incorporate substantial processing gain.

The proposed change in the FHSS rules were the most far-reaching because it potentially offer a way to avoid the feared "Bluetooth versus 802.11b" interference problems.

Bluetooth is a FHSS system, and under current Part 15 rules, must "hop" (change channels) to make use of all of the 2.4 GHz band. The actual requirement is for a FHSS system that uses a 1 MHz-wide hopping channel, that FHSS system must use 75 different channels for a total of 75 MHz of the 83.5 MHz in the 2.4 GHz band. The rationale for this requirement is to insure that a FHSS system doesn't "concentrate" most of its activity in one area of the band and thus "saturate" the available "channel time".

The problem comes from the potential for interference of a FHSS system, to another system such as DSSS that isn't frequency-agile and uses a large portion of spectrum (23 MHz in the case of 802.11b). When a FHSS system is operating near a DSSS system, the two systems will interfere with each other to some extent. This is because the FHSS *must* "hop through" the DSSS signal, degrading both the FHSS signal and the DSSS signal.

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This conflict has always been possible, but it wasn't considered to be likely on a widespread basis... that is, until both Bluetooth and 802.11b (which uses DSSS) began increasing in popularity on their way to becoming ubiquitous within the next few years. The conflict could also erupt from the use of 802.11b systems in close proximity to HomeRF (which uses FHSS) devices, such as might be the case in an apartment complex. It's inevitable that Bluetooth devices will be used in the presence of 802.11b systems, likely causing problems for both. Bluetooth will be embedded in numerous portable devices such as wireless phones, personal digital assistants (PDAs), laptops, etc. Publicly accessible 802.11b Wireless Local Area Networks (WLANs) or Public Wireless Access Points (PWAPs) are well on their way to becoming ubiquitous at airports, and are being installed in hotels, coffee shops, and conference centers.

When the FCC modified the Part 15 rules in 2000 to allow wider FHSS channels (increased from a maximum of 1 MHz to a maximum of 5 MHz), the FCC continued the requirement that a FHSS must make use of most of the 2.4 GHz band. Originally, a FHSS system using a 1 MHz hopping channel was required to use 75 non-overlapping channels. With the 2000 changes, a FHSS system could use a 3 MHz-wide hopping channel with 25 non-overlapping channels, and a FHSS system using a 5 MHz hopping channel with 15 non-overlapping channels.

Whether using a 1 MHz channel x 75, a 3 MHz channel x 25, or a 5 MHz channel x 15, the interference potential between FHSS and DSSS was still present.

A number of companies proposed to the FCC to alter the "use most of the band" requirement, allowing a FHSS system to potentially avoid "hopping through" a DSSS signal. Using "adaptive hopping" techniques, a FHSS system could "sense" the presence of a DSSS system, and "hop around it" for the duration of the DSSS signal.

For example, two pieces of Bluetooth equipment such as a phone and a laptop could begin their synchronization, notice that a DSSS system was in operation (an 802.11b access point a few feet away in the ceiling), and avoid "hopping into" that particular 802.11b channel (but checking every few minutes if the 802.11b channel is still in use), and returning to its "normal" behavior when the 802.11b channel is no longer in use.

Those proposing the change suggest that Part 15 FHSS rules be changed to allow the use of as few as 15 hopping channels as narrow as 1 MHz. "15" was derived from an earlier attempt to get the FCC to "slipstream" the change as a "minor reinterpretation" of its 2000 changes to Part 15.

Potentially, such a change could invite abuse. One (completely theoretical) example of abuse would be that manufacturers and operators could configure Part 15 FHSS systems to deliberately operate on 15 hopping

channels that would be most likely to cause interference to a DSSS system. This can't happen at the moment as a FHSS system can't "concentrate" its use of such a small section of 2.4 GHz.

The FCC is actively inviting comments on how such Adaptive Hopping Techniques could be accomplished, and still limit potential abuse, such as requiring a corresponding reduction in output power as less spectrum is used (full power is allowed if 75 MHz is used, 33% of full power is allowed if 25 MHz is used), etc.

Overall, the proposed changes could, as the FCC hopes, result in increased innovation and new technology being introduced in the spectrum where license-exempt operation is permitted. But many fear that the proposed changes will have the effect of "upsetting the delicate balance" that currently exists between various license-exempt systems and uses and render many older Part 15 systems non-operational in the presence of newer types of modulation.

Comments on ET Docket No. 99-231 are due no later than 75 days after publication in the Federal Register, with Reply Comments due no later than 105 days after publication in the Federal Register.

In a separate but related action, the FCC granted WLAN a waiver to begin selling products that use OFDM modulation for operation in the 2.4 GHz band.

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### **An Introduction To Terabeam**

In May, I was invited to attend the WSA (formerly Washington Software Association, now no longer limited to Software) President's Group meeting at the Woodmark Hotel in Kirkland, Washington. It was a very pleasant venue, the price was reasonable, and the speaker was someone, and a company, I'd wanted to learn more about for some time, but had had no luck with to date as an Independent Technology Writer. The speaker was Dan

Hesse, President, CEO, and Chairman of the Board of Terabeam.

Please understand that this article is not the result of a formal interview with Terabeam, and is, therefore, incomplete in a number of areas. In a brief chat after his presentation, Hesse provided me with appropriate Press contact information, and I hope to be able to do an in-depth, formal interview within the next few months for an article in a future issue of *Focus On Broadband Wireless Internet Access*.

From Hesse's presentation and the question-and-answer session that followed, I was able to gather enough information to provide what I consider a reasonable "introduction" to Terabeam and its products and services, and feel that, incomplete though it is, such an article would be of use to *Focus* readers,

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In the first few minutes of his presentation, Hesse offered a startling, even chilling statement: "The politics of the last mile are *so* gruesome that it's holding the US back, in comparison to the telecommunications services of other countries... like Iceland and Mexico."

Fiber is considered to be the "best" way to obtain Broadband Wireless Internet Services, and there are a number of providers to choose from... all of which would *like* to service your particular building, but fiber is very slow and very expensive to install, and building owners are difficult to deal with to obtain access. Hesse quips "You *can* get the fiber to the building... and *then* life *really* starts to suck... building owners are *s l o w*..." The economics are against accelerated installation of fiber. Not only is there a capital crisis, but it's becoming progressively more expensive to install fiber because the cost of permits, labor, equipment costs, etc. all keep rising.

Terabeam is a high-speed (Broadband) Internet Service Provider, and provides both service and equipment to its customers using Free Space Optics (FSO) technology. Terabeam can provide Internet service by placing one of its units in the window of an office high rise, aimed at one of its hub sites. Hesse offers an analogy: "Think of a Terabeam hub as the 'sprinkler head' on the end of a 'fiber hose'". Terabeam constructs multiple hubs in a city and there is no interference issue between hubs because, in the physics of optics, there is no interference. Optical beams can cross each other with absolutely no effect.

Terabeam's signals have no trouble passing through tinted, and even metallic-coated windows. Terabeam's signals are totally eye safe – CDRH Class 1- Intrinsically Safe, which means that the laser energy in a Terabeam signal isn't absorbed by the cornea.

In this way, Terabeam does not have to suffer the long lead time, expense, and overhead of dealing with building owners to obtain roof rights. (Terabeam can also make use of rooftop space when it encounters an "enlightened" building owner that makes life "reasonable" for installation of rooftop systems.)

As to concerns about Terabeam's system being optical and therefore potentially prone to service interruption from its signal being blocked, Hesse states that heavy rain and snow do not affect Terabeam's system at all. Fog does affect Terabeam's system somewhat (the very fine water droplets in fog are like tiny prisms and refract the light). A bird flying into a Terabeam signal is not harmed and does not block the signal because it is diffused (not a highly-focused beam as we're accustomed to thinking about lasers). Hesse quipped "the only bird that *can* block Terabeam's signal is a 747 that can fly between buildings... and hover."

Terabeam considers its market to be the 97.5% of US businesses that don't have access to fiber. Business bandwidth requirements are increasing 60 - 120% per person, per year. This increase is being driven by:

1. Companies needing to become more efficient, such as using web-based forms rather than paper and fax or postal mail.
2. Network extension such as extending corporate networks all the way to remote offices, even small branch offices
3. Outsourcing, the trend to let an outside organization manage a company's computing resources, such as relying on an internet-based server-for-hire rather than having a server on premises.

Terabeam's revenue model is that of a carrier that leases Internet connectivity. Terabeam's low end service is 5 Mbps "for about the same cost as two T-1 circuits".

Hesse offered these main points of differentiation between Terabeam and its competitors:

1. No Voice. Terabeam does not attempt to provide voice services, and offers data / Internet services only. This sidesteps the "Teligent / Winstar" problems of legal issues of registering with Public Utilities Commissions as a Competitive Local Exchange Carrier (CLEC), having to invest capital in telephone switching systems, having to interconnect with Incumbent Local Exchange Carriers (ILECs) on *their* terms, and most importantly, the low (and decreasing) profit margins of voice services when competing with the ILECs. Terabeam may offer Voice Over Internet Protocol (VoIP) services at some point in the future, but at present it's remaining focused on deployment to new customers and new service areas
2. Efficient Technology. Terabeam's system is based on IP and Ethernet technology, not Synchronous Optical Network (SONET) / Asynchronous Transport Modem (ATM) as many other "bypass" systems are. It is five times as "expensive" to send packets in an ATM network compared to an IP network. Terabeam uses Multiprotocol Label Switching (MPLS) to insure Quality of Service (QoS). Terabeam's optical technology is relatively inexpensive because it makes use of the same 1550 nm laser technology (equates to 192 TeraHertz) as current-generation fiber optic systems, and can therefore use 1550 nm fiber amplifiers, splitters, etc. Terabeam's system can scale- the current system can achieve speeds of 40 Gbps using 16 lambdas, and an experimental system has achieved 160 Gbps.
3. Vertically Integrated. Terabeam is vertically integrated, owning all aspects of design, manufacturing, installation, service and operations. Personnel from factory, Research and Development (R&D) laboratories, and network operations meet daily to discuss issues, which provides for a rapid product feature, production, and operational improvement cycle.

Hesse summarized Terabeam's main strategies as:

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- Fast service (both fast to install, and high bandwidth)
- Go through windows, don't depend on getting roof access
- Don't depend on Incumbent Local Exchange Carriers (ILECs) for any part of your service
- Don't have any debt

Terabeam will begin offering its service in Bellevue, Washington, just east of Seattle, later in 2001. Terabeam plans to begin service in Denver by late June, and in four other large cities by the end of 2001. In Denver, Terabeam estimates that it will take approximately three months to set up a network that will provide service to approximately 60% of the area.

Terabeam has a system operational in Denver now, and there's an interesting story that goes with it. Barrett Resources needed a very high speed connection between two buildings, and needed it installed very quickly. Apparently they were doing some very computationally-intensive work that was split between two buildings, and the deadline for the completion of the work was fast approaching. The time-to-install that they had been quoted for wireline circuits was far too long for their requirements. They had seen Terabeam profiled on Cable News Network (CNN) and called them and asked if they had a system operational in Denver. Terabeam said no. Barrett Resources asked how much Terabeam would charge to install one of their systems as a dedicated link between two buildings. Terabeam named (what they considered) a nearly-obscene price, and Barrett Resources said "Fine, when can you have it up and running?" Terabeam had the link installed with a couple of weeks after that conversation, and both parties are quite satisfied with the arrangement.

Terabeam, like the rest of the telecom and information technology (IT) industry is suffering from the downturn in spending for IT and Telecom. More importantly, its potential customers are suffering badly. In Hesse's view, the IT and telecom industries are very firmly in recession, rapidly headed towards *depression*.

Terabeam has two year's worth of cash in reserve—they're relatively well funded. It's Hesse's top priority to insure that Terabeam can eke out two years from that cash reserve, and as part of that process has (painfully) reduced headcount by ten percent to help insure that its reserves will last.

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### **WCA To Form Sub-group of License-Exempt Wireless Internet Service Providers**

Many, especially smaller Wireless Internet Service Providers, use equipment that operates under FCC Part 15 and Unlicensed National Information Infrastructure (UNII)

(license-exempt) rules. For many, license-exempt equipment is affordable, and works well. For others, the main barrier to using wireless is the high cost of obtaining suitable spectrum, and so the use of license-exempt spectrum is their only option.

Many more ISPs would use license-exempt equipment if they could obtain funding, but are unable to convince potential investors that use of license-exempt spectrum is can be an acceptable risk. Offering such assurances is a daunting task for many equipment vendors, let alone startup or small Internet Service Providers. There is universal agreement that there is virtually no "visibility" of the part that License-Exempt Wireless Internet Service Providers play in "bridging the digital divide", especially in small and rural communities. Several previous efforts to form groups of Wireless Internet Service Providers have not been very effective.

This problem has been recognized by The Wireless Communications Association International (WCA), which has created the License Exempt Alliance (LEA), with AIR2LAN Chairman and CEO Jai Bhagat as the LEA's first Chairman.

Bhagat points to an WCA's record of successful initiatives with the FCC and other government, technical, and industry organizations as evidence that aligning with the WCA will offer substantial benefits to participating on the LEA.

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### **Letters**

Since we've just begun publication of *Focus on Broadband Wireless Internet Access*, we don't have any letters yet specifically directed at the contents of *Focus*.

This month I'd like to explain what my policy, and hopes, are for letters. A number of other newsletters that I admire have made the reader's letters, and the editor's responses, a significant part of the content of those newsletters. This serves several purposes: (1) It makes the newsletter more interesting to read, (2) It provides something of a reality check on what's written in the newsletter, (3) the readers likely know of things that the editor doesn't.

So, Letters and Editor's replies will be an integral part of *Focus*. Initially, while readership is relatively low, this will be a pretty intimate exchange of ideas and points of view. As *Focus* grows, it may not be possible to include all letters that are submitted... but we'll do our best.

Here are the initial guidelines for Letters to *Focus on Broadband Wireless Internet Access*:

- All editorial commentary letters (including email) to *Focus on Broadband Wireless Internet Access* will be considered to be submitted for inclusion in the Letters section of *Focus* unless otherwise stated.



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- Letters may be edited for space and relevance (and such edits will be noted)
- If you do not wish for your letter to be included in the Letters section of *Focus on Broadband Wireless Internet Access*, please state that in the letter.
- If you prefer to remain anonymous, but have your letter included in the Letters section of *Focus on Broadband Wireless Internet Access*, please state that in the letter and the request will be honored.
- All letters must include contact information; no anonymous communications will be published.

So, Please write! I very much look forward to exchanging ideas with the readers of *Focus!*

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### **Events Of Interest To The Broadband Wireless Internet Industry**

Please let me know of events that will be of interest to those in the Broadband Wireless Internet Access industry, and we'll feature them as space permits. If I plan to attend a particular Event, it is noted.

- June 15, Falls Church, VA – License Free Bands Training, Young Devices, Inc. – [www.ydi.com/training.asp#breezecom](http://www.ydi.com/training.asp#breezecom)
- July 9, 2001, St. Louis, MO - License-Free Wireless IP Workshop Series, Shorecliff Communications, Inc. [www.scievents.com/wisp/](http://www.scievents.com/wisp/)
- July 10-12, 2001, Falls Church, VA – BreezeCOM Training, Young Devices, Inc. - [www.ydi.com/training.asp#breezecom](http://www.ydi.com/training.asp#breezecom)
- July 19, 2001, Phoenix, AZ – Wireless ISP Seminar, BreezeCOM, Inc. [www.breezecom.com/CorpInf\\_30210.asp?tNodeParam=1](http://www.breezecom.com/CorpInf_30210.asp?tNodeParam=1)
- July 25, 2001, Sioux Falls, SD – Wireless ISP Seminar, BreezeCOM, Inc. [www.breezecom.com/CorpInf\\_30210.asp?tNodeParam=1](http://www.breezecom.com/CorpInf_30210.asp?tNodeParam=1)
- August 6, 2001, Las Vegas, NV – Wireless ISP Seminar, BreezeCOM, Inc. [www.breezecom.com/CorpInf\\_30210.asp?tNodeParam=1](http://www.breezecom.com/CorpInf_30210.asp?tNodeParam=1)
- August 8, 2001, Dallas, TX - License-Free Wireless IP Workshop Series, Shorecliff Communications, Inc. [www.scievents.com/wisp/](http://www.scievents.com/wisp/)
- August 13, 2001, Seattle, WA – License-Free Wireless IP Workshop Series, Shorecliff Communications, Inc. [www.scievents.com/wisp/](http://www.scievents.com/wisp/)  
(I plan to attend this event.)
- August 29, 2001, Boise, ID – Wireless ISP Seminar, BreezeCOM, Inc. [www.breezecom.com/CorpInf\\_30210.asp?tNodeParam=1](http://www.breezecom.com/CorpInf_30210.asp?tNodeParam=1)
- September 7, 2001, Irvine, CA – License-Free Wireless IP Workshop Series, Shorecliff Communications, Inc. [www.scievents.com/wisp/](http://www.scievents.com/wisp/)
- September 11-13, 2001, San Diego, CA – Wireless IT & Internet 2001, CTIA [www.wirelessit.com/general](http://www.wirelessit.com/general)  
(I plan to attend this event.)
- September 12, 2001, Denver, CO – Wireless ISP Seminar, BreezeCOM, Inc. [www.breezecom.com/CorpInf\\_30210.asp?tNodeParam=1](http://www.breezecom.com/CorpInf_30210.asp?tNodeParam=1)
- September 12-14, Lake Tahoe, NV – Gilder/Forbes Telecom Conference – Telecom V, Forbes, Inc. and Gilder Publishing [www.gildertech.com/public/conferences.html](http://www.gildertech.com/public/conferences.html)  
(I wish I could attend this conference!)
- September 21-23, 2001, Cincinnati, OH – ARRL and TAPR Digital Communications Conference, American Radio Relay League (ARRL) and TAPR, Inc. [www.tapr.org/dcc](http://www.tapr.org/dcc)  
(I plan to attend this event.)
- September 24-25, 2001, Dallas, TX – Private Broadband Show, Private & Wireless Broadband Magazine [www.privatebroadband.com/conference.html](http://www.privatebroadband.com/conference.html)
- September 26, 2001, San Jose, CA – Wireless ISP Seminar, BreezeCOM, Inc. [www.breezecom.com/CorpInf\\_30210.asp?tNodeParam=1](http://www.breezecom.com/CorpInf_30210.asp?tNodeParam=1)
- October 9-11, 2001, Las Vegas, NV – ISPCON Fall 2001, Penton Media, Inc. [www.ispcon.com/fall2001](http://www.ispcon.com/fall2001)  
(I plan to attend this event.)
- October 16-18, 2001, Cincinnati, OH – Wireless LAN Workshop, Wireless-Nets Ltd. / Jim Geier [//www.wireless-nets.com/ws\\_overview.htm](http://www.wireless-nets.com/ws_overview.htm)
- October 24, 2001, Bellevue, WA – Wireless ISP Seminar, BreezeCOM, Inc. [www.breezecom.com/CorpInf\\_30210.asp?tNodeParam=1](http://www.breezecom.com/CorpInf_30210.asp?tNodeParam=1)  
(I plan to attend this event.)
- November 28, 2001, Portland, OR – Wireless ISP Seminar, BreezeCOM, Inc. [www.breezecom.com/CorpInf\\_30210.asp?tNodeParam=1](http://www.breezecom.com/CorpInf_30210.asp?tNodeParam=1)  
(I plan to attend this event.)

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Steve Stroh, Editor

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