Independent, original, in-depth coverage of the trends and technology shaping the BWIA industry

Recipient of Part-15.Org's *2002 Wireless Advocate Of The Year* Award

Steve Stroh, Editor

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***FOCUS** On Broadband Wireless Internet Access* is founded upon the following tenets:

1. Internet technology is becoming the foundation for nearly all communications, commerce, and entertainment services;
2. For Internet access to be truly usable, always-on Broadband Internet access is required;
3. By the end of the first decade of the 21st century, Internet access will be ubiquitous;
4. In the "last mile", wireline-based technologies and systems will generally prove to be insufficient or not cost-effective to provide ubiquitous, always-on, Broadband Internet to most homes and businesses;
5. In the near term, Broadband Wireless Internet Access in all its forms – Sub 11 GHz, Above 11 GHz, Free Space Optics, Ultra Wideband, Licensed, License-exempt has emerged as *the most likely technology* to provide cost-effective, ubiquitous, always-on Broadband 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 in the Broadband Wireless Internet Access industry is significant. Each issue contains a number of *original*, in-depth articles and news stories. ***FOCUS is a just-in-time, short-lead-time publication, using Adobe Acrobat (.pdf) format, and email distribution. ***FOCUS** On Broadband Wireless Internet Access* is published by:

Steve Stroh
P.O. Box 84
Redmond, WA 98073-0084 USA
425-481-0600
steve@strohpub.com
www.strohpub.com

IEEE 802.11g Standard Finally Ratified

On June 12, 2003, the Institute of Electrical and Electronic Engineers (IEEE) completed (http://standards.ieee.org/announcements/80211gfinal.html) ratification of the long-anticipated 802.11g Wireless Local Area Network (WLAN) standard. Long-anticipated, as there have been "G" products shipping for some months now, which have or will continue to have widely-varying levels of compatibility. Briefly, 802.11g blends existing WLAN standards 802.11b and 802.11a by incorporating 802.11a's use of Orthogonal Frequency Division Multiplexing (OFDM) with 802.11b's use of the 2.4 GHz band, achieving theoretical / signaling speeds of 54 Mbps in the 2.4 GHz band. 802.11g is designed to be fully backward-compatible with 802.11b, to the point that even though OFDM and Direct Sequence Spread Spectrum (DSSS - used in 802.11b) are completely non-interoperable, an 802.11g device will have a "protection mode" that can detect 802.11b transmissions, transmit "beacons" that can be heard by 802.11b devices, and will allow an 802.11b device to connect to an 802.11g device (at 802.11b's 11 Mbps theoretical / signaling speed). Although 802.11g's signal will only occupy 17 MHz (and thus possible to accommodate four non-overlapping 802.11g channels in the 2.4 GHz band), it was decided to

retain the 802.11b channelization of three non-overlapping channels (1, 6, and 11) for backwards compatibility with 802.11b.

The significance of 802.11g to the Broadband Wireless Internet Access (BWIA) industry is that vast volumes of 802.11g consumer devices will make 2.4 GHz OFDM technology very inexpensive. OFDM is in almost all ways a far superior modulation method than DSSS, which has become the basis of much of the inexpensive BWIA systems now being offered, at price points that allow Wireless ISPs to offer inexpensive Customer Premise Equipment (CPE) to their customers. While many of these types of systems retain 802.11b compatibility, many do not. The deficiencies of 802.11b when used for BWIA ("outdoor", "last-mile" such as much lower speeds with increasing distance are well-documented. Such deficiencies can be overcome with intelligent system design - keeping link lengths short, using phased-array antennas to "concentrate" an 802.11b signal to a user (Vivato and other's approach), etc. Another approach to take advantage of the economies of 802.11b equipment, but reduce the deficiencies is to buy 802.11b hardware but use a Media Access Control (MAC) system more appropriate for BWIA use (Karlnet's approach, recently endorsed by Proxim's offering of a very similar MAC).

Space doesn't permit an extended discussion of how OFDM works, but a brief explanation is in order. OFDM is most easily contrasted against DSSS. While the latter uses one contiguous carrier across a 22 MHz channel (again, the 802.11b implementation of DSSS), the former transmits many narrow carriers "orthogonally". This approach has many benefits, one being that error correction from a distorted signal in one of the carriers is considerably easier than with DSSS. In general, OFDM works better than DSSS, making possible "Near Line Of Sight" and generally more robust signal. In short, for the same money, OFDM is better than DSSS.

Recall that 802.11g is backward-compatible with 802.11b; operating a mixed 802.11b/g network will result in the 802.11g speeds being 30-50% slower than the theoretical 54 Mbps. This is because 802.11g has to "listen, and transmit 802.11b-compatible frames", as well as periodically switch into 802.11b mode to communicate with 802.11b clients. This isn't optimum for outdoor / BWIA usage, where a Wireless ISP manages their network tightly and controls what devices get access to the network. Fortunately, it was anticipated by the 802.11g designers that it would be desirable to build 802.11g-only networks, and it is easy in most 802.11g devices to set "Protection Mode OFF".

Once 802.11g volume ramps up, and vendors gain more familiarity with OFDM on 2.4 GHz, the BWIA industry will likely see a plethora of new generation 2.4 GHz systems with greatly increased performance due to the use of OFDM, at approximately the same price points as older 802.11b/DSSS systems. In short, OFDM will make a very measurable difference in the performance of networks currently based on 802.11b technology.

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Speedcom To Be Acquired By P-Com

In another combining of "licensed spectrum" + "license-exempt spectrum" equipment vendor, pioneered by BreezeCOM and Floware to form Alvarion, and earlier this year YDI merging with Telaxis, struggling license-exempt equipment vendor Speedcom (http://www.speedcom.com), best known for its Wave Wireless Networking division (http://www.wavewireless.com), has agreed (http://209.15.100.4/speedcompress/include1.cfm?filename=p-com_aquire_06-17-03.htm)to be acquired by not-quite-so-struggling licensed spectrum equipment vendor P-Com

(http://www.p-com.com). On the surface, it looks like a good fit. Speedcom has some good product lines, most notably the SPEEDLAN 9000 Mesh Network product. Speedcom's higher-speed products, and P-Com's license-exempt products look like good candidates for consolidation, leaving Speedcom's license-exempt spectrum products and P-Com's licensed spectrum products as the surviving product lines.

As the Broadband Wireless Internet Access market continues to accelerate, such mergers will become increasingly common. But P-Com/Speedcom is faced with some considerable challenges besides the usual post-merger challenges. They're faced with a very capable competitor in Alvarion in both the licensed and license-exempt equipment business. P-Com's core business - licensed point-to-point microwave links is severely challenged due to the reduced number of new wireless telephony sites being installed and the increasing capabilities of license-exempt equipment. If P-Com can pump money into strongly differentiated product lines like the SPEEDLAN 9000 to improve and extend that product and others, it should do reasonably well in a rapidly-growing license-exempt BWIA industry.

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Nextel Wins Bid For Worldcom MMDS Spectrum

In a court filing on Monday, June 30, 2003 it was revealed that Nextel's offer of $144M had won the bidding for Worldcom's Broadband Wireless Internet Access business, including its spectrum holdings in the Multichannel Multipoint Distribution Service (MMDS) spectrum - 2.5 - 2.69 GHz. Nextel has given no hints as to what it's plans are for the new spectrum. Considering the limited national footprint of spectrum (largely divided nationally with Sprint in metropolitan areas) it's unlikely that Nextel will extend its current mobile voice services to use the new spectrum. It seems equally unlikely that Nextel will continue or expand Worldcom's (Fixed) Broadband Wireless business as it's simply not in the business of commodity fixed Internet access.

Three possibilities emerge: 1) Nextel will lease the spectrum to various entities that have sufficient capital and technical savvy to deploy current-generation highly-capable Broadband Wireless Internet Access Systems, including services to municipal governments at price points far more aggressive than equivalent wireline services, 2) Nextel will use the spectrum as backhaul for its numerous base stations for its very popular mobile voice "walkie talkie" services, replacing expensive, bandwidth-limited, and slow-to-deploy wireline circuits, 3) Nextel will take on partners to begin offering a new "mobile / nomadic / self-install" broadband service that will offer a new price/performance/features paradigm. (After some thought, a fourth possibility emerged... do nothing with the spectrum and see what kind of demand emerges for it, which may be the likeliest scenario of all.

More importantly, Nextel's winning $144M bid - less than 1/7 of what Worldcom paid for the spectrum and invested in deploying equipment, establishes very clearly that the "value" of licensed spectrum has fallen considerably, but is still at price points sufficient to discourage small, innovative service providers who are fueling the very aggressive license-exempt Broadband Wireless Internet Access industry.

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WaveRider Acquires Avendo Wireless

WaveRider (http://www.waverider.com) plans to acquire Avendo Wireless (http://www.avendowireless.com). WaveRider's core product line is its Last Mile Solution (LMS) product line - Broadband Wireless Internet Access systems that operate in the little-used (by BWIA) 902-928 MHz band. Signals at 902-928 MHz penetrate foliage relatively easily and so WaveRider markets LMS as a Non-Line-of-

Sight (NLOS) system. As Wireless ISPs, including municipal governments, have increased their coverage, foliage penetration has proven to be problematic when using 2.4 GHz and 5 GHz systems. Until Alvarion began actual shipments of its competing 900 MHz product this month, WaveRider was largely alone its use of 902-928 MHz for products that offer > 1 Mbps speeds. Because of the competition from deep-pocketed Alvarion, WaveRider was beginning to look very vulnerable in the BWIA market.

Avendo Wireless has an impressive technology - a high-performance implementation of Orthogonal Frequency Division Multiplexing (OFDM) combined with phased array antenna technology that achieves high speeds and NLOS. While implementations of OFDM are becoming more common with impressive new OFDM implementations from Redline, Alvarion, and Wi-LAN, no other vendor that I'm aware of to date has combined the use of OFDM and phased array antennas. An effective combination of the two technologies should result in higher performance at considerably lower cost than competing products. But, at the moment, Avendo does not have a product, only prototypes. Its business model was license its intellectual property; in the current business climate that was a severe challenge, where a licensed technology is viewed as unwanted overhead expense.

It remains to be seen if WaveRider can continue to grow its LMS business line while quickly productizing the Avendo Wireless technology. OFDM, with Phased Array Antenna technology... in 902-928 MHz (or the new 700 MHz bands) - now THAT would be QUITE the product!

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***FOCUS On Broadband Wireless Internet Access*:**

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Palm Tungsten C - Great PDA, With Wi-Fi

On April 23, 2003 Palm, Inc. launched its newest and most capable device ever – the Palm Tungsten C – the product that will quite possibly make… or break… Palm, Inc. in the face of Microsoft's relentless offensive to increase market share in the Personal Digital Assistant category. The Tungsten C departs from previous units in a number of ways; impressively it achieves backward software and data compatibility while changing almost everything else:

- The primary point of relevance to readers of FOCUS is that for the first time in a Palm device, 802.11b/Wi-Fi is integral, not an add-on. Palm has (nearly) always had an integrated TCP/IP stack, but previous connectivity was cumbersome at best. With the Tungsten C, applications can begin to assume Internet connectivity.
- New processor family – 400 MHz Intel Xscale – vastly more computing power than has ever been available on a Palm device. As I'll discuss, this is a critical point.
- Integrated keyboard – easier (for my large hands) to manipulate than a RIM Blackberry. There is also a multifunction "ring" cursor control device which I didn't quite get the hang of in the few minutes I was able to use the demo device. As of this writing, I do not yet own a Tungsten C; impressions are from a working demo unit at a local computer store.
- Color – gorgeous, good color depth, 320x320 pixel color. I'm looking forward to having enough memory space and sufficient color quality to add my "traveling" pictures of wife, daughter, home, pets, favorite photos to share, etc.
- RAM – 64 MB minus overhead, resulting in 51 MB being available for data and RAM-resident applications.
- Built-in applications – reasonably capable web browser and email programs, and software capable of reading and writing PC

files compatible with Microsoft Word, Excel, and PowerPoint, and Acrobat Reader.
- Expansion – a Secure Digital (SD) slot. In preparation for the eminent purchase, after some travel is completed, I purchased a 256 MB SD card at Costco for ~$64.00.
- Audio input and output – built-in mono speaker, and Nokia-style 3-pole jack intended for cellular-style "dangle" microphone and earplug.

If you're used to Palm's "value" devices such as my current Palm IIIc, the Tungsten C (TC) is very comfortable – quite comparable in size and weight. I turned on the unit and within seconds it had found an open 802.11b AP within the store and obtained an IP address – fast, efficient, no fuss. I then went to my web page and it displayed within seconds. One thing that's very noticeable about the TC compared to previous Palm devices is that it's fast! All functions on the device are simply snappier and more fun to use.

In features and marketing, Palm has targeted the Tungsten C squarely at corporate customers. Notable "corporate" features include:
- Virtual Private Network software
- Word, PowerPoint, and Excel-compatible applications
- "Business only" audio; in the current corporate budget climate, Information Technology managers must be acutely sensitive to accusations of corporate PDAs as "toys" – such as the capability to play MP3 files (at least… as high-fidelity music). However unfounded, such a charge would be difficult to withstand, so the Tungsten C does not have a stereo output capability, which Palm can easily justify by pointing out that there was only room for a single audio jack, and it had to accommodate a microphone, earphone, volume control, and "answer/hang up" button.
- Audio input/output, including a voice recorder application
- Acrobat Reader application
- Extensive security and identification features; can auto-identify by username, MAC address, or serial number
- Web browser supports Secure Sockets Layer (SSL)
- Email application supports Internet Message Application Protocol (IMAP)
- Agreement reached on May 6, 2003 between PalmSource (split out from Palm, Inc. to develop the PalmOS independently of Palm, Inc.'s hardware) and Research In Motion (RIM) to promote RIM's well-developed email back-end solutions for redirecting corporate mail messages for use with Palm devices (to date, available only for use with RIM devices)

The Tungsten C is nearly the perfect device for the high school or college student. Assuming campus-wide 802.11b/Wi-Fi coverage, web surfing to clarify a point during a class discussion would be easy. Of course, "abuse" would be a ongoing "problem", such as use of Instant Messaging during "pay attention" times. The keyboard makes Instant Messaging easy, as well as composition of email. There's a subtle advantage for student use of the Tungsten C over the older Palm devices; the Grafiti handwriting recognition software uses a simplified form of cursive writing to increase the accuracy of character recognition. Some studies suggest that student handwriting skills suffer from "confusion" and "imprinting on Grafiti" in their formative years, and the keyboard largely eliminates this concern.

VOIP Is The Killer App (The following paragraphs were written prior to the announcement from Palm of VOIP capability for the Tungsten C.) It's abundantly clear, from the capabilities of the Tungsten C, and widely discussed in discussion forums for the Tungsten C that Voice Over IP (VOIP) over 802.11b/Wi-Fi capability is immanent for the Tungsten C. The processor is more than capable (400 MHz) for such overhead, there is sufficient RAM (more

built-in RAM would be better, but that's undoubtedly coming in future devices), and the inclusion of Nokia-compatible headset jack with both audio in and audio out offer all-but-conclusive proof that VOIP was a major consideration in the design of the Tungsten C.

VOIP over 802.11b/Wi-Fi plays well on many levels:

- Enterprise usage – for many, a Tungsten C will be all the "wireless phone" that they'll need for their daily activities, capable of taking advantage of corporate security such as encryption, firewalls, etc. No additional (parallel voice access points) infrastructure other than existing or planned 802.11b coverage is needed, and no fees need be paid to service providers such as the case with cellular phones.
- Students – will likely be one of the most avid early adopters of VOIP over 802.11b/Wi-Fi; they'll have "free" (paid as part of tuition and fees) 802.11b/Wi-Fi access over an entire campus, and likely in the commercial Wi-Fi coverage in near campus areas where "roaming" Wi-Fi HotSpot agreements have been struck.
- For the budget-conscious, use of the Tungsten C at no-cost Wireless HotSpots will be a draw; it's already possible to make VOIP phone calls from several online services such as MSN. Earthlink now offers its broadband members a branded version of Vonage service… with Earthlink's relationship with Boingo Wireless, it's not much of a leap that Wireless HotSpot service providers may soon offer Vonage services to their customers.
- For experimenters, VOIP over 802.11b/Wi-Fi will be a considerable draw, given that VOIP is increasingly common and well-understood and doable with inexpensive hardware and open source software; Jeff Pulver's Free World Dialup system is very attractive as a VOIP telephony "back end" to those that wish to connect over the Internet using VOIP with no intention of making use of the Public Switched Telephone Network (PSTN).
- Vonage (www.vonage.com) is rapidly becoming a major force in the evolution of telephony services. For a flat fee, a customer gets two physical "phone lines" (on the same number, working much the same as a business Hunt Group), call waiting, caller ID, call forwarding, voice mail, etc. Nearly every week brings an announcement of additional area codes that have been "activated" by Vonage (equipment collocated in a Central Office serving particular area codes). Which area code one uses for Vonage is only an issue to whose who call a Vonage user from the conventional Public Switched Telephone Network (PSTN) and incur an added-fee "long distance charge". Although Vonage currently only supports the Cisco ATA 186 adapter (Ethernet jack in, two telephone line jacks out), the essence of Vonage is Voice Over IP (VOIP) and Session Initial Protocol (SIP). Those two protocols are embedded in the ATA 186 for ease of support and compatibility with existing telephony devices… but nothing prevents VOIP and SIP being implemented in software on general purpose devices such as the Palm Tungsten C. Indeed… the Tungsten C would be the ideal platform for a significant extension of services from Vonage since Vonage customers are assumed to be Internet savvy and could use a web browser to control various aspects of their service… such as "away from desk, route all calls to portable device and if no answer, to voice mail."

VOIP – A Two-edged Sword For Palm In creating a device that's capable of VOIP Over Wi-Fi, Palm risks alienating a powerful customer – the wireless telephony companies which are the primary distribution channel for Palm's devices that use wireless telephony connectivity. The Tungsten C with VOIP will develop

tremendous appeal to a customer segment that's critical to the ongoing viability of the wireless telephony industry – the early adopters and "younger" users who are comfortable with (higher-margin) "enhanced services" such as text messaging, exchange of electronic photos, email, etc.

Such customers are critical to the long-term viability of the wireless telephony industry – those who desire "enhanced services" and are willing to pay more than commodity pricing. For the wireless telephony industry, the worst-case scenario would be for the enhanced services that they are depending on for revenue growth and churn reduction to become "commodity services" in the minds of customers… much like what is now happening in wireline telephony with Vonage bundling in long distance, voice mail, caller ID, two lines, etc. for a flat-rate fee that doesn't involve any revenue for conventional wireline telephone companies.

So, two obvious compromises in the design of the Tungsten C – no bundled VOIP software, and no built-in camera, either or both of which could easily be seen as a direct challenge to wireless telephony, are an understandable deference to the wireless telephony companies that Palm is depending on to resell its wireless telephony devices.

Tungsten C VOIP – But Not From Palm On May 29, Palm announced a number of agreements relating to the Wi-Fi capabilities of the Tungsten C. The primary announcement was that VLI (www.vliusa.com) is now offering Gphone – VOIP/SIP software which is already available for PocketPC and Windows. There were two subtle, but highly significant mentions relating to Gphone: 1) that Gphone will be able to "… communicate with other Palm handhelds using corporate wireless networks, public hotspots, or wireless home networks." 2) that Gphone will be able to "… make calls over the switched public telephone network". The former statement hints at a "peer to peer" capability… which is another direct assault on wireless telephony providers who have a major initiative to develop "direct connect" system to counter Nextel's key differentiating feature which has proven to be very, very popular to corporate customers. The latter statement, especially when considered with "… will be able to pick up calls forwarded from their voice phone…" hints that VOIP services such as Vonage (and its inevitable competitors) and enterprise VOIP services will be able to offer at least "nomadic" if not full mobility VOIP telephony service.

The prospect that sufficient numbers of customers of high-margin services "defecting" to VOIP services is the nightmare scenario for the wireless telephony companies. The wireless telephony companies seem to have developed four key strategies to try avert such a scenario:

- Co-opt Wireless HotSpots - T-Mobile (then VoiceStream Wireless) bought the remains of MobileStar out of bankruptcy and has expanded its high-visibility placement in Starbucks stores with similar agreements for Borders and Kinko's stores. All the major wireless telephony companies have some involvement in Wireless HotSpots.
- Position Wireless HotSpots as a high-speed, but very localized extension of wireless telephony services, with unified billing.
- Develop interoperable VOIP/Public Switched Telephone Network (PSTN) systems so that a single mobile telephone number will work both on the PSTN and VOIP.
- Discredit and limit license-exempt wireless and especially 802.11b/Wi-Fi as a non-mobile, very limited range system

Unfortunately for the wireless telephony companies, those measures don't have any real hope of succeeding. Unlike telephones, devices such as the Tungsten C can be quickly reprogrammed, and maintain multiple configurations to take advantage of Wi-Fi coverage wherever it is available – home, work, school, for-pay public, for-free, temporary, etc.

Regular readers will recall my prediction that the emergence of an 802.11b/Wi-Fi version of Palm will be far more of a factor in the ultimate success of Wireless HotSpots than will laptops, because a PDA is an “unconscious carry” item, typically on one's presence at most times. This Palm will make it very easy, in the presence of 802.11b coverage, to make effective use of the web browser on a casual basis, and that this will drive far more potential customers to actually note the availability, or not, of Wireless HotSpot coverage (it's trivially easy to check with the Tungsten C), and if not, sufficient motivation to change venues or ask that Wireless HotSpot coverage be added.

Wireless Hotspot coverage is multiplying rapidly. In the past several weeks, Verizon has announced that it is building Wireless HotSpots into pay phone locations in New York City, and early results of that test were highly favorable. At Networld+Interop, Zyxel showed the ZSG-100W with is the most “do it yourself” Wireless HotSpot solution I'm aware of to date, intended for single-location venues and places where Wireless HotSpot service can be managed with cash or credit card transactions on existing systems. The ZSG-100W comes with a small printer which will print a receipt with password. The user then uses starts up their device, opens the browser, types in the password that's printed on the receipt, and they are immediately enabled for HotSpot usage.

I have received word recently of Wireless HotSpots being installed in three “non-traditional” venues where I predicted Wireless HotSpots would be highly desirable, used heavily, and lucrative: truck stops, marinas, and campgrounds. Imagine how much saner family car trips will be if the teenager can stay in touch with friends with at least occasional access to a Wireless HotSpot.

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Letters To *FOCUS*

[The writer requested anonymity.]

Hi Steve,

We've been using a wireless ISP for a few years now, and I'm sad to say that we've had some problems. We've never gotten the speeds that we were promised, the signal drops out frequently, and lately the service has been extremely slow, causing interruptions in our email and uploading. Meanwhile, cable and DSL service is now available here and the prices have fallen for these alternatives, while the wireless prices have stayed the same and are now actually more expensive.

I feel like we backed the “right horse” with 802.11b, as it's become more and more popular, but it seems like the technology (or maybe just our service) has not improved with time.

I guess I would like to have any thoughts or suggestions that you'd be willing to give, especially “what would you do?” We use a company called [deleted], and they're great guys and they've tried in every way to address our concerns, but it just seems as though the wireless ISP's have now fallen behind the competition. Have you heard similar complaints?

Any comments would be appreciated.

(end of letter)

My reply:

I'm not, as one might assume, rabid "Pro-Wireless no matter what the situation". Wireless CAN be cost-effectively used to provide broadband when it's not otherwise available, and can even beat the price/performance/reliability of DSL and cable modems IF the right equipment choices are made and the individual ISP is

professional, proactive, and analytical in their approach to providing Broadband Wireless Internet Access. But it's quite possible to do wireless "wrong" - as you're experiencing. Other WISPs that I'm familiar with would never have let your service deteriorate to the point where you would be faced with the choice; they monitor every connection 24x7 and they know, before you do, when, where, and why there are problems.

Because they use license-exempt spectrum, Wireless ISPs are subject to increasing interference as more and more people begin using devices that also use that same spectrum. That's solvable, if the ISP "adapts" to the changing situation and uses better and better technology. That's the "Faustian bargain" they have for not having to pay for the spectrum they use.

802.11b devices are NOT, by far, the best choice for Wireless ISP use. 802.11b was specifically designed for Wireless LOCAL Area Network (WLAN) use - NOT long range connections extending for miles. 802.11b systems can be made to work in such situations, especially in areas and situations that experience little interference, but even then 802.11b systems suffer from severe limitations. [Likely your WISP doesn't] see the limitations and problems of 802.11b as affecting their business - yet.

I don't think you owe any loyalty to your WISP. The bottom line is that you, as a business, contracted for fast and reliable Internet service, and you're not receiving it. You have to address that situation as you would with any vendor that's delivering inadequate services or products that are materially affecting your business. You've made your concerns known to the vendor, and for whatever reason they haven't been able to correct the problems. Now that you have an alternative, you can "vote with your wallet". You have to do what's right for your business.

I would suggest moving to DSL if you can get it (cable modems have various deficiencies that generally render it far less suitable for business use than DSL), and when canceling your service with your WISP, explain formally why you're switching - the promised speed didn't happen, and the reliability was less than your business can tolerate. When your WISP hears enough of those stories - and experiences the pain of losing enough accounts such as yours, they'll get the message that their technology is no longer adequate.

But be aware that DSL is no panacea. It can suffer from variations of speed (at some point, "upstream" of your connection, DSL bandwidth is aggregated and the actual speed of real-world Internet access can vary considerably moment-to-moment.) It's also quite possible to experience reliability problems with DSL, especially in areas where the copper cabling infrastructure hasn't necessarily been maintained well, which I judge your city to be subject to that problem.

Thanks,

Steve

(end of my reply)

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New Products!

- Speakeasy Offers Neighborhood Wireless - Speakeasy is the first ISP to get this right - Speakeasy's WiFi NetShare not only specifically allows Speakeasy DSL users to share their Speakeasy Internet connections with anyone else, it offers to do the billing and otherwise aid and abet you in recruiting "users" of your wireless sharing. Basically, a Speakeasy DSL user sets up a wireless hub (presumably outdoor, longer-range, with an external antenna and higher power) and turns on WEP encryption. Those that wish to make use of your wireless system contact

Speakeasy to set up an account. Speakeasy arranges billing and then provides the user with the WEP key, email accounts, and backup dialup access. Speakeasy pays the DSL user 50% of what they collect per account (but the wireless owner sets the rate), so conceivably one could be in the "micro-WISP" business and get their connectivity for free if they can find enough people to pay for sharing it. Speakeasy's policy is enlightened. http://www.speakeasy.net/netshare/learnmore/

- Cirronet High-Gain Antenna 2.4 GHz Units, New 5.8 GHz Units - Cirronet now offers a 5.8 GHz version of its WaveBolt system. No mention that the 5.8 GHz product offers faster speeds than the 2.4 GHz product, which is ~ 1 Mbps. The new 2.4 GHz unit features an integral 12 dB antenna for use in marginal signal areas for a price increase of $50. Both units use Frequency Hopping Spread Spectrum (FHSS), and the only vendor that I'm aware besides Alvarion that offers a FHSS product for use in the 5 GHz band. http://www.cirronet.com/pdf/Cirronet Extends WaveBolt Product Line _final.pdf
- Trango 10 Mbps P-P Bridge With 40 Mile Range - Trango Broadband Wireless is giving its competition in the BWIA industry a real contest. Trango products have become a favorite of many Wireless ISPs for the combination of relatively low prices, relatively high speeds (one of the first to do 10 Mbps), and spectrum efficiency (in marked contrast to Motorola's Canopy which offers somewhat similar speeds and relatively low prices, but requires 30 MHz of 5 GHz spectrum). With the TrangoLINK10, Trango has optimized their P-MP product for P-P use, and added a few features such as SmartSEEK which changes channels when interference is encountered, and automatically re-associates with the remote unit. http://www.trangobroadband.com/news/common/trangolinkpress.html
- DragonWave AirPair 100 Gets Full FCC Approval - Until DragonWave sent me a press release about the AirPair product line, with a cryptic reference to the "unlicensed 24 GHz band", I DIDN'T KNOW there WAS a license-exempt 24 GHz band. Turns out this spectrum was originally intended for microwave door opening sensors and security systems, but is underutilized for that purpose and is now available for low-power, license-exempt P-P use. AirPair 100 is a true wire speed full duplex 100 Mbps (there's also a 50 Mbps version) link. The biggest advantage other than its speed is that 24 GHz will likely not be crowded for a very long time. http://www.dragonwaveinc.com/company/pdfs/24GhzFinal.pdf
- Alvarion BreezeAccess 900 System now shipping - Many months after the initial announcement of this system, it's finally shipping. In its initial form, it is most suitable for use by existing Alvarion users to bridge between an existing Alvarion 2.4 GHz network and clusters of potential users that cannot be reached using 2.4 GHz or 5.8 GHz systems, typically because of dense foliage. The BreezeAccess 900 includes a spectrum analyzer function to remotely monitor for sources of interference within the 902-928 MHz band. http://www.alvarion.com/RunTime/CorpInf_30130.asp?fuf=343&type=item

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BWIA In Other Media

- Seattle Weekly - Wherefore and Wi-Fi http://www.seattleweekly.com/features/0325/news-wifi.php While Seattle Weekly is not a paragon of technology reporting, it does have Frank Catalano (http://www.catalanoconsulting.com/), who is one of the savviest technology

commentators and analysts that I know of. I've been a fan of Catalano since his brief, but very good radio show Northwest Computing in the late 80's. This article, though it has an understandable "Seattle" flavor, considering its venue, is notable in the context of BWIA because Catalano lays out some startling numbers on the amount of venture capital investment that is flowing into "the Wi-Fi industry" - a startling $2B since the beginning of last year. Catalono goes on to posit a shakeout in this particular "bubble" perhaps as early as this Fall. I agree with Catalano to a point - there are way, WAY too many companies being funded to "solve the enterprise WLAN management problem" and the shakeout when it happens will be brutal, but probably mercifully brief. But Catalano suffers from the conventional blindness that "Wireless" equates to "wireless telephony" OR "Wi-Fi"; missing BWIA completely, and missing the growing trend of Wi-Fi equipped personal devices such as PDAs and eventually GameBoy-like portable gaming systems that will "pull" demand for ubiquitous Wireless HotSpots in many venues, using many revenue models - from free, to "cash", to "credit card charge" to "monthly roaming account". There's room for all of these models.

- Dana Blankenhorn - Moore's Lore Weblog http://www.corante.com/mooreslore/20030601.shtml - 40837 Blankenhorn discusses a recent Forrester report on Wi-Fi HotSpots, and concludes that there's little money to be made. "Will big money be made in assuring universal access to Wi-Fi network resources? No, it's a utility. It will be a challenge to assure universal access to this utility. In exchange for taking on this challenge, a regulated monopoly might actually have a pretty good business model. Guaranteed access to capital, guaranteed returns, but no competition so your returns are limited by law." ARGH! Wireless HotSpots will be anything BUT a utility, because it's within the capability AND motivation of individuals and small companies to put one wherever they think there's a buck to be made. Enormous differentiation can be applied - faster, better, more reliable, more ubiquitous service in return for higher fees. Free if you don't care. Assuming that the product that can be provided TODAY is what we're going to want FOREVER and basing a "utility" model around that lowest common denominator is what got us INTO this telecom crash - we fossilized the use of copper pair to the point that wireline telephony companies are in the "signals over copper pairs" business - with laws, cross subsidies, and services all centered around the idea of COPPER PAIRS, not "best, most cost effective COMMUNICATIONS".
- Andrew Seybold - One Year To Get It Right http://www.siliconinvestor.com/stocktalk/msg.gsp?msgid=19024624 (I read this on various mailing lists, but this was the one web posting of it that I found, including Seybold's web page.) Seybold simply doesn't understand that the rules of spectrum have changed from when HE learned them years ago due to the emergence of advanced technology being applied to radios. This is most apparent from Seybold's point #1 - "Systems that use unlicensed spectrum are unregulated. Interference is not only possible, it is a foregone conclusion." First, license-exempt spectrum is NOT unregulated... nothing could be further from the truth. It is very regulated to maintain the open access that made license-exempt spectrum such a stellar success, and the crucible of most new spectrum-based services and products of late. Second... yes, interference is inevitable... and that point is completely irrelevant because SUCCESSFUL systems and products are designed to deal effectively with interference and continue to operate - the "Darwinian Effect Of License-exempt Wireless". Seybold is apparently ignorant of highly-

successful deployments of public safety broadband wireless systems such as the San Diego County Sheriff's Department 650 vehicle fleet... that use license-exempt spectrum upon which Seybold heaps so much scorn.

- Broadband Wireless Business May/June 2003, Page 32 - Big Questions For Service Providers http://www.shorecliffcommunications.com/magazine/volume.asp (This issue is not yet online) Donald L. "Dee" Herman Jr.'s column in this issue is stellar. Herman gives capsule descriptions on some of the legislative and law enforcement issues that ALL service providers are now required to deal with, such as How is your company prepared to deal with law enforcement requests?, Are your networks currently equipped to allow access to law enforcement? and How are your customer records kept? If you are a subscriber to Broadband Wireless Business, dig this issue out of the pile and READ Herman's column on Page 32. If not, Herman's email address is mailto://dherman@bennetlaw.com.

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BWIA-related Events Of Note

- WCA 2003, July 8-11, 2003, Washington, DC - http://www.wcai.com/event/03general.htm This will likely be the defining event for 2003 for the overall Broadband Wireless Internet Access industry. It was inspired of the WCA to move their annual event to DC to be within easy commute range of lawmakers and FCC staff, and reschedule (it's traditionally held in August) it while Congress is still in session (DC largely shuts down during the month of August while Congress isn't in session). In the wake of seminal events in the Wireless industry last year and this year, such as last year's Spectrum Policy Task Force, introduction of bills requiring allocation of additional license-exempt spectrum, and increasing awareness of Broadband Wireless Internet Access in general, this event will likely be a huge success for exhibitors and attendees alike. I will be attending, but not speaking.
- IEEE 802.16 Working Group on Broadband Wireless Access Standards Session 26, July 21-24, 2003, San Francisco, CA - http://ieee802.org/meeting/future_meetings.html
- IEEE Radio and Wireless Conference (RAWCON), August 10-13, 2003, Boston, MA – http://www.rawcon.org/
- WISPCON-EURO, August 25-27, 2003, London, United Kingdom - http://www.wispcon.info/Euro/wispcon-euro.htm
- Broadband Wireless Asia 2003, September, 2003, Hong Kong – http://www.scievents.com/bwasia
- 802.11 Planet Japan 2003 - September 1-2, 2003, Tokyo, Japan - http://www.jupiterevents.com/80211/tokyo03/index.html
- IEEE Working Group on Broadband Wireless Access Standards Session 27, September 8-11, 2003, Denver, CO - http://grouper.ieee.org/groups/802/16/calendar.html
- 802.11 Planet Australia 2003, September 18-19, 2003, Sydney, Australia - http://www.jupiterevents.com/80211/sydney03/index.html
- 8th International OFDM Workshop, September 24-25, 2003, Hamburg, Germany - http://ofdm.tu-harburg.de/
- Broadband Wireless East Conference & Expo - September 25 & 26, Baltimore, MD - http://www.scievents.com/bwwEast03/ Shorecliff Communications is extending their annual Broadband Wireless World Forum into a semi-annual, apparently bi-coastal event.

- 802.11 Planet Europe 2003 - September 29-30, 2003, Munich, Germany - http://www.jupiterevents.com/80211/munich03/index.html
- WISPCON IV - October 27-29, 2003, Dallas, TX - http://www.wispcon.info/ Dates are tentative per the Part-15.Org WISP discussion list. Targeted specifically at the small-to-medium Wireless ISPs, this conference brings together those that are WISPs, those who want to be WISPs, and the equipment and service vendors who wish to aid and abet them in deployment of WISP services.
- IEEE Working Group on Broadband Wireless Access Standards Session 28, November 9-14, 2003, Albuquerque, NM – http://ieee802.org/meeting/future_meetings.html
- Software Defined Radio (SDR) Forum General Meeting, November 17-20, 2003, Orlando, FL - http://www.sdrforum.org/MTGS/upcoming_events.html
- Wireless Broadband Forum, November 25-26, 2003, Cambridge, UK – http://www.broadband-wireless.org/WBF2003/wbfindex.htm
- 802.11 Planet Fall 2003 - December 2-5, 2003, San Jose, California - http://www.jupiterevents.com/80211/fall03/index.html
- IEEE 802.16 Working Group on Broadband Wireless Access Standards Session 29, January 12-15, 2004 – Vancouver, British Columbia, Canada - http://grouper.ieee.org/groups/802/16/calendar.html

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BWIA Deadpool (New Feature)

The BWIA Industry is one of continuous, and of late, very rapid evolution. The strong, fast, clueful, and sometimes just lucky survive. The weak, slow, clueless, and unlucky usually don't survive. There's so MUCH "evolution" going on - new companies coming into the market, and dead or acquired companies leaving the market, and this (hopefully not too regular) feature will try to keep tabs, especially on the going.

* Malibu Wireless, Inc., dead approximately Spring 2003, lack of response to http://www.malibunetworks.com and Google's cache stating "Malibu Networks, Inc. has discontinued operations." Malibu had a great idea - better-than-anyone-knew-was-needed IP over wireless control; everything in their wireless technology was biased to assure superb Quality of Service (QOS) of TCP/IP. But their overhead was high - three development centers, and they never quite shipped any actual product (though the proposed hardware, like the software, was very impressive). In 2002 they decided to adapt their IP technology to 802.11 commodity hardware, but the pricing was very high and they couldn't really get the message across as to what advantages their product conferred. I was unable to find any information on the disposition of Malibu Networks' assets, especially its Intellectual Property.

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***FOCUS On Broadband Wireless Internet Access*:**

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On Broadband Wireless Internet Access

Steve Stroh, Editor

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Steve Stroh is the perpetrator of the "FOCUS on Broadband Wireless Internet Access" newsletter, an in-depth review that gets it. The subscription fee is worth every penny.
David Isenberg, SMART Letter #71

Independent technology writer Steve Stroh again provided his unique blend of comprehensive and informative insights in his newsletter "FOCUS On Broadband Wireless Internet Access.". The newsletter continues to provide personal interpretations on industry developments that are worth knowing – and supporting.
Andrew Kreig, President Wireless Communications Association International, WCAI Bulletin April 11, 2002

Clued-in is Steve Stroh , whose understanding of the technical issues involving wireless broadband is first-rate and fine-grained.
Dana Blankenhorn, A-Clue.com, February 25, 2002

To the increasingly large group of people who talk sense about broadband wireless services, I have to add Steve Stroh. His subscription publication is full of sensible advice born of deep technical and market knowledge. Anyone trying to make a living, start a company, or run a division in which this is your market shouldn't hesitate before subscribing.
Glenn Fleishman, 802.11b Networking News, February 13, 2002

There is a very good writer named Steve Stroh who specializes in wireless technology...
Robert X. Cringely, PBS.com Technology columnist, I Cringely June 6, 2002

*Steve Stroh is *the* most knowledgeable writer about emerging Wireless issues, and is far ahead of the journalistic curve on the growing role of License Exempt businesses, from manufacturers, and Wireless ISPs, to emerging efforts to form national companies aggregating local 802.11b hot spots.*

FOCUS on Broadband Wireless Internet Access

Dave Hughes, Principal Investigator, National Science Foundation Wireless Field Tests

Some Background On *FOCUS*

Since beginning my professional writing career, I have specialized in the emergence of Broadband Wireless Internet Access. Many readers have repeatedly told me how valuable my articles and columns in Boardwatch Magazine, CLEC Magazine, Broadband Wireless Business Magazine, and other publications have been to them in understanding the companies and technologies of the Broadband Wireless Internet Access industry. I've been asked many times if there was any way to read more of what I have written about Broadband Wireless Internet Access. In answer to those readers, in June, 2001 I began publication of a newsletter- ***FOCUS*** *On Broadband Wireless Internet Access*.

FOCUS is founded upon the following tenets:

- Internet technology is becoming the foundation for nearly all communications, commerce, and entertainment services;
- For Internet access to be truly usable, always-on Broadband Internet access is required;
- By the end of the first decade of the 21st century, Internet access will be ubiquitous;
- In the "last mile", wireline-based technologies and systems will generally prove to be insufficient or not cost-effective to provide ubiquitous, always-on, Broadband Internet to most homes and businesses;
- In the near term, Broadband Wireless Internet Access in all its forms – Sub 11 GHz, Above 11 GHz, Free Space Optics, Ultra Wideband, Licensed, License-exempt has emerged as the most likely technology to provide cost-effective, ubiquitous, always-on Broadband 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 in the Broadband Wireless Internet Access industry is significant. ***FOCUS*** is not an investment newsletter, merely recommending or highlighting particular companies for their investment potential. Each issue contains a number of original, in-depth articles and news stories. ***FOCUS*** is a just-in-time, short-lead-time publication, using Adobe Acrobat (.pdf) format, and email distribution

In every issue, ***FOCUS*** *on Broadband Wireless Internet Access* will profile the companies, technologies, and developments that are creating the Broadband Wireless Internet Access industry. FOCUS' coverage is independent and accepts no advertising; FOCUS is entirely reader-supported. Key events such as Broadband Wireless World Forum and Wireless Communications Association International's Summer Tradeshow and Winter Technical Symposium, and other significant wireless and Internet events will receive extensive coverage in FOCUS. I intend that ***FOCUS*** *On Broadband Wireless Internet Access* will be in a state of continuous evolution. My promise to readers is that ***FOCUS*** will be relevant, honest, and interesting.