

TECHNOLOGY BRIEF

INSIDE THIS ISSUE:

<i>WiNOG</i>	1
<i>ISPCON Discounts</i>	2
<i>WiMAX Adopters...</i>	3
<i>FCC Clarifications</i>	5
<i>Backhaul Bash II</i>	6
<i>Technolog-E-Advice...</i>	8



Special points of interest:

- Maxed out on WiMAX? Want to know more about WiMAX, but overwhelmed by the marketing hype? Read Part V - the conclusion of our WiMAX Update Series.
- WiMAX Trends is the leading information gateway for WiMAX, based on the IEEE 802.16 standard for wireless MAN technology. www.wimaxtrends.com
- What's the best radio for the job? Trango? RedLine? Canopy? RadWin? Tranzeo? Mikrotik? Orthogon? Want to know the "hidden secrets" that salespeople "conveniently forget" to tell you about? Check out the "Backhaul Bash" eXchange this month at ISPCON Spring 2005 in Baltimore, MD. www.ispcon.com

WINOG-PARK CITY, UT: AUGUST 15-17, 2005 PUBLIC VS. PRIVATE OPERATOR DEBATE

The Phenomena of Municipal Broadband Networks

Long considered the domain of private-sector enterprise and the FCC, broadband access has emerged as an essential concern for America's local government. John Eger, professor of communications and public policy at San Diego State University tates that "Cities of the past were built along waterways, then highways...today, with information highways... Cities that don't have these broadband infrastructures of our time will atrophy and die. They will be cut off from the mainstream."

Building public sector (municipal, fire/police, educational) networks is coming to the forefront as a method for fostering economic development throughout the community. Throughout America, both urban and rural local governments are doing whatever it takes to make telecommunications and broadband services – including high-speed Internet connections, telephone service, computer networks, and even cable TV – available to government agencies, residents and business.

Broadband Wireless Technologies (WiFi, WiMAX, Mesh and more...)

Led by the wide-scale adoption of WiFi and the promise of the upcoming WiMAX standard, low-



cost, high-speed wide-area-networking broadband wireless technologies are revolutionizing public communications, spurring economic development and bridging the digital divide. With new wireless networks cropping up across the country every day, it is only a matter of time before one witnesses a massive transformation in telecommunications across America.

Face Off: Public Broadband Networks vs. Private Service Providers

Despite widespread consensus about the importance of broadband, service providers and local governments disagree about how communities should achieve the goal of providing ubiquitous high-speed Internet access. Local governments that have opted to become broadband service providers have sparked intense backlash from the telecommunications industry, with private operators battling municipalities through lobbying, lawsuits, and local and national marketing campaigns to sway the court of public opinion.

As of December 2004, 14 states, Arkansas, Florida, Missouri, Minnesota, Nebraska, Nevada, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Washington and Wisconsin have some passed sort regulation banning or restricting local utilities from providing broadband services.

Arguments against local government as a broadband service provider tend to focus on two fundamental issues: competition and competence. Service Providers claim the competitive playing field is tilted against them when local governments enter the telecommunications marketplace – for example, governments enjoy free right-of-way access and do not need to make a profit.

Others claim that local governments do not have the competence to provide telecommunications, cite age-old "big-government" concerns like that government accounting standards are lax and that

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MAXED OUT ON WiMAX PART V: OPERATORS DEBATE

So, back to ISPCON Fall 2004 (seems like ancient history nowadays), most eye-opening to me was the "Maxed out on WiMAX" ISP/Operator XChange forum. What was to be a brief roundtable discussion focusing on WiMAX evolved into a heated debate that ended only as the janitors threatened to turn off the lights.

Personally, I felt that this discussion was especially important & enlightening, as independent Wireless Internet Service Providers (WISPs) seem to represent the "core early adopter group" of WiMAX product consumption, and their opinion (and their attitude toward this technology) is especially important, as it is generally assumed that they are the ones that will be buying first.

In addition to having a variety of independent ISPs & WISPs from around the country, we were also privileged to have representative from several industry analysts/reporters, BWA hardware manufacturers & system integrators, CLECs, a small ILEC from Northern Michigan, an IXC and a major national ILEC contribute to the discussion.

Below are some of the viewpoints & conclusions that I (and

hopefully others) took away with me from this discussion:

Travis Johnson, President of Microserv Computer Technologies, an independent ISP/WISP located in Idaho Falls, ID with over 6000 dial-up users, 1800 wireless customers, and 600 DSL customers, made the following observations.

1. His #1 goal is to install paying customers, he (and his customer) does not care about how he does it if he does this (via wireline, wireless, or carrier pigeon) – he will install the customer with whatever is the most reliable & cost-effective solution available to him – he is currently installing approximately 60 new fixed-wireless customers / month using a mix of WiFi & proprietary BWA infrastructure.

2. He finds it amusing that the wireless competition spends all their time worrying about the choosing the "right & long-term viable" infrastructure platform; while they worry & wait, he takes their customers, and generates increased cash flow

3. He has learned that hardware selection, in the ISP/Carrier business, is merely a means to an end; in his opinion, reliability & customer service is what makes

or breaks one in this business - and what matters most is a cost-effective, reliable solution that he can deploy TODAY!!!!

4. He is not paying much attention to all the WiMAX hype, because his main concerns are signing on new customers, handling competitive pressures from DSL & Cable, and operating his business...lf/when WiMAX becomes available, and if the combination of the WiMAX feature set and price point is a compelling value proposition, he will overlay his existing system w/ WiMAX (he's already done this before, he has overlaid his original 2.4 GHz WiFi-based system with a proprietary 5 GHz & 900 MHz BWA-focused solution)

5. A veteran of license-exempt BWA deployments (he has been using fixed wireless technology since 1997), all things being equal, given a choice between a cost-effective landline solution (DSL, leased line) versus license-exempt wireless, he would more than likely go with the landline solution.

6. For the independent operator "waiting for WiMAX" simply

(Next Page)

"the WISP (the early adopter of WiMAX) does not care much for WiMAX - although nice, the cost of "the last mile" is his #1 concern, and he will use whatever technology is most cost-effective (via wirelines, WiFi, proprietary, even carrier pigeon) as long as it allows him to cost-effectively deliver reliable service to his customers"

WINOG-PARK CITY, UT: SUMMER 2005 PUBLIC-PRIVATE OPERATOR DEBATE

accountability is limited. In addition, many caution against this course of action, stating that local governments are getting into things in which they have no business or background in.

Public-Private Partnerships: A Middle Road?

As more and more issues get tied up in the legal system, what is clear is that, like in all lawsuits, "only the lawyers truly win." So, what are the options? Rather than wasting resources "fighting amongst each other" – let's meet, work together, and coordinate so that public and private sector alike can leverage each other

In continuing our traditional **EXCHANGE**, WiNOG establishes the forum to bring parties from both sides of the table, public and private, to discuss methods of working together to accomplish the task of "bridging the Digital Divide."

www.winog.com

MAXED OUT ON WiMAX

PART V: OPERATORS DEBATE...

does not make sense. Cable & DSL is being rolled-out all across the country; operators in smaller “underserved” rural markets are also watching the cannibalization of their existing dial-up user base

An independent ISP/WISP, who wished to remain anonymous, stated that in his main town, population~4000, located approximately 75 miles away from a major Tier 1 city, \$26.95 DSL & \$24.99 Cable competition has eaten up almost 50% of his existing dial-up user base (approximately 1200 customers) in the last 8 months

This same operator was an early adopter of BWA technology. He has been deploying fixed wireless utilizing Wi-Fi & proprietary BWA solutions since 2001, and as a result, has had the time to gradually absorb the infrastructure investment required to stay competitive (currently has approximately 500 customers)

This operator, although understanding the inherent limitations of Wi-Fi, currently utilizes and is happy with Wi-Fi based CPE as his primary infrastructure platform, due to his sub-\$200 all-inclusive CPE solution (includes antenna, cables, bridge, etc) and relative sparse customer density. He utilizes external devices (e.g., bandwidth management boxes) to help “tweak” the performance of his system. In areas where basic Wi-Fi cannot perform, (e.g., backhauls, NLoS, premium customers) he utilizes a variety of solutions from proprietary BWA hardware manufacturers like WaveRider, Canopy & Trango.

This operator is fairly skeptical about WiMAX because

1. He needs equipment to install today (if he had been “waiting for WiMAX” instead of deploying in 2001 – he’d be looking for a job in a few months)

2. His current mix of Wi-Fi & Proprietary BWA equipment, although not perfect, work acceptable, with lower price points every day (his Wi-Fi-based system will soon be sub \$150 / complete CPE) allowing him to offer free setups & installs and enabling him to compete head to head against DSL & Cable.

3. The interoperability promised by WiMAX are nice features to have, but the \$700+ CPE price tag does not excite him very much

4. This operator will deploy WiMAX if/when the CPE prices drop to a point that is comparable to his current infrastructure price points (e.g., \$150-250 / CPE)

A CLEC was interested in WiMAX because although he has currently blanketed a market with a Wi-Fi/Mesh system, he is backhauling his Wi-Fi access points with a combination of DSL & leased line solutions, and would like to use WiMAX to eliminate the recurring monthly cost.

An existing WISP/System Integrator pointed out that rather than waiting for overpriced WiMAX product, he can buy a proprietary system today engineered for outdoor BWA for \$1000 / AP and \$400 / CPE to eliminate this recurring cost. By the time WiMAX is available, he will have already paid off his investment

In terms of the idea of investing in WiMAX as a potential exit strategy for the independent operator, the representatives from the ILEC provided some interesting insights:

1. They are actively aware of nimble license-exempt BWA operators “outmaneuvering them” in the field, and want to learn more about the business in general

2. If evaluating potential acquisition targets, their main concerns would be customer & market penetration (total # of customers), cash flow/long & short-term debt, and business operations.

3. In terms of acquisitions, hardware platform used is virtually irrelevant; they stated that there is a 99% probability that due to the inherent risks of license-exempt wireless, they will never deploy a license-exempt fixed wireless system. Even if the operator used a WiMAX-compliant system, they would still have to undergo a “forklift upgrade” as they migrated the new network away from license-exempt products. For the independent operator, the benefits of investing in a WiMAX compliant system from an acquisition standpoint are irrelevant.

4. This ILEC stated that they were not terribly interested in the fixed wireless portion of WiMAX, as their existing DSL & leased line infrastructure seemed to work fine. Plus, they weren’t completely sold on the idea that people would want to install additional fixed wireless antennas on their rooftops. Their major interest in WiMAX was geared towards the mobility aspect and the potential relationship overlap with their existing developing cellular data networks was something that they could not ignore. (this particular ILEC also happens to operate a cellular company that blankets a good portion of the markets that it serves).

www.cwlab.com/wimax

“they (a major ILEC) stated that they were **NOT INTERESTED IN THE FIXED** wireless portion of WiMAX”

FCC RULE CLARIFICATIONS & Q/A

PART I

In the last several months, there has been a lot of exciting news from the FCC. We have the following clarifications based on conversations (and clarifications) from several FCC officials over the last several months.

Part-15 Antenna Substitution Certification Rules

Previously, as long as the equipment manufacturer accepted responsibility for ensuring that substituted antennas were of equal or lesser gain, the system would remain certified. However, “professional installers” (WISPs, Integrators) had no power to legally substitute antennas.

Now, the FCC has clarified that professional installers are allowed to legally substitute certified antennas with lower-gain non-certified antennas. In other words, a WISP could feasibly substitute a different brand of antenna as long as it had similar or less harmful (lower power, tighter beam width) characteristics. For example, a certified 31 dBi 3 foot Radiowaves parabolic dish could be legally substituted with a 29 dBi 2 foot Pacific Wireless parabolic dish.

Section 15.204 continues to state that the transmitter may be operated only with the antenna with which it is authorized and that if an antenna is marketed with the transmitter it must be of a type authorized for use with the transmitter. Type is defined as having similar in-band and out-of-band radiation patterns. Any antenna that is of the same type and of equal or less directional gain as the antenna certified with the transmitter may be marketed with and used with that transmitter. However, we also have Section 15.203 which requires that the transmitter be designed to en-

sure that no antenna other than that furnished by the responsible party (the holder of the grant of certification) shall be used. Except for professionally installed systems, this requires the use of a unique antenna connector. The requirement to employ a unique antenna connector was retained in the recent rule making.

Based on the above, any antenna marketed with the transmitter must employ the unique connector associated with the transmitter. However, the operator of the transmitter may substitute a different antenna as long as the substituted antenna is of the same type and of equal or less directional gain as the antenna's that was certified with the transmitter. The antenna substituted by the operator does not require use of the unique connector described under Section 15.203.

3650 Band Equipment Certification Rules

The newly released 3650 GHz band has a requirement that the radios must be contention based. According to the FCC, the method of contention is up to the industry to decide. This ruling has created some concern amongst potential users due to potential delays from industry formulation of a common “contention based” standard.

According to the FCC, this is **NOT TO BE THE CASE**. The FCC has stated that there will be no requirement for a standard “contention based” implementation before certifications for equipment will be given to a radio manufacturer. The FCC is only looking that the device is designed with some implementation of a “contention based” mechanism for controlling traffic. Each individual certification can propose its individual method of satisfying the “contention based”

requirements.

The FCC has stated that it will only be a couple months before they finalize implementing the 3650 band in the online licensing application and other reasonable administrative tasks related to the band. Manufacturers are welcome to submit requests for certification as soon as they had a product ready to send for certification.

The **ONLY** hold up on using the band is the manufacturer.

This is the band many operators have been waiting for. A semi-regulated band with allowances for higher output levels makes this a band made and designed for operators.

The FCC is not going to delay certification of 3650 equipment until the industry players agree to a single consensus approach to implementing the "contention-based protocol" requirement. As with the 2.4 GHz band, with BlueTooth, WiFi, and other standards, we can envision the possibility of more than one co-existing protocol. Ideally, from a technical efficiency standpoint, different protocols would work well together to maximize the throughput for all users in the band.

In regards to process, equipment certification and the non-exclusive licensing have to occur before anyone can use the band. On the equipment side, the folks at the OET Lab are available at any time to sit down and talk with manufacturers about possible equipment for use in this band. On the licensing side, the Wireless Bureau is moving forward but we can't give you a timeframe at this point. Stay tuned.

“the FCC has clarified that professional installers are allowed to legally substitute certified antennas with lower-gain non-certified antennas.”

CWLAB “BACKHAUL BASH” ROUND 2 EXCHANGE SESSION @ ISPCON



The Definitive Event for Wired & Wireless ISPs

CWLab, the Broadband Wireless industry’s real-world consumer reporting and independent equipment testing organization, will present an exclusive evening Pre-WiMAX Equipment Review Workshop at the ISPCON eXchange session this May in Baltimore, MD.

This four-hour workshop, presented by Charles Wu and Anton Kapela, will provide an independent 3rd party comparative review, based upon REAL-World implementation and field testing, on the capabilities of various high-capacity broadband wireless backhaul and bridging solutions available on the market today. Presentation material will give participants an in-depth and comparative “nuts-and-bolts” view of “the good, bad and ugly” of each system. Each backhaul system presented will undergo the following implementation scenarios and comparative testing criteria:

1. Measurement / Comparison Criteria

- Product Overview / Pricing (MSRP)
- Physical Implementation Overview
- RF PHY Overview
- Operational Overview
- Management Overview
- Manufacturer Specified Performance
- “Real-World” Performance Testing
- Application TCP Throughput
- Maximum Two-Way, Non-Application TCP Throughput
- Maximum One-Way, Application TCP Throughput
- Throughput “Blast”
- Round-Trip Time Measurement
- Round-Trip Time Measurement of Maximum One-Way, Non-Application TCP Throughput

2. Field Implementation Scenarios

- 50 foot “controlled” Lab Setup (for best-case benchmarking purposes)
- 5 mile Line-of-Sight Real-World Setup
- 30 mile Line-of-Sight Real-World Setup
- 5 mile Non Line-of-Sight Real-World Setup (if applicable)
- Round-Trip Time Measurement of Maximum Two-Way, Non-Application TCP Throughput
- Round-Trip Time Measurement of Maximum One-Way, Application TCP Throughput
- Round-Trip Time Measurements in the presence of Constant-Bit-Rate Packet Flows (5 Mb / 10 Mb)

3. Performance Testing Criteria (to be performed and documented in each scenario)

- Maximum One-Way, Non-

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“will give participants an in-depth and comparative “nuts-and-bolts” view of each backhaul system...”





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July 19-20, 2005

**Location information for each session will be provided after registering.*

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Thank you.

-The Motorola Training Team.

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The other day, I started researching some theories on how I could have “accidentally” forgotten to publish last month’s newsletter. Not surprisingly, all roads pointed in one direction.

The Discounted Expectancy Theory of Procrastination

It suggests that the reasons why people make any decision can be largely represented by the following equation:

$$Utility_i = \frac{E_i \times V_i}{\Gamma_i D}$$

Utility indicates preference for a course of action. Naturally, the higher the utility, the greater the preference. On the top of the equation, the numerator, we have two variables: Expectancy (E) and Value (V). Expectancy refers to the odds or chance of an outcome occurring while Value refers to how rewarding that outcome is. Naturally, we would like to choose pursuits that give us a **good chance** of having a **pleasing outcome**. On the bottom of the equation, the denominator, we also have two variables. G refers to the subject’s sensitivity to delay. The larger G is, the greater is the sensitivity. Finally, D represents Delay, which indicates how long, on average, one must wait to receive the payout. Since delay is in the denominator of the equation, the longer the delay, the less valued the course of action is perceived.

How does this theory related to procrastination? Essentially, we are constantly beset with making decisions among various courses of action. Should we spend money on that marketing campaign? Should I go through and finish up that (much needed) network documentation? Discounted Utility Theory suggests, unsurprisingly, that we are more likely to pursue goals or tasks that are easier and that we are likely to attain. Consequently, we are more likely to put off, to procrastinate, difficult tasks with potentially larger uncertainties.

Even more important regarding procrastination is the effects of delay. We like our rewards not only to be large but also to be immediate. Consequently, we will most likely procrastinate any tasks that are unpleasant in the present and offer recompense only in the distant future. In other words, we would be more likely to put off higher priority tasks (upgrading infrastructure, renumbering those IP addresses, routing) if there are options available that lead to more immediate rewards with more remote costs.

The following prototypical example is put forth: the operator’s need to implement proper networking practices and documentation during a period of rapid customer growth. The operator has been building his network for several years now and for the sake of simplicity has always just “bridged-in” new network elements and kept configurations “in-his-head.” The operator likes turning on new customers (increases revenue), but also realizes the necessity in taking the steps to build a robust and scalable network infrastructure.

Since the reward for adding new customers is always in the present, it will maintain a uniformly high utility evaluation. For working on a “seemingly-ok” network, the reward is distant, diminishing it utility. Only when the operator is in Disneyland with their kids, and the next virus strikes thus melting down the entire network does the switch in motivation occur, leaving scant time for concentrated efforts (to little to late). It is quite likely, that during this “final hour,” that earnest but empty promises (i.e., intentions) are made to start working earlier next time.

-Charles