



the **WiMAX** Guys

US INTERNET
Get Your Net's Worth™

Wireless Technical White Paper

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Introduction

The WiMAX Guys, in conjunction with our strategic partner, US Internet, provides wireless networking installation, management, and service to hospitality companies wishing to provide public or private wireless hotspots. Our complete solution encompasses not only the installation of world-class commercial wireless equipment, but also high-speed Internet connectivity, easy-to-use wireless and user management capabilities – including user authentication and a Web portal ready for advertising use – 24/7 help desk support, remote management and comprehensive break/fix programs to keep your network running smoothly. In addition, property employees can be supplied with spam-free e-mail.

We provide the property manager the flexibility to charge for access, to provide wireless access for free, or to set times of day or days of the week during which to charge.

The system also has the capability to integrate with Ethernet wire and coaxial cable installations. Our solution also meets stringent industry standards for security.

This white paper discusses some of the technical aspects of The WiMAX Guys/US Internet wireless solution.

Wireless Network Components

Our standard wireless network setup includes three main components:

- An external connection to a high-speed Internet line
- A network Gateway/Portal
- Backend software to handle authentication, advertising, security, remote management of equipment and other services

Broadband Internet Connection

We can utilize any kind of high-speed Internet connection, including DSL lines, cable broadband, and T-1 lines. Our partner US Internet often can provide this connectivity as part of a service bundle, but we can also use existing connections or connections installed by other vendors. It is, however, mandatory that the service provide a minimum of two static, routable IP addresses.

Network Gateway/Portal

External IP addresses are assigned to the external router and the Gateway/Portal unit. This unit uses Universal Address Translation (UAT) which enables the unit to interact with host computers that have static addresses as well as proxy settings assigned. This capability means fewer problems for your guests, since it allows your network to accept any client configuration and doesn't force guests to change their default network, e-mail, or browser settings.

To use the network, a guest simply starts his or her Web browser and types in the user ID and password assigned at check-in. Front desk personnel use a Web browser to create guest IDs and passwords, and can assign a length of stay. At checkout time on departure day, the guest's wireless account is automatically disabled. Guest records are retained for 30 days by default. Properties wishing to retain records longer can use our optional backup services to maintain them for months or indefinitely.

Properties with existing wired networks have the option to manage all guest access through the Gateway/Portal, presenting a unified guest experience.

Backend Software

We recommend that regardless of whether a property is charging for wireless service, all guests should be required to log in using credentials given to them at check-in. Guest authentication is handled through the Gateway/Portal, which communicates with a RADIUS server at US Internet's state-of-the-art data center in Minneapolis, Minnesota. For more information, see the section entitled *The WiMAX Guys Solution Meets Highest Standards – Backend Hosting* below.

When a guest connects to the wireless network and opens a browser, he or she sees a customizable log in page that can display the property's identity and can include "walled garden" links – links that even unauthenticated users can follow. These walled garden

links might be to your reservations Website, local advertisers, or other defined destinations.

The Gateway/Portal unit locally loads the login page information via the backend server which it then transmits to all new hosts upon connection and prior to allowing access. Once the guest provides user ID and password the Gateway/Portal connects to the backend server to authenticate the guest.

When credentials have been authenticated a security token is passed to the guest that allows them access and redirects them to a predetermined “landing” page located on a secondary backend server. This page is fully customizable and is most often used to display property information, terms of use, preferred links to associated vendors, as well as providing advertising revenue opportunities. A full range of Web portal services are available for this landing page, including:

- Event calendar
- News and announcements
- Frequently Asked Questions (FAQ)
- Contact information
- Real time chat
- Polls
- Customizable News Page

This last feature, a customizable news headline page, can be a real differentiator for properties. It allows the property or even the guest to customize a page that displays news headlines from sites such as CNN, C|Net, the New York Times, Business Week and other Internet sources.

Wireless Infrastructure

The WiMAX Guys and our partner US Internet utilize the latest Wi-Fi technologies to ensure the efficiency and security of your wireless network. In addition, our solution minimizes the number of Access Points (AP) necessary through the use of equipment with the highest reach and sensitivity in the industry. In addition, our solution has no moving parts – no on-site computer to possibly break and require maintenance. All our equipment is solid state and commercial grade. Authentication, user creation/management, and network management is all done through the facilities of US Internet, an Internet Service Provider (ISP) with a top five nationwide footprint and award winning reliability.

Security

Enabling true end-to-end security in a public hotspot environment is problematic. Your guests will have computers of all shapes, sizes, and configurations, using wireless networking capabilities from a wide variety of vendors, with a wide variety of security capabilities.

By requiring log on for wireless network use, our solution removes immediately the ability for random hackers to quickly and easily attach to the network. Should an

unauthorized person gain access, our use of PSPF (Public Secure Packet Forwarding) denies all inter-client traffic, thus isolating each user from the others.

The integrated firewall in the Gateway/Portal ensures network security by isolating your network from the Internet. In addition we deactivate all wireless administration features upon completion of installation to prevent tampering and unauthorized usage. **Note:** *Although the Gateway/Portal has a firewall, we require an external dedicated firewall between the Internet and the property's networks. If an existing property firewall meets our requirements it can be used; otherwise, we can install one.*

Those guests requiring encrypted over-the-air communications can use an Ethernet/Wireless bridge we can provide. This pre-configured unit plugs into the Ethernet port on the guest's PC and connects him or her to the wireless network. Since the bridge is under our control, we can configure it to encrypt the wireless traffic.

Optionally, The WiMAX Guys can offer a wireless intrusion detection service. We install wireless sensors on site and monitor anomalous activity using equipment and personnel back at the US Internet data center. We can identify and block many kinds of wireless attacks. For more information, see the section entitled *The WiMAX Guys Solution Meets Highest Standards – Intrusion Detection* below.

Physical Connectivity

Each wireless access point must be connected via wires to the Gateway/Portal. Most providers use the typical Ethernet/Category 5 wired solution to accomplish this. This solution is adequate for most installations. However, where stringing new cable is problematic or expensive, we can employ a new technology that can utilize a facility's existing Coaxial TV cable network to provide connectivity. This option provides a two-fold advantage:

- Cost reduction
- Increased security

Since this method utilizes the existing coaxial network, the installation time is reduced by more than half as the need to run cable to the access point locations is all but eliminated. The cost of the equipment necessary to utilize this technology is often far less expensive than the installation of new Cat 5 cable as well.

In addition, using coaxial cable allows for the designation of a specified "channel" for network transmission. That channel is then split to completely separate the transmit portion of a signal from the receive portion. This makes network "snooping" virtually useless as all transmissions to and from a host are disassociated.

The WiMAX Guys Solution Meets Highest Standards

Our solution meets the most stringent requirements in the hospitality industry. The following section goes into more technical detail of the features of our equipment and services.

- **Meeting Rooms:** All wireless meeting rooms are provided with at least one dedicated Ethernet/Wireless bridge for guests without wireless cards.
- **Guest Rooms:** Because some guests are restricted from using wireless access by their employers, The WiMAX Guys can, at the property's request, wire a certain percentage of the guest rooms. We can do this either by pulling Ethernet cable to the rooms or by using the existing coaxial cable plant to provide wired room access as previously discussed.
- **Public Areas:** We can include one or more public areas in the property's wireless coverage. At the property's discretion, we can enable the property to charge for use of wireless Internet access in public areas for non-guest users.
- **Always On, Always Available:** The wireless connection is "always on," and our support makes sure it is available 24/7/365.
- **Troubleshooting and Support:** The WiMAX Guys can provide troubleshooting support for guests through use of a support telephone number. At the property's option, the first call can be directly to our support line and the number can be included on signage in the guest room or in the Guest Services Directory. Property staff will be given clear procedures to follow if they are providing troubleshooting advice.
- **Minimum Speeds:** Guests can expect minimum speeds as follows:
 - **Wired – to the Guest Room:** Our wired solution – Cat 5 or coaxial – provides a minimum access speed of 2Mbps sustained concurrently to each guest room from the main equipment room.
 - **Wireless – to the Guest room:** Our wireless solution provides a minimum access speed of 1 Mbps sustained concurrently to each user.
 - **Wireless – Public Area:** Our public wireless solution provides a minimum wireless access speed of 200 Kbps sustained concurrently to each user in the Wi-Fi enabled Public Area, with 1 Mbps or more in a typical installation.
- **Internet Connection:** The WiMAX Guys solution provides a minimum shared connection speed to the ISP of between 384 Kbps (DSL) and 1.5 Mbps (T1). At the property's discretion, The WiMAX Guys can either bundle in this ISP connectivity through our partner, US Internet, or use any existing connectivity, as long as the existing provider can offer a sufficient Service Level Agreement (SLA) to make remote management of the property's network feasible.

- **Backend Hosting:** All our remote services such as authentication and the Web portal are sited at our partner US Internet's state-of-the-art data center.
 - **Coverage:** US Internet offers Internet access in 13,000 locations across the United States as well as providing services world wide, enabling mobile employees and branch offices to connect to the Internet from virtually anywhere.
 - **Connectivity:** US Internet is connected to the Internet by dual OC-3 connections that are carried over two different OC-12 fiber optic SONET networks. Should one connection fail or experience unacceptable response time delay, the other connections have enough capacity to handle our full workload. USI also maintains a copper connection to Sprint in case of catastrophic SONET failure. The USI network is connected to three peering points on the Internet, allowing for a high degree of redundancy and routing flexibility. US Internet consistently places in the top 5% of the Keynote Business 40 Index, which benchmarks website responsiveness.
 - **Redundancy:** US Internet data center facilities are powered by two separate power grids and equipped with multiple 75 kva full-time inline UPSs. In addition, a diesel generator is located onsite in the event of a sustained electrical outage. US Internet also contracts with a mobile power source for generator redundancy.

US Internet offers state-of-the-art firewall and layer 4 switching technology for maximum availability and uptime. All US Internet core services are complete and n+1 redundant, providing maximum fault tolerance.

- **Security:** To prevent unauthorized network access, US Internet utilizes a combination of technical platforms to counterattack all known methods of compromising the core network. Technologies include Cisco PIX firewalls, Router ACLs and Network Intrusion Detection Systems. Firewalls are utilized to restrict access to the network and filters have been added to the routers and the switches. IP restrictions and username/password authentication are utilized where appropriate. US Internet also utilizes a pro-active monitoring platform to proactively determine potential intrusion. These methods individually and in conjunction with each other provide the highest level of security.
- **Compatibility:** Our solution is fully compatible and certified for use on computers using any operating system that supports TCP/IP connectivity. Our wireless and wired connections support the guests' existing Ethernet or Wi-Fi devices through the use of our gateway, which eliminates more than 90 percent of connection problems. Our solution is "plug and play", meaning guests are not required to install any additional software or software drivers or make changes to the networking settings in their computers in order to use the network. The authenticating gateway server can auto-sense static IP addresses for VPN access and provides SMTP routing, outbound spam control, and bandwidth limiting by user.

- **Ethernet/Wireless Bridge:** For those guest room users who are concerned about security in a public wireless network environment or for those properties that have a wireless-only network and want to accommodate users without wireless cards, we can provide a supply of Ethernet/Wireless bridges. We recommend that the minimum number of these devices be equivalent to 10 percent of rooms with wireless access. The Ethernet/Wireless bridge can provide encryption to effectively secure guest traffic between the user device and the wireless access port and vice versa. The bridge requires no software or re-configuration of the user's PC.
- **Wireless Equipment:** The WiMAX Guys only uses enterprise grade Wireless Access Point equipment. Our APs are all remotely manageable and any on-site hot spares are pre-configured for plug and play replacement by property service personnel (building engineers and the like). Remote management of Wireless Access Point configurations is done only over a wired connection, never over the air. The APs are protected and further secured through an SSL connection. All APs are securely mounted and hidden from the public to reduce the possibility of theft or tampering.
- **Supported Standards:** All our hardware and software is industry standards compliant, including Ethernet (IEEE 802.3 series), DSL (ITU G.992 series standards), Wireless (IEEE 802.11 series), and so on. In addition, our equipment complies with Underwriters Laboratory Standards ("UL Standard") and FCC requirements Part 68 and Part 15 regulations regarding connecting to the US telephone network and unlicensed RF devices.
- **Interference:** Our equipment does not cause interference or degradation of service when used simultaneously with other services such as VoIP, VoD, RF devices (for example cordless phones, microwave ovens, and so on) within the property.
- **System Reliability:** At the property's option, The WiMAX Guys can design the system design so that there is no single point of failure. We can ensure that any equipment failure will result in fewer than 10 percent of guest rooms being without service. We can offer Service Level Agreements (SLA) to meet a range of Mean Time To Repair (MTTR) requirements from 2 hour service to next day.
- **Security:** The WiMAX Guys recommends that properties require user ID and password for guests to use the wired or wireless network. As previously discussed, once a guest's credentials have been authenticated, a security token is passed to the guest that allows them access to the network.
 - **Port-to-Port Security:** PSPF (Public Secure Packet Forwarding) denies all inter-client traffic, thus isolating each user from the others. This solution ensures that no guest can access or view the

computer, data or network of any other guest.

- **Property to Room Security:** Property staff members are not able to access or view the computers, data or users in the guest network other than to determine which guests are currently using the network. The property management is responsible for physical security of any router, switch, administrative computer, and other network access points installed by The WiMAX Guys.
 - **Internet to Room/Property Security:** A firewall (either an existing one that meets The WiMAX Guys specifications, or one installed by us) isolates all property networks from the Internet. Users on the Internet cannot access or view the computers, data or users in the guest rooms. *Note: if the property does not currently have a firewall and management personnel routinely communicate with the on-site network remotely, installation of a firewall will require remote users to use VPN technology. The installation of VPNs and the training of personnel in their use is an extra cost.*
 - **Room to Property Security:** The guest network is separated from any existing property management network even though both may share a broadband connection to the Internet. Guests cannot access or view the computers, data or network of the property management LAN through the guest wired or wireless network.
 - **Meeting Rooms to Meeting Rooms:** The WiMAX Guys equipment can be configured so that users in one meeting room cannot access or view the computers, data or users in another meeting room. Additionally, wireless access points installed for meeting room purposes can be configured to not broadcast Service Set Identifiers (SSID).
 - **Public Area and Meeting Rooms to Guest Rooms:** Because all users of the guest network are isolated from one another, users in public areas or meeting rooms cannot access or view computers, data or users in guest rooms.
 - **Property to Property Security:** Typically users at one property cannot access or view another property's computers, data or network. However, at the client's option, The WiMAX Guys can enable multiple sites to be networked together.
- **VPN Support:** The WiMAX Guys solution supports Virtual Private Networks (VPN) for leading industry VPN servers and client software. This applies to common client and firewall software that may already be installed on guest devices.
 - **Intrusion Detection:** At the property's option, The WiMAX Guys can install a system that can detect and mitigate any intrusion into the network that can jeopardize guest security. We place sensors on site that monitor the wireless network and report back to a management device at our partner US Internet. Trained security personnel monitor the alarms from this device and can carry out manual or automatic mitigation steps.

Among the anomalies we can track are rogue access points and Ad-Hoc networking between peers that can have an impact on the overall system performance. We can even identify attackers and lock them out of any other networks in our system, thus providing a way to exclude known attackers from your property as well as others'. Some features of our intrusion detection service include:

- Detect All Rogue Wireless LAN Devices & Activity
 - Access points
 - Wi-Fi user stations
 - Soft Access Points
 - Wireless bar code scanners
- Identify Rogue Behavior From:
 - Ad hoc networks
 - Peer-to-peer networking between user stations
 - Accidental associations
- Detect Documented and Undocumented Attacks Including:
 - Identity thefts from MAC spoofing
 - Man-in-the-Middle attacks
 - Denial-of-Service Attacks
 - Denial-of-Service Attacks with Excessive MAC addresses
 - Dictionary attacks
 - Suspicious Activity & Impending Threats
- Deny Access for Suspicious Users including:
 - Those on our watch list
 - Users making repeated attempts by a station to connect with multiple APs
 - Anomalous traffic from unusual off-hours activity or large downloads
- **Private Network Capability:** The WiMAX Guys equipment can be configured so that certain ports are open or otherwise enable users to share information and thereby create a "virtual LAN" (VLAN). This technique permits users in a conference area to share information with one another, but not with the larger guest network.

Summary

The WiMAX Guys and US Internet offer a state-of-the-art wireless and wired solution at a price point that is very competitive. Our goal is to take the headaches out of providing Internet access for your property. The broad range of options and services we offer allow you to tailor your solution to your needs.

In addition to the solutions detailed here, we also offer wired or wireless digital security cameras and on-site cell phone amplifiers to improve reception at your property. Contact us for more details if interested.

Our unparalleled wireless coverage coupled with comprehensive support services makes our solution the best value in the industry.

For more information or to obtain a quote, please contact Peter Simpson at 952-400-0185 or email BizGuy@TheWiMAXGuys.com.