US INTERNET
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Building a City-Wide Wi-Fi Network in Minneapolis from the Outside In

Raising After raising $48,000 over a decade ago with the idea that there was a better way to offer broadband and Internet-based services, US Internet was born. Since that time, US Internet has evolved from a local Internet Service Provider ISP offering dial-up Internet access, to a thriving business with an international scope - operating points of presence in over more than 4,000 cities around the world.

Most recently, US Internet was selected by the City of Minneapolis to build and operate a 60-square-mile broadband wireless network. The citywide initiative, known as "Wireless Minneapolis," will result in one of the largest municipal Wi-Fi rollouts in the United States. US Internet is allocating more than $20 million to build the network and is deploying some 2,000 BelAir metro Wi-Fi nodes.

The City of Minneapolis will use the network for a myriad of applications for police, ambulance, fire and other public service uses. A departure from "free Wi-Fi networks" sprouting up throughout the country, the Minneapolis network is designed to be a reliable utility for government agencies, businesses and consumers alike. Consumers and businesses will be able to sign up for wireless accounts for $19.99 and $29.99 per month respectively, with access speeds ranging from one to three megabits per second. The network is covering Minneapolis with signals that can be received in 95 percent of the outdoor and 90 percent of the indoor coverage area.

END USER CONNECTIVITY THE KEY

According to US Internet, the in-home CPE (customer premise equipment) was the single biggest issue in the design, deployment and ultimate success of the Minneapolis city network. "In Minneapolis where it's often below freezing, people aren't going to access an outdoor Wi-Fi network in the park like they do in California," said Travis Clark, co-founder and VP of technology for US Internet. "You can have the best Wi-Fi radios on every light pole in the city, but if subscribers in their homes, can't connect, then who really cares?"

Most metro Wi-Fi build outs are constructed from the inside out - starting with the deployment of Wi-Fi mesh nodes throughout the city area to blanket the city with a Wi-Fi signal. But US Internet took the opposite approach - first focusing on in-home devices - so-called "Wi-Fi modems" - that would provide reliable, consistent and adaptable connectivity to the outdoor mesh network. The provider chose the Ruckus Wireless MetroFlex system for this purpose.

"We looked at the metro networks being built and found that almost all of them looked at considered the subscriber last instead of first - with the vast majority of their them focusing on the internal architecture of the WAN mesh," said Carter. "Before we would even commit to building a network with this kind of money, we needed to know that there was an affordable in-home solution that would deliver the kind of user experience that would result in consistent and predictable performance."

COMPANY OVERVIEW

Headquartered in Minnetonka, MN, US Internet was founded in May,1995. US Internet has points of presence in over 4,000 cities allowing it to provide a wide range of Internet, Web and application hosting services. The company also has colocation facilities in Milwaukee, WI, London, UK and Sydney, AU. Its customers come from a wide range of industries and include companies such as Century 21, Coldwell Banker, Jostens and Clark.

REQUIREMENTS

- Consistent upstream throughput from home to outdoor node
- Long-range connectivity
- Adaptability to interference
- Remote management of in-home Wi-Fi modem
- Automatic firmware updates
- Visual troubleshooting LEDs
- Dual zone (simultaneous Wi-Fi receiver and access point) support
- User self-installable
- Low-cost

SOLUTION

- Ruckus Wireless MetroFlex

BENEFITS

- Predictable connectivity
- Faster installation times
- Self-installable in minutes
- Eliminated a truck roll
- High performance uplink speeds
- Automatic interference avoidance and interference rejection

ruckus™
WIRELESS

Among US Internet's four major main requirements for a Wi-Fi modem were low-an affordable cost, stability, uptime and remote management capabilities. According to US Internet, one of the biggest barriers to building a profitable business model for metro Wi-Fi networks centered on end user support. "To construct a profitable business model, the Wi-Fi modem can't be expensive to purchase or support," said Carter. "This has been the fundamental flaw that many carriers have failed to take into consideration. The CPE is typically an afterthought."

Another essential criteria criterion was the uplink speed from the subscriber home to the outdoor Wi-Fi node. Within metro Wi-Fi environments, a good user experience is often dictated by the speed at which they connect to the outdoor mesh, as opposed to the downlink speed or signal strength coming from the metro Wi-Fi network.

Outdoor mesh nodes (in the United States) typically operate at one watt and can blanket a good-sized area with a Wi-Fi signal. But client devices, such as laptops and PDAs, have low-powered radios., which This often results in slow performance, Wi-Fi signals deterred by interference or massive fluctuations in throughput. In addition, the orientation of the laptop can negatively affect performance, forcing users to move their laptops in a different direction to achieve better throughput.

FIXING THE PROBLEM(S)

To fix these problems address these issues, US Internet has standardized on the Ruckus MetroFlex system. Purpose-built as a high performance Wi-Fi modem, the Ruckus MetroFlex integrates patent-pending smart antenna technology, known as BeamFlex. BeamFlex is a high-gain, directional antenna array that continually selects the best antenna for sending or receiving a Wi-Fi signal.

With this capability, the Wi-Fi uplink to the metro node remains consistent and high performance. Placed virtually anywhere inside the home, the Ruckus MetroFlex provides a reliable connection in any orientation to the best performing metro node without user intervention. Unlike other Wi-Fi modems on the market, the Ruckus MetroFlex provides a high level of receive diversity to increase the reliability of signal reception - and is capable of receiving a signal down to -99dB.

US Internet also selected the Ruckus MetroFlex system due to its ability to mitigate and avoid interference. Not only does the MetroFlex focus RF energy in a specific direction - based on best path algorithms - when transmitting, based on best path algorithms, it effectively ignores interfering signals that it detects. Conversely, the system changes receive antennas on-the-fly when there is interference from obstacles such as trees, people, microwave ovens, cordless phones and other RF interferers. "You just don't find these sorts of features and functionality in low-end consumer products or even high- end enterprise system products. But they become essential when trying to operate a large-scale production Wi-Fi network," said Carter.

US Internet is offering subscribers the Ruckus MetroFlex for purchase or for a nominal monthly lease price. Preconfigured, subscribers self-install the device in a matter of minutes. "Two huge benefits this system gives us is are being able to eliminate technicians having to install the gear onsite and being able to remotely manage the devices. And as new features and functionality come to market, these systems can be automatically upgraded," concluded Carter.

As a result of working with Ruckus, US Internet estimates that it will reduce costs spent on installation and truck roll visits by 50 percent or more. Additionally, with the system's remote management features, the company can troubleshoot problems in real-time as they occur, so subscribers experience little to no downtime. "Choosing Ruckus is a win-win for us and our subscribers. The optimal experience we can deliver should result in more people subscribing to the network, and we can focus our efforts on marketing the system, rather than continually trying to fix or improve it."

"People haven't yet realized that this entire exercize in building outdoor Wi-Fi networks is CPE driven and that's where the focus should absolutely start."

"You can have the world's best Wi-Fi node on every pole in the city but if users can't get on to the network from inside their homes, who really cares?"

Travis Carter
VP of Technology
US Internet