

# **Mad City Broadband Case Study:**

## **The Xicom Purpose-Built Network Approach**



## Muni-Wi-Fi: One Size Never Fits All

Municipal Wi-Fi networks have undergone a significant transformation since early 2005, when it seemed the future of mobile communications lay in the creation of muni-Wi-Fi networks that spanned dense urban cities to provide free or cheap high-speed data services—even before the masses had arrived.

Many organizations entered the muni-Wi-Fi industry not fully understanding the long-term implications of the “free” model’s cost to network operators. Business models were short-term focused and forecasting models were unrealistic because of the “build-it-and-they-will-come” mentality. Organizations jumped on the muni-Wi-Fi bandwagon despite technical limitations and no industry “best practices.” In short, muni-Wi-Fi networks were a “one-size-fits-all” approach without taking into account the individual characteristics of a market. Service providers were challenged to find profitable business models for an end-to-end solution while their equipment vendor partners were focused on selling a la carte services.

The City of Madison, WI, home to over 200,000 residents and the more than 42,000 students of the University of Wisconsin, began pursuing its own muni-Wi-Fi initiative. The city’s goal was to provide a state-of-the-art wireless network offering reasonably priced broadband Internet for the large student population, transient business travelers and mobile government employees. In January 2005, a local firm named CellNet Technologies Inc. was awarded the contract, to construct a multi-use Wi-Fi network to be deployed within a 10-square mile area of the Madison Central Business District plus nearby Dane County Regional Airport.

## The Industry’s Design Approach

CellNet chose Cisco as their primary vendor for network equipment. Cisco’s best practices resembled a “one-size-fits-all” or “canned” approach. Each router’s antenna covered a 360-degree circle, overlapping coverage areas with its nearest neighbors (to avoid interference in the overlap, the access points use different channels – depicted below are three different colors: pink, beige, and blue).



Cisco’s traditional mesh architecture, while simple, also presented CellNet with some disadvantages. They included:

- A “waste factor” as the same area was covered multiple times with varying frequencies.

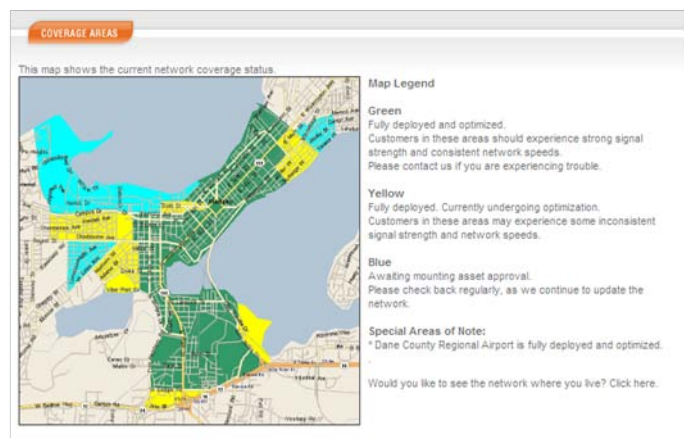
- A topology engineered on the assumption that the subscriber population was evenly distributed. That was not the case. The denser areas of the population were under-served in terms of capacity, while the sparser areas were over-killed.
  - Bandwidth injection points, via wireless injection, caused frequency overlap, noise and interference impacting performance.
- While the world is three-dimensional, traditional mesh networks typically work in two dimensions. The coverage area may roll over hills or mountains or users may be on the 30th floor of an office tower.

Due to these limitations, a CellNet RF Engineer was tasked with providing an alternative architecture for a head-to-head trial deployment. While incorporating certain aspects of the Cisco design he also specified licensed point-to-point microwave links between rooftop “drop-off” locations. 5.8 GHz unlicensed point-to-point links would then distribute bandwidth from the rooftops to central street-level Cisco nodes. The internal Cisco mesh radios would next distribute bandwidth to “clusters” of street-level access points.

Ultimately, the CellNet design provided better performance and reliability in a test deployment and was chosen. Ironically, CellNet did not realize it was one of the first pioneers in this evolving industry to design a hybrid network to better suit the market’s needs. The final CellNet design was approved in the winter of 2006 and pre-deployment planning began.

### “Trial and Error” Deployment and Its Challenges

In March 2006, CellNet began the deployment of distribution infrastructure in the central business district using licensed backbone links, fiber optic links, and unlicensed backhaul links which connected parts of the mesh to the centralized Cisco Access Point (AP) Controller. Multiple technologies were used to compensate for nodes located in difficult RF environments. At the street level, the 5.8 GHz “backfire” links and Cisco access points were deployed on and powered through City of Madison utility poles. The first phase of network deployment was officially completed in late 2006.



However, the network’s first year was plagued by issues typical of those faced by many muni-Wi-Fi deployments that hindered true commercialization:

- CellNet’s design required the use of many advanced features, yet the technically immature Cisco APs (lab tested only) needed frequent experimental firmware updates to utilize these features.

- Excessive RF interference from the 5.8 GHz unlicensed link prompted CellNet to replace them with selectable 5.4 to 5.8 GHz gear, providing decreased RF interference, increased performance, and advanced, user-friendly management software.
- The largest network issues stemmed from third-party authentication, OSS and BSS services.
  - Long-lasting subscriber outages resulted from numerous authentication platform issues.

CellNet felt it had lost control of its subscriber activities and revenue stream. Cisco recommended Broad Hop's Subscriber Management System combined with Cisco's SSG (Secure Services Gateway) enhancement to IOS. However, the out-of-the-box solution only provided "opportunistic" hot zone services utilizing built in templates to perform the basic functions needed. CellNet invested an additional \$300,000 on basic network upgrades for hotzone services only, and the Madison network began to offer some stability. Because of the network instability, true commercialization was not as important as subscriber retention.

### **The Evolving Muni-Wi-Fi Model: Mad City Broadband is Born**

In early 2007, Cellnet decided to primarily focus on automated meter reading services. Management decided to sell its interest in the Madison network to former CellNet CEO, Lewis Kek. The company known as Mad City Broadband was born.

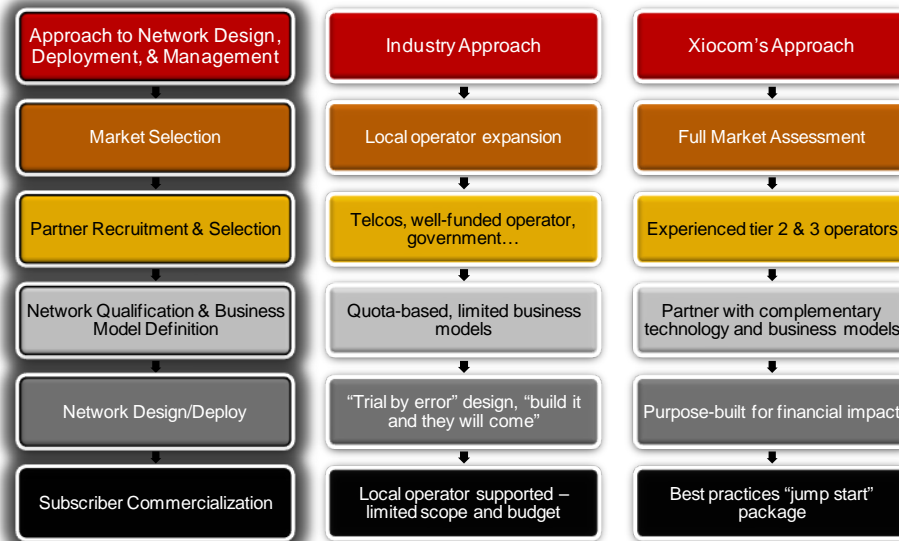
The Mad City team began moving away from an Internet delivery platform, toward an applications delivery platform supporting a "purpose-built" approach. Their goal was to deploy "outside in" Wi-Fi HotZone coverage of MTU/MDU (Multi Tenant Units/Multi Dwelling Units) market segments, (approximately 48,000 of Madison's households are rental units), targeting the large student and government populations. Revenue came from direct tenant subscribership with a "revenue share" to property management or from a wholesale "per unit" monthly recurring revenue model. This brought Mad City Broadband a large surge of revenue once the first properties began to come online in mid 2007.

Although Mad City Broadband experienced several challenges along the way, it continued to follow the standard industry approach. Primarily focused on hardware/software sales, professional services and system integrations they relied on selling a la carte services versus a full end-to-end solution. Ultimately, the singular focus on network operations with trial and error product selection, impeded the vision for future market driven product offerings. Soon thereafter, there was no investment money left to fund the network's growth. Mad City Broadband/CellNet's total investment was \$1.5 million.

### **Xiocom Implements Best Practices Approach with Mad City Broadband**

By mid 2008, the Mad City Broadband team was operating in the red. Cisco was again contacted to see if any perspective investors could come forth. Cisco referred Mad City to Xiocom Wireless, an Atlanta-based global provider of integrated wireless broadband solutions to network operators in under-served markets. In August 2008, Mad City was acquired by Xiocom Wireless, providing some much-needed funding.

Xiocom implemented its best practices approach, treating the Madison market as a new market.



Xiocom re-assessed the market and the business requirements working collaboratively with Mad City Broadband's in-market team to evaluate the gaps and capabilities required to meet market needs. Xiocom then directly moved away from the "one-size-fits-all" strategy to implementing design, deploy, integrate and manage tactics:

- Placing wireless routers strategically to offer more reliability and the ability to layer in advanced services
- Upgrading all of the access points to provide "next gen" wireless capabilities as well as more efficient routing and subscriber capacity
- Upgrading the subscriber management system and the Cisco edge and core routers to Cisco ISG (Intelligent Services Gateway)
  - Allowing implementation and enforcement of QoS and VLAN based services such as rate limiting, tiered and dedicated bandwidth services, video and VoIP services
  - ISG and BroadHop greatly improved customer self-service and self-provisioning capabilities, and paved the way for future QoS-based product offerings as well as "triple-play" (phone, Internet, video) bundle options
- Fortified the network with licensed, terrestrial and unlicensed links to support the tiered bandwidth required for market-driven product offerings
- Reassessed fixed CPE installation practices for business and residential, including self-install
- Executed MDU/MTU build-outs from pre-existing signed contracts

The benefits of Xiocom's best practices approach entailed:

- Designed and built for immediate financial impact and plan for future expansion
- Utilized appropriate technologies (mesh, PTMP, hybrid)
- Designed and deployed on an end-to-end solution
- Provided network and project management

- Supplemented operator people, process, and systems, while training existing resources

Today, Xicom's Mad City Broadband is executing true commercialization best practices to drive incremental revenue. With a host of forward-looking services, application offerings and an optimized "next gen" network, Mad City Broadband is poised to become a highly profitable Wi-Fi network.

Once a full market assessment was completed, and in parallel with the network upgrade, the sales and marketing teams quickly created plans and programs to support a rapid commercialization effort utilizing Xicom's best practices "tuned" to best fit the Madison market and culture. Mad City Broadband implemented the following tactics:

- Targeted expansion areas based on revenue potential
- Identified key prospects to pursue, formalized a sales funnel and began working new prospects
- Developed direct and in-direct sales programs
- Standardized sales process across systems, people, etc
- Met with the city to discuss anchor tenancy plans
- Reassessed current product offerings, created market-driven product offerings, including pricing and promotions to targeted segments, and developed a solutions roadmap to fill in the gaps
- Identified strategic solution partners to complement the existing and future product offerings
- Created sales and marketing tools to increase subscriber acquisition:
  - A web-based captive portal or splash page
  - ROI-driven marketing programs
  - Sales and marketing support materials
  - A new sales program manager whose task is to optimize the sales force

The impact of Xicom's "best practices" sales and marketing launch approach jump started subscriber acquisition efforts. In addition, Xicom provided value added services, like marketing, sales, and professional services to supplement operator needs, while training existing resources, ensuring faster and sustainable growth.

### **Xicom's Purpose-Built Network Approach Is Proven**

Xicom has had the opportunity to watch and learn from the industry's shortcomings. They utilized a "build-as-you-grow" model balancing the right mix of people, processes, and performance to drive lower Total Cost of Ownership (TCO) for Mad City Broadband. By partnering with best-in-class providers to train and develop mission critical skills, in market, they ensured a sustainable and cost-effective approach to resourcing the ongoing business requirements. This approach enabled a highly local and be-spoke broadband network which served the specific market needs.

In addition, unlike many hardware/software providers in the industry focused on a la carte sales, Xicom's unique business model focused on the operator's economic returns, driving active subscriber acquisition, thereby increasing revenue and margin per subscriber. Implementing best practices in design, deployment, integration and management has allowed Xicom to capitalize on Mad City Broadband's existing infrastructure and allow the City of Madison to reach its vision as intended.