



Chaska.net
Chaska, Minnesota

A Case Study



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Brad Mayer
Information Systems Manager
Chaska, MN

Introduction

Chaska, Minnesota is a Wi-Fi technology trailblazer. The community of 18,000 residents south of Minneapolis prides itself on being a "quality small town." Chaska is one of the first communities in the nation to deploy a citywide Wi-Fi network. The goal is to supply affordable Internet access to every resident and business.

Using Pronto Networks' carrier-class operations support system (OSS), Chaska quickly and cost-effectively set up, and now centrally manages, a secure wireless broadband network that spans the city's entire 16 square miles. To date, up to 850 users have shared the Wi-Fi network simultaneously with no effect on performance.

Chaska's network is powered by advanced technology from three providers: the OSS and a Hotzone Gateway from Pronto Networks, cellular Wi-Fi mesh technology from Tropos Networks, and point-to-multi-point wireless backhaul connections from Terabeam Wireless. The Wi-Fi network, which is owned and operated by chaska.net, the city-run Internet Service Provider (ISP), links to the city's existing fiber network.

"Our lives revolve around the Internet; it is almost as important as heat or electricity," observes Brad Mayer, Chaska's information systems manager. "The Wi-Fi network gives Chaska the ability to provide students, low-income residents and families with access to Internet learning tools."

History

"Chaska" is a Dakota Indian name often bestowed on a first-born son. The area has been home to Mound Builders, fur traders, brick makers and canners. Modern Chaska is an attractive community just a 30-minute drive from the Twin Cities.

It boasts a historic downtown, four business parks and a fast-growing residential population. Chaska residents prize its small-town ambiance and low-cost, high-quality civic services, including a state-of-the-art community center and a public golf course.

Business Need

Six years ago, Chaska decided that telecommunications providers were not meeting the broadband data needs of community schools. Businesses also wanted more high-speed Internet access than private providers offered.

Chaska operates its own public utility, so it was natural for the municipality to take on the role of ISP and offer the community low-cost telecommunications services.

The city applied for and won an Urban Challenge Grant from telecommunications provider 3Com Corporation. It used the grant to launch chaska.net, the city-owned and -operated ISP. Chaska.net built a wireless wide-area network that augments the schools' T-1 lines and a fiber optic network that connects city industrial parks to high-speed broadband services.

Once schools and businesses were linked to the Internet, the Chaska city council urged chaska.net to extend broadband access to all 18,000 residents.

Development Plan

Chaska.net took time to search for the right Wi-Fi network providers. The ISP wanted mesh network topology with self-healing and self-load balancing features that would limit support staff and lower operating costs. To control system management costs, chaska.net preferred an open-standards-based OSS with features such as bandwidth shaping for prioritizing and managing data traffic, and access control, which would allow different user groups ranging from residents to public safety staff to share the network securely.

"We looked at other solutions and even considered building our own system," Mayer says. "We selected Pronto Networks and Tropos Networks because they offered a turnkey solution. The solution was cost-effective to install and operate, and it had all the functions we required."

The Pronto and Tropos solution is scalable, another distinct advantage. Chaska expects its population to double in the next five years. In addition, nearby communities want chaska.net to supply Wi-Fi services to their residents and businesses.

Business model

Chaska financed the Wi-Fi network with equipment certificates. Under Minnesota law, municipalities can fund equipment purchases with a city council sign-off as long as the payoff does not exceed five years. Chaska.net bankrolled \$650,000 of the capital investment for the project with privately-placed four-year equipment certificates at a 4% interest rate.

The city administrator set a pricing plan of \$15.99 per month for residents and \$24.99 for businesses. The chaska.net price plan is 60% lower than competing broadband services, and at or just below dial-up service costs. The plan represents the lowest possible cost that would allow chaska.net to build the system, cover operating expenses, and pay back its debt.

For the subscription price, residents get 1+ Mbps

Internet access, five free e-mail accounts, and 10 MB of web space. Business users get up to three network connections with 10 e-mail accounts and 20 MB of web space. Business users can choose among wireless, T-1, and fiber connections. Wi-Fi service charges are a line item on subscribers' utility bills, which streamlines the payment process for the city and eliminates the need for users to qualify for a credit card to subscribe to the service.

The service is available to all 7,500 homes in the city and provides mobile access throughout the community. In its projections, chaska.net estimated that 200 customers per month would sign up for the wireless service and that the network would have 1,450 customers the first year and 3,300 by year five. In reality, 2,000 residential subscribers signed up in the first 3 months, despite minimal advertising in a few utility bill flyers and newspaper inserts. The rush of subscribers will help chaska.net pay off its capital debt a year earlier than projected and reach positive cash flow in less than three years.

Solutions

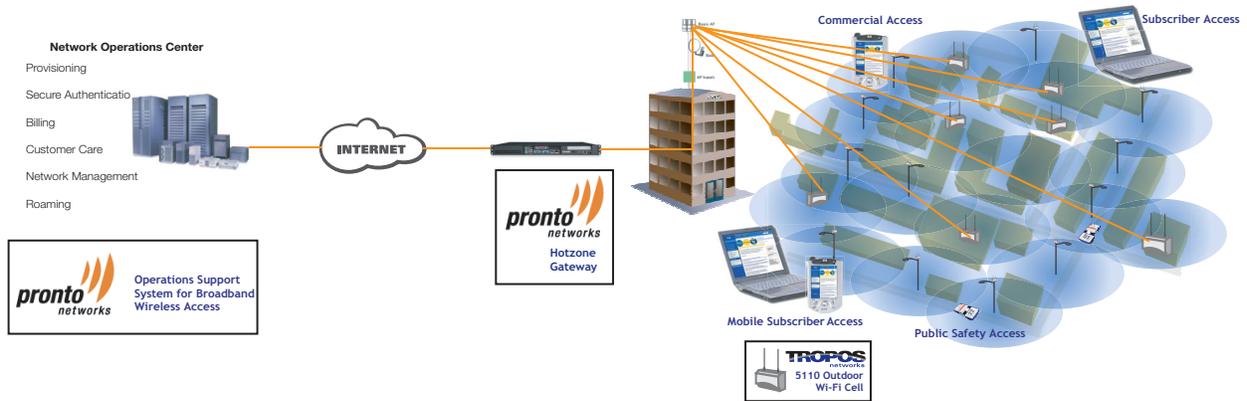
Chaska's metro-scale Wi-Fi network combines interoperable, open, standards-based hardware and software components.

The Pronto OSS, an open, standards-based Wi-Fi service delivery platform, enables operators and system integrators to deploy wireless broadband rapidly and cost-effectively to deliver new value-added services to consumers.

The OSS also enables municipalities to sublet their network to Virtual Network Operators (VNO) who can brand the service as their own. The OSS provides complete back-office functionality for large-scale Wi-Fi deployments, secure authentication and access control, pre-paid and post-paid billing, location-based services, incident tracking, remote subscriber monitoring, and roaming, clearing and settlement.

The Pronto Hotzone Gateway, a 1U access gateway, supports up to 2,000 concurrent users; provides authentication, authorization, and accounting and IP routing functions; and allows users to custom-tailor portals and walled-garden sites, which are browsing environments that control what users can access.

Figure 1: Metro-Scale Wi-Fi Network



The **Tropos 5110 Wi-Fi cell**, an outdoor-optimized and ruggedized wireless mesh router, is based on the 802.11 standard. The Tropos 5110 quickly and economically uses the intelligent, scalable Tropos Predictive Wireless Routing Protocol to provide pervasive coverage over metro areas; routing traffic wirelessly along the highest throughput path to a wired gateway and eliminating up to 95% of the wired backhaul (network data inter-connections) associated with traditional access point solutions.

Terabeam Wireless point-to-multi-point (P2MP) wireless backhaul connections link the wired and wireless networks.

Implementation

In the summer of 2004, chaska.net installed 267 Tropos 5110 Wi-Fi cells throughout the city's 16 square miles. Installation costs were kept low because the city did not have to pay for installers or negotiate tower facility rental rates. Workers from the city's utility installed the cells on city-owned fixtures, primarily streetlights equipped with photocell-switched power.

The Pronto OSS and the plug-and-play Hotzone Gateway were installed on a server in the chaska.net data center. The current configuration can seamlessly manage up to 2,000 concurrent network users. If usage grows beyond that figure, which is likely, chaska.net can simply add additional gateways. Benchmarks show that the scalable Pronto solution can support millions of users.

Backhaul was injected at 42 locations with a combination of Terabeam Wireless P2MP wireless links and connections to the city's fiber network.

As the subscriber numbers grow, chaska.net can add backhaul to increase the aggregate capacity of the network without a long and costly redesign process.

Included in the subscription fee is a low-cost indoor Wi-Fi bridge that chaska.net supplies. It extends the signal from the Tropos WiFi cell into each residence or business.

Subscribers sign on to the network with a password and ID. The firewall built into the Pronto Hotzone Gateway, an integral part of the citywide network infrastructure, authenticates legitimate users and blocks illegal access.

Pronto's support for multiple service set identifiers (SSID) that differentiate one WLAN from another enables chaska.net to brand the initial splash page that network subscribers see. In the future, police, fire, city departments, businesses and other user groups will be able to create their own custom splash pages on the network.

The Pronto gateway also allows chaska.net to carve out a walled garden that permits free, unauthenticated access from the main portal to web sites for the city, community center and golf course.

With the Pronto OSS, there is no need for chaska.net to pre-partition bandwidth. Bandwidth allocation is subscriber-based and part of the service level agreement (SLA).

Chaska.net can assign bandwidth to premium business customers and, at the same time, stop users who share music and video files from hogging the network, an important feature as residential usage grows.



Highlights

- **Wi-Fi network brings Internet learning tools to every Chaska resident**
- **Low service cost puts the Internet within everyone's reach**
- **Metro-scale broadband network deploys quickly at a low entry cost**
- **Pronto Networks and Tropos Networks solution is based on open standards**
- **Chaska can offer custom splash pages and pricing for residents, businesses and visitors**
- **Residents and public safety staff can share the network with secure access**
- **The network is scalable, providing an upward path to growth**

Pronto's broadband wireless platform supports VLANs that allow the network to be separated for public and private use. When Chaska's public safety officers and municipal workers link to the Wi-Fi network later this year, chaska.net can securely segregate the network. The Pronto OSS handles account management for a mix of free and paid subscriptions. Network administrators can also use SLAs to assign priority access to public safety field personnel. And chaska.net will be able to direct any of the unused bandwidth to user groups with premium-level access, just as the city's utility assigns unused electricity during non-peak periods.

Results

The city of Chaska was able to bring a low cost Internet solution to their residents and businesses. "Chaska.net has been a huge success. Residents are very excited about the technology," Mayer says. "Chaska.net has had a better than expected response to the internet service offering, with over 2000 residents

signing up on the first day. As this far exceeded the initial expectation." Pronto Networks addressed chaska.net's changing needs and was able to quickly respond with their scalable system architecture. Pronto Networks allowed chaska.net to adapt efficiently to the large response and accommodate the needs of all 2000 customers.

What Lies Ahead

Chaska.net already supplies wireless services to businesses in towns within a 15-mile radius. Pronto's support for Virtual Network Operators and multiple SSIDs makes it possible to sublet the network to residents in neighboring communities, too. Neighboring cities can either buy bandwidth or offer subscribers a custom splash page.

"Because we are a smaller community, we have a unique advantage in deploying a metro-scale Wi-Fi network," Mayer says. "The system is self-sustaining; it is not a revenue generator. The benefits are intangible: giving low-income students and their families



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access to Internet learning tools and supporting everyone's lifestyles, which revolve increasingly around the Internet."

Chaska.net plans additions to its service plans. Today, visitors who want to use the network must sign up for a month's service. Chaska.net will offer subscription cards that purchase a few hours of service. And future plans will allow Chaska residents who travel to subscribe to a service from Pronto Network's partner, Boingo Wireless®, which connects customers in thousands of airports, hotels, convention centers, cafes and other public locations for one monthly fee.

After police and municipal workers link into the network in this year, chaska.net wants to deploy Voice

over Internet Protocol (VoIP) and streaming video utilizing a service provider. Pronto's standards-based platform allows municipalities to offer these and other services on top of the wireless network. Equipping emergency service workers in the field with wireless phones and cameras would help incident commanders and field personnel share knowledge during emergencies and improve communication between organizations.



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