



# Motorola Gets An A+ From Thompson School District

Loveland, Colorado



Thompson High School tower on a 7,000-foot mountain and powered by solar

Many school districts across the country are faced with the delicate balance of providing new and innovative programs to students while keeping within strict budget guidelines. The Thompson School District in Loveland, Colorado was no stranger to this dilemma and opted to deploy a point-to-point wireless network from Motorola. While a wireless network was a cost-effective alternative to a traditional fiber network, it needed to withstand the diverse and harsh weather conditions this Rocky Mountain community experienced throughout the year. Coming in under budget and being deployed a full year ahead of schedule, Motorola now gives over 15,000 students across 33 campuses high-bandwidth and reliable connectivity.

## Customer

Located north of Denver at the front range of the Colorado Rocky Mountains, Thompson is the 16th largest school district in the state with five high schools, five middle schools and 18 elementary schools in the Loveland and Berthoud areas. The district, comprised of 15,000 students and 33 campuses, is Loveland's largest employer with 2,000 employees.

## Solution Provider

Based in Denver, Colorado, Anyware Network Solutions (ANS) is a value-added reseller focused solely on broadband wireless data networking solutions. ANS works with leading broadband wireless networking manufacturers and service providers to offer wireless network design assistance, knowledgeable sales and technical support, and implementation services in Colorado and the Rocky Mountain states. ANS offers complete turnkey wireless networking services including consulting, site surveys, product sourcing, installation, project management, training and network maintenance.

## Situation and Challenge

In 2001, the Thompson School District outgrew the capacity of its network, which was originally comprised of 47 T1 circuits and 10 Mbps switched Ethernet to the desktop. The district began investigating the possibility of upgrading its existing telecommunications connections, but bandwidth was limited and costs were unrealistic. It also considered deploying a fiber loop that would be provided by a local power company, but that proved to be too expensive as well with estimated costs at \$3.1 million, not including any ongoing yearly maintenance fees.



Loveland High School

In addition to finding a cost-effective solution, Thompson School District needed to overcome several non-line-of-sight (NLoS) issues and span distances ranging from one to 13 miles between campuses. Large overgrown trees in the downtown locations, plus the neighboring mountains, were major obstacles to establishing connectivity. A top priority was to make sure the district had ample bandwidth to accommodate new internet-based educational programs that typically have a high amount of graphics, and a distance learning initiative that would provide videoconferencing and digital video delivery to every classroom. Finally, given the geographical location of the Thompson School campuses, the network needed to be able to withstand a variety of weather conditions year round, including high winds of over 100 miles per hour in the spring, lightning in the summer and blizzards in the winter.

#### Technical Requirements

- Data rates of at least 10 Mbps each way for elementary schools and no less than 30 Mbps each way for all other sites
- Latency of less than 25 ms, based upon the G729 codec used in VoIP
- Stability in challenging environments comprised of obstructions, long distances and inclement weather such as snow, lightning and high winds
- High-bandwidth to handle new Internet programs and a distance-learning application
- Cost-effective solution that could be implemented quickly

#### Deployment Detail and Interoperability

Utilizing systems that operate in the 5.8, 5.4 and 2.5 GHz bands, Thompson School District deployed a combination of 27 Motorola w4 Fixed Point-to-Point (PTP) 400 and 600 Series Wireless Ethernet Bridges throughout the 33 locations. Motorola's Integrated systems were used for those locations that did not have NLoS issues or long distances between them.

For locations that were further than one mile or had obstructions, Connectorized systems were deployed with three- or four-foot parabolic antennas.

Thompson was easily able to integrate the PTP 400 and PTP 600 bridges into its local area networks. With products from two different switch manufacturers, early auto-negotiation problems with the Motorola radios were corrected quickly. Furthermore, planning was easy with Motorola's path-profiling software. Thompson also used non-penetrating sleds/masts for fine-tuning or moving the radios. For example, while renovating a school the radios can easily be moved to accommodate construction, or adjusted as structures are added to the buildings to alleviate any NLoS issues.

#### Results

All of the campuses within the Thompson School District are now receiving more bandwidth than planned. The installation was completed a year ahead of schedule, and by implementing the Motorola point-to-point wireless network versus using an existing fiber loop, the district estimated it saved about \$1.7 million in building and ongoing annual costs. It expects to receive a return on its investment within two years.

The school district's new network is now able to deliver Spanish and other foreign languages to its elementary students using video conferencing and digital media delivery systems. In the future, the district expects to hire four foreign language teachers who will teach to one classroom while using interactive video conferencing to simultaneously teach four other schools. Finally, despite extreme weather conditions, all of the radios have operated without issue.

“Providing our students with all the necessary tools and information, while keeping a careful eye on fiscal responsibility, is a top priority for us. Motorola’s point-to-point wireless network provided us with even more bandwidth than we expected, so we can offer our 15,000 students new and innovative Internet-based programs now and in the future. In addition to overcoming non-line-of-sight challenges and delivering remarkable speed and connectivity, our installation was completed a year ahead of schedule and has saved us nearly \$2 million when compared to a traditional fiber network. To say our deployment exceeded our expectations would be a gross understatement.”

— Derrick Hoffman, Senior Systems Engineer, Thompson School District

#### Why Motorola

- The Motorola point-to-point network provides the diverse school district’s 33 locations with higher than expected data rates at a significantly lower cost than a traditional fiber network.
- Network implementation was completed a year ahead of schedule, and a return on investment is expected within two years.
- The Motorola wireless network saved the school district an estimated \$1.7 million over a fiber network.
- The Motorola wireless Ethernet bridges provide a network that can deliver increased educational options in the future.
- Motorola’s PTP 400 and PTP 600 Series bridges provide reliable connectivity that is sustained during harsh weather conditions.

#### MOTOwi4™

The wi4 Fixed Point-to-Point (PTP) 400 and 600 Series Wireless Ethernet Bridges are part of Motorola’s MOTOwi4 portfolio of wireless broadband solutions and services that help customers improve communications, increase efficiency and enhance customer and public service. Delivering IP coverage to virtually all spaces, the MOTOwi4 portfolio includes wi4 Fixed, wi4 Mesh, wi4 Indoor and wi4 WIMAX solutions for high-speed connectivity over private and public networks.

#### About Motorola

Motorola is known around the world for innovation and leadership in wireless and broadband communications. Inspired by our vision of seamless mobility, the people of Motorola are committed to helping you connect simply and seamlessly to the people, information, and entertainment that you want and need. We do this by designing and delivering “must have” products, “must do” experiences and powerful networks – along with a full complement of support services. A Fortune 100 company with global presence and impact, Motorola had sales of US \$36.6 billion in 2007. For more information about our company, our people and our innovations, please visit [www.motorola.com](http://www.motorola.com).



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