



Northern Michigan University Deploys World's Highest Density Wireless Network

Northern Michigan University has a long history of delivering academic excellence to the upper Midwest.



Originally founded as Northern State Normal School in

1899 with a focus on educating teachers, it grew substantially in the 50's and 60's and was granted University status by the state of Michigan in 1963. The University now serves over 9600 students.

Challenge

Provide reliable wireless LAN access in a dense environment that serves over 6000 students and faculty daily, while maintaining high throughput performance for both 802.11b and 802.11g users

Solution

- Meru Networks Wireless LAN Controller and AP 200s
- Air Traffic Control technology enables much higher densities of students all connecting to the same AP, without resorting to a microcell architecture
- Fair access for both 802.11b and 802.11g clients

Benefits

- Lower number of access points than required for previous 'micro-cell' architecture
- Reliable connectivity for sustained loads of 800 users
- Improved performance for 802.11g clients
- No proprietary client software required

Creating a Cutting Edge Learning Environment for Students and Faculty

Northern Michigan University (NMU) is the first public university in Michigan dedicated to enhancing the learning experience through its Teaching, Learning and Communication Initiative (TLC). Each student is equipped with an IBM Thinkpad® as part of their tuition and fees, enabling faster, more complete access to instructors, fellow students, and notes. The goal of NMU's notebook computer program is to attract students in a competitive secondary education environment by keeping them on the cutting edge of communication and independent learning. Originally, over 16,000 wired Ethernet drops were placed around the campus to facilitate connectivity.

As wireless LAN (WLAN) technology became available in the IBM Thinkpads, the University began adding access points (APs) to open areas and to the Library where Ethernet wiring was either prohibitively expensive or nearly impossible. Over time, additional APs were put in place, as faculty requested wireless access in classrooms that did not have Ethernet wiring. Closely coupled with the need for wireless is the use of WebCT online course management tools. WebCT enables faculty to create a rich learning environment which blends in-classroom learning with online resources. WebCT allows students to submit assignments, review lecture notes, and work collaboratively with other students in the same course. Instructors can create on-line quizzes and then grade them quickly and easily, allowing the student to review their grades securely online as well.

Challenges with Density and Mixed 802.11b and 802.11g Clients

Wireless was working very well for the University until usage in Jamrich Hall increased significantly. Jamrich Hall is a unique brick building on campus with lecture halls on the 1st

floor and multiple classrooms on the 2nd floor. The building frequently serves over 6000 students at one time with 150 to 250 in each lecture hall and 35 in each classroom. On average, the University sees a sustained load of over 800 students actively connecting to the WLAN simultaneously. Such a high density of students in a relatively small space led to significant issues with the WLAN.

To deal with the high density of users, the initial AP deployment used a traditional 'micro-cell' approach. The AP power was reduced so that they could be spaced more closely, in an effort to reduce the number of students per AP and keep the average throughput per user high. "This worked well when the IBM ThinkPads used the AP's software client, as there was a proprietary mechanism for the APs to tell the clients to turn their transmit power down," said Dave Maki, Director of Technical Services. "But when the ThinkPads began using generic wireless clients, they didn't turn down their transmit power and we suffered from a lot of interference issues which resulted in connectivity issues and poor performance. Our students and faculty were unhappy."

At approximately the same timeframe, the IBM Thinkpads transitioned from 802.11b to 802.11g technology. Dave immediately noticed that although the infrastructure supported the higher 802.11g data rates, the actual performance was much lower any time even a single 802.11b client was present. This reduced performance for all, and with such a high density of students using the network having as much bandwidth available as possible was critical.

Meru Networks Enables Unparalleled Density of Students to Connect Wirelessly

With these challenges, Dave went looking for a new solution. He had already tried a newer

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LWAPP-based WLAN solution, but with limited success. At Networld Interop 2005, he learned of Meru Networks and its unique approach to density and mixed 802.11b and 802.11g environments.

"I had heard of Meru's approach to client density and improving 802.11g and 802.11b performance and was intrigued to see if this would solve our issues."

Meru deployed a single Wireless LAN Controller and AP 200's in Jamrich Hall. Meru's Air Traffic Control (ATC) technology eliminated the two issues that students and faculty were experiencing. Because ATC uses deterministic channel access mechanisms, a much higher density of clients can be supported on each AP. And this same method enables fair time-based access for both 802.11b and 802.11g clients, greatly improving performance.

The Meru Wireless LAN System is deployed throughout Jamrich Hall, supporting over 800 students simultaneously on the network, with upwards of 100 clients per AP at certain times of the day. "Meru Networks supported us flawlessly during this deployment. We are very pleased with the performance and will now be rolling out the AP 200s in all high density areas, including the library and other lecture halls."



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