ADC Outdoor DAS Systems are Every Carrier's Choice at MSU

CASE STUDY

A member of the Association of American Universities, the National Association of State Universities and the Big Ten athletic conference, and the nation's first land-grant college, Michigan State University (MSU) has been transforming lives through innovative teaching, research, and outreach for more than 150 years. MSU's campus in East Lansing, Michigan is one of the largest public university facilities in the United States – with 5,200 acres and 553 buildings (including the 75,005-seat Spartan Stadium, Breslin Student Events Center, and the Wharton Center for Performing Arts) supporting approximately 46,000 students and 12,000 faculty and staff on any given day. More than 14,000 residential students also make MSU one of the largest residential campus communities in the U.S.

Urban Density, Rural Coverage

Nearly all of MSU's students and employees carry a mobile device, but the large campus, the large number of buildings, and the population density made it difficult to get good service in many areas. MSU's campus is bordered by farmland on one side and East Lansing on the other, and local service providers AT&T, MetroPCS, Sprint, Nextel, T-Mobile, and Verizon serve the area with cell towers located at the property edges. Unfortunately, these cell site signals don't penetrate buildings or many 'shadow' areas or underground facilities, and they don't consistently provide enough capacity for the campus population.

On a typical day the campus hosts tens of thousands of people, and during commencements, football or basketball games and other events where Spartan Stadium is filled, the campus can easily host over 75,000 people. "We've been told we're one of the bigger coverage problems in the Midwest," says Jeff Carpenter, Planning and Engineering Supervisor for Telecommunication Systems at MSU. "Unlike urban areas like Chicago where they have dozens of cell sites on top of buildings and distributed antenna systems (DAS) nodes for street-level service, our service came only from a few sites at the edges of the campus."

Soliciting Carrier Solutions

Ever since MSU began tackling its wireless service issues in 2004, the university has pursued a hands-off approach. While many universities opt to purchase their own, multi-carrier RF distribution systems and then invite local providers to participate, MSU decided it didn't want to be in the cellular equipment business.

"We aren't a cellular service company," says Carpenter, "so we approached the local service providers and asked them to improve our situation."

In exchange for service provider investments in wireless coverage gear on campus, MSU offered to lease equipment space and to provide the operators access to its 60-mile underground fiber optic network.

"This approach allowed each operator to provide enhanced wireless service for the areas of campus they wanted to cover," says Carpenter. "Every service provider has a different model about where they want to deliver coverage, so it made sense to let each of them do what made sense for their licensed network. And it means we're not responsible for service, management, or maintenance of the systems on someone else's licensed frequencies."

The approach also led to a very efficient use of resources on MSU's part. Carpenter ran the university's side of multiple carrier deployments with help from just one student engineering aide who, while enrolled in MSU's College of Communication Arts and Sciences, gained valuable experience during the process. In-house electrical, roofing, and fiber technician resources from the MSU Physical Plant were also used as they were familiar with the nuances of each building.

Wireless Service Providers Choose ADC

The first operator to provide enhanced coverage was Nextel in 2004, which at the time was a separate company from Sprint. Nextel engineers chose ADC's Digivance LRCS outdoor DAS because it could deliver high capacity and broad coverage from outdoor mounting locations such as poles and cabinets placed around campus. Following Nextel's deployment, and its purchase of Nextel, Sprint deployed an ADC DAS for its frequencies. They were followed by Verizon, which deployed an ADC DAS in 2007 and 2008.

MetroPCS deployed an ADC DAS at MSU in 2008 as part of its initial service rollout in Michigan. Significantly, MetroPCS opted to deploy exclusively with a DAS and save the cost of building large macro towers at the edges of the campus.

Currently, MSU hosts four discrete DAS systems for four service providers, all of which were supplied by ADC. The university is currently in negotiations with the remaining carriers in the local market to deploy DAS on their networks. In addition to the legacy ADC DAS products, operators have also deployed ADC's new FlexWave™ Prism DAS solution. In fact, Verizon recently upgraded its LRCS systems to Prism systems because the new Prism product can support up to four frequency blocks per system, which will enable a smooth transition to serving former Alltel customers who were acquired by Verizon in January of 2009 and will also allow Verizon to be "LTE ready."

ADC Advantages

While Carpenter and MSU were not involved in the selection of ADC DAS solutions for the campus wireless service enhancements, he has found a lot of reasons to like DAS as a coverage model.

"We like DAS because the products use a small amount of fiber, so we don't have to allocate a lot of dark fiber resources," says Carpenter. "We only have a limited amount of fiber in the ground, and the equipment offers CWDM and multiplexing to get the best leverage from it. This allows us to support all these different companies. If every service provider that came in needed a large number of fiber strands to support their solution, we wouldn't be able to accommodate them all."

Another benefit is that the ADC systems are small. The Prism remote unit can support multiple sectors of coverage in one enclosure, and it blends into the campus environment, unlike large cell sites. The DAS remotes are mounted on masts or buildings. The host or hub equipment is mounted indoors, often with the cell site BTS equipment.

"These mechanical spaces are very tight, but the DAS equipment uses a low power, 20-amp connection just like a house circuit," says Carpenter. "It also uses very little space, and it doesn't put off a lot of heat. If a company wanted to put in macro equipment, they'd need much more power, floor space, and air conditioning, and we couldn't do it. As a landlord, the efficient space usage is a blessing because we can find room for several discrete systems in the same building."

Solid Performance, Great Results

The biggest difference for Carpenter since having the DAS systems in place is that the level of complaints about wireless service has dropped to a new low. "People don't know why their wireless service is better; they just know that it works," he says.

While the outdoor DAS has vastly improved in-building coverage, it doesn't fully penetrate underground facilities. For individual departments wanting such coverage, they can negotiate directly with service providers to deploy ADC in-building DAS systems as necessary.

The bottom line is that bringing carriers and ADC on campus has been a win for every constituency—the university, the carriers, and the users. "We were in a unique position to have everything align—the need, the large campus, the poor coverage, the existing fiber, and the revenue model—all these things coalesced to make this a great plan for us," says Carpenter.

In fact, Carpenter is sold on the DAS architecture as a result of the experience. "I think we've just seen the infancy of DAS," he says. "I think this is the way all macro wireless networks will be deployed in the future. The age of a large number of new, high power macro sites is over. Sure, there will be rural areas and upgrades to existing macro sites, but I wouldn't be surprised if this technology is in every building a couple of generations from now."

Challenges

- 5,200-acre university campus with 553 buildings hosting tens of thousands of users
- Enable cost-effective wireless service enhancements for every local carrier
- Minimize equipment space, power, cooling and fiber requirements

Solution

- High-performance digital electronics and multi-sector radio heads provide broad coverage and high capacity with fewer systems, when and where needed
- ADC outdoor DAS solutions deployed by each service provider to meet their own unique network requirements
- Use of CWDM, multiplexing, and high-efficiency electronics technologies reduces space, power, cooling and fiber usage

CASE STUDY

Website: www.adc.com

From North America, Call Toll Free: 1-800-366-3891 • Outside of North America: +1-952-938-8080

Fax: +1-952-917-3237 • For a listing of ADC's global sales office locations, please refer to our website.

ADC Telecommunications, Inc., P.O. Box 1101, Minneapolis, Minnesota USA 55440-1101

108576AE 11/09 Original