

TEXAS A&M'S KYLE FIELD FIBER FOR THE FUTURE

BY PAUL KAPUSTKA



When Texas A&M's newly renovated Kyle Field opens for the 2015 football season, its outside appearance will have changed dramatically...

But from a networking perspective, what's really different is hidden on the inside – namely, an optical fiber infrastructure designed to bring a new level of performance, cost savings and future-proofing to stadium network deployments.

While the use of optical fiber instead of copper cable in large networks isn't exactly "new" in the core telecom or enterprise networking worlds, in the still-nascent field of stadium network deployments fiber has yet to make large inroads. But the promise of fiber's ability to deliver much higher performance and greater future-proofing at lower installation costs in stadium situations may get a very visible poster child when Texas A&M's football facility kicks off the 2015 season with a technology infrastructure designed to be among the most comprehensive in any stadium, collegiate or professional.

With a Wi-Fi network designed to support 100,000 concurrent connections, a robust DAS network with more than 1,000 antennas, and an IPTV deployment with more than 1,000 screens, the IBM-designed network based largely on Corning's fiber-optical systems is incredibly impressive on paper – and it has already produced some eye-popping statistics this past season, when just a part of it came online during the "Phase 1" period of the two-phase \$450 million Kyle Field renovation.

The final, or Phase 2 of the renovation, just now getting underway, will begin with an implosion of the stadium's west stands in December, with reconstruction scheduled to finish in time for the 2015 season with a new, enclosed-bowl structure that will seat 102,512 fans. And if the new network delivers as planned, those fans will be among the most-connected anywhere, with plenty of

future-proofing to make sure it remains that way for the foreseeable future – thanks to fiber.

Driving on the left side of the street

What's going to be new about Kyle Field? According to news reports some of the creature comforts being added include redesigned concession stands, so-called "Cool Zones" with air conditioning to beat the Texas heat, well-appointed luxury suites and new restrooms – including 300 percent more women's bathrooms.

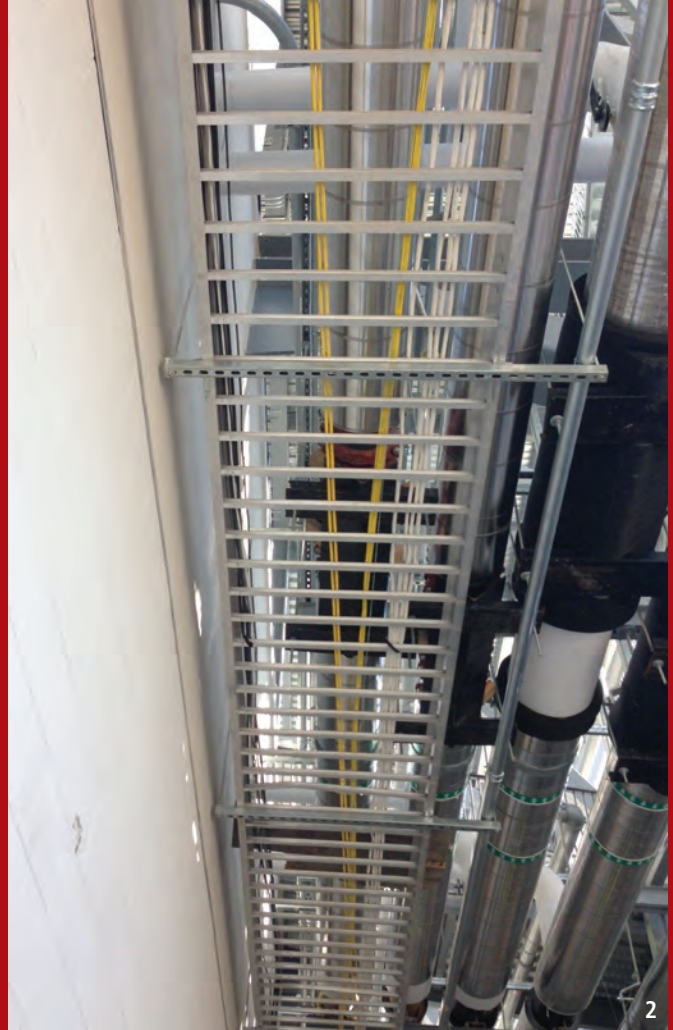
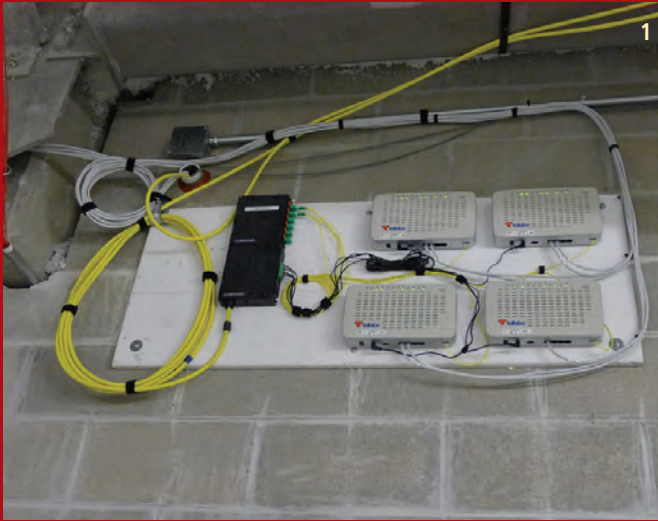
According to representatives from the school, the decision to make the new stadium a standout facility extended to its network infrastructure. "Our leadership decided that [the stadium renovation] would be leading edge," said Matthew Almand, the IT network architect for the Texas A&M University System, the administrative entity that oversees university operations, including those at the flagship school in College Station, Texas. "There were some leaps of faith and there was a decision to be leading edge with technology as well."

Though the Phase 1 planning had started with traditional copper cable network design for the network, Almand said a presentation by IBM and its "smarter stadium" team changed the thinking at Texas A&M.

"The IBM team came in and did a really good job of presenting the positive points of an optical network," Almand said.

Todd Christner, now the director, wireless business development at Corning, was previously at IBM as part of the team that brought the optical idea to Texas A&M. While talking about fiber to copper-cable veterans can sometimes be "like telling people to drive on the left side of the street," Christner said the power, scalability and flexibility of a fiber network fit in well with the ambitious Kyle Field plans.

"The primary driving force [at Texas A&M] was that they wanted to build a state of the art facility, that would rival NFL stadiums and set them apart from other college programs," Christner said. "And they wanted the fan [network] experience to be very robust."



1) Zone location in back of house. 2) Optical fibers hardly take up any space in an old-design cable tray. 3) Corning ONE DAS headend equipment. 4) Optical line terminal (ONT) in Kyle Field MDF. 5) Kyle Field command center. (Photo 2: Corning. All other photos this page: IBM/Texas A&M)

With what has to be one of the largest student sections anywhere – Christner said Texas A&M has 40,000 seats set aside for students – the school knew they would need extra support for the younger fans’ heavy data use on smartphones. The school officials, he said, were also concerned about DAS performance, which in the past had been left to outside operators with less than satisfactory results. So IBM’s presentation of a better, cheaper alternative for all of the above found accepting ears.

“It was the right room for us to walk into,” Christner said.

IBM’s somewhat radical idea was that instead of having separate copper networks for Wi-Fi, DAS and IPTV, there would be a single optical network with the capacity to carry the traffic of all three. Though the pitch for better performance, far more capacity, use of less space, and cheaper costs might sound a bit too good to believe, most of it is just the combination of the simple physics advantages of using fiber over copper, which are well known in the core telecom and large-enterprise networking worlds, applied to a stadium situation.

Deploying now and for the future

Without going too deeply into the physics or technology, a simple explanation of the benefits stem from the fact that optical fiber can carry far more bandwidth than copper, at farther distances, using less power. That advantage is one reason why fiber is used extensively in core backbone networks, and has been creeping slowly closer to the user’s destination, through deployments like Verizon’s FiOS.

Why hasn’t fiber won over completely? Mainly because in single-user deployments – like to a single home or office – it is still costly to replace systems already in the ground or in the wall with fiber, and for many users fiber’s capacity can be a bit of overkill. Fiber’s main benefits come when lots of bandwidth is needed, and the scale of a project is large, since one main benefit is the elimination of a lot of internal switching gear, which takes up space and consumes lots of power.

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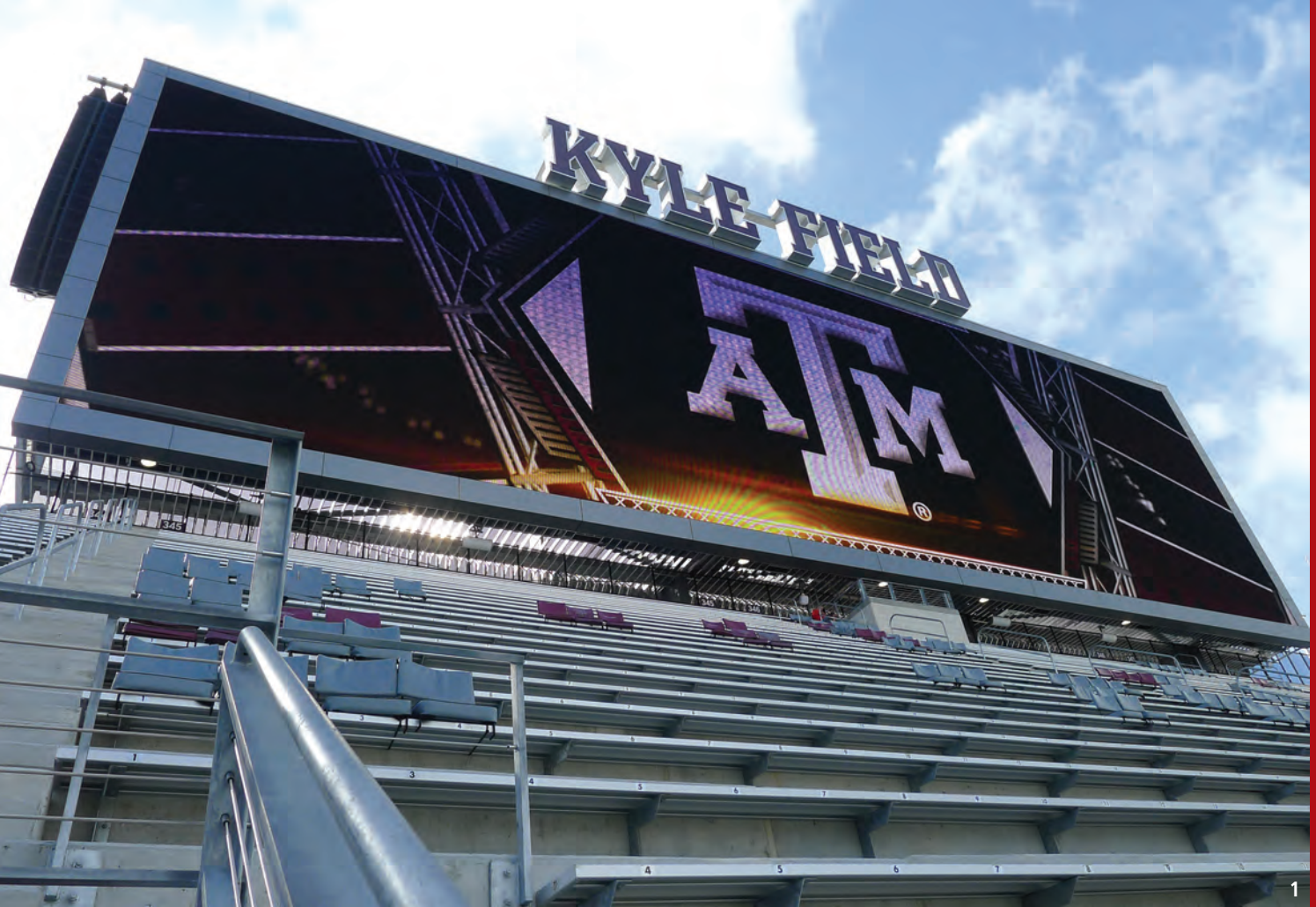
Those reasons seem to perfectly describe the perfect bandwidth storm happening in networked stadiums these days, where demand seems to keep increasing on a daily basis. Some stadiums that were at the forefront of the wireless-networking deployment trend, like AT&T Park in San Francisco and AT&T Stadium in Arlington, Texas, have been in a near-constant state of infrastructure upgrades due to the ever-increasing needs for more bandwidth. And Issac Nissan, product manager for Corning ONE, said new equipment like Wi-Fi access points with “smart” or multiple-input antennas are also going to help push the LAN world into more fiber on the back end.

But there’s another drawback to using fiber, which has less to do with technology and more to do with history: Installers, integrators and other hands-on networking folks in general are more comfortable with copper, which they know and have used for decades. Fiber, to many, is still a new thing, since it requires different skills and techniques for connecting and pulling wires, as well as for managing and administering optical equipment.

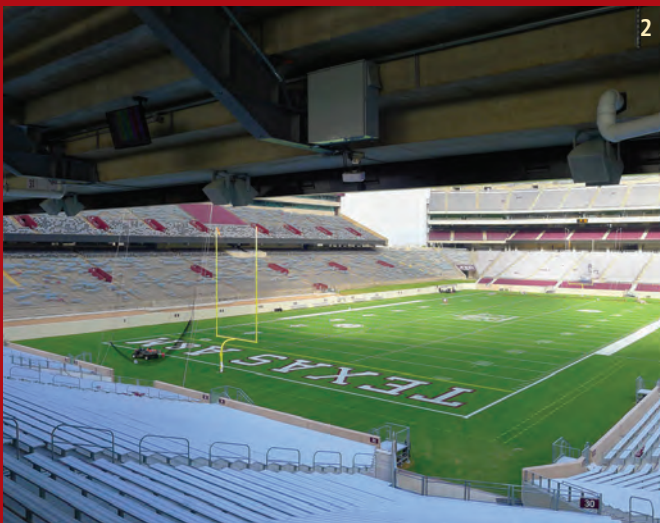
“There’s definitely a learning curve for some the RF [industry] people, who have been doing coax for 20 years,” Nissan said. “Fiber is a little different.”

Texas A&M’s Almand admitted that bringing the stadium’s networking group into a new technology – fiber – was a challenge, but one with a worthy payoff.

“There’s definitely been a gear-up cycle, getting



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1) Kyle Field scoreboard. 2) Zone location and antenna under overhang.
3) Upper bowl zone box (remote gear) and directional antenna.
(All photos this page: IBM/Texas A&M)

The power, scalability and flexibility of a fiber network... fit in well with the ambitious plans for the Kyle Field renovation.

to a new confidence level [with fiber],” Almand said. But he added that “sometimes it’s good to break out of your comfort zone.”

Lowering the IDF count

Christner said the Corning optical gear is at the center of the Kyle Field deployment, providing support for the fan-facing Wi-Fi as well as Wi-Fi for back of the house operations like point of sale; it also supports the stadium DAS, as well as a network of more than 1,000 IPTV screens. Aruba Networks is the Wi-Fi gear supplier, and YinzCam is helping develop a new Kyle Field app that will include support to use smartphones as remote-control devices for IPTVs in suites.

On the Wi-Fi side, Christner said the finished network will have 600 APs in the bowl seating areas, and another 600 throughout the facility, with a stated goal of supporting 100,000 concurrent 2 Mbps connections. The DAS, Christner said, is slated to have 1,090 antennas in 50 sectors.

With no intermediate switching gear at all, Christner said that for the fiber network in Kyle Field only 12 intermediate distribution frames (the usually wall-mounted racks that support network-edge gear, also called IDFs) would be needed, as opposed to 34 IDFs in a legacy fiber/coax system. In addition to using less power, the cabling needed to support the fiber network is a fraction of what would have been needed for coax.

One of the more striking pictures of the deployment is a 36-inch wide cable tray installed for the original copper-network plan, which is carrying just 10 inches of fiber-optic cable. Christner said the fiber network also provides a cleaner signal for the DAS network, which already had a test run this past season, when 600 DAS antennas were deployed and lit during the 2014 season.

“At the Ole Miss game we had 110,663 fans at the stadium, and according to AT&T on the DAS

all their lights were green,” Christner said. “Before this [renovation] we hadn’t been that concerned with DAS,” said Texas A&M’s Almand, who said that carriers have already responded positively to the new DAS infrastructure. “Now we’ll be able to provide the DAS with much higher bandwidth as well.”

Up from the dust – a model for the future?

Also included in the design – but not being used – are an additional 4,000 spare fibers at 540 locations, which Christner said can be immediately tapped for future expansion needs. And all of this functionality and flexibility, he added, was being built for somewhere between one-third and 40 percent less than the cost of a traditional copper-based solution.

The proof of the network’s worth, of course, will have to wait until after the west stands are imploded, the new ones built, and the final pieces of the network installed. Then the really fun part begins, for the users who will get to play with things like 38 channels of high-def TV on the IPTV screens, to the multiple-angle replay screens and other features planned for the mobile app. Christner said IBM’s support squad will include some team members who work on the company’s traditionally excellent online effort for the Masters golf tournament, as well as the “smarter stadium” team.

For Texas A&M’s Almand, the start of the 2015 season will mark the beginning of the end, and a start to something special.

“If I were a country singer, I’d write something about looking forward to looking back on this,” Almand said. “When it’s done, it’s going to be something great.” -MSR-