



STADIUMS

race to

DIGITIZE

How sports teams are scrambling to keep
Millennials coming to games

by Teena Hammond



Image: Jim Mahoney/New England Patriots



Image: Cisco

Younger fans are leaving stadiums when they can't get connected, so sports teams are finally embracing technology as a way to improve the fan experience and increase the team's bottom line.



Barclays Center in Brooklyn, New York is one of the world's most connected stadiums.

Imagine walking into a stadium and your smartphone immediately pings you that a \$30 premium seat upgrade is available for purchase on your mobile device. As soon as you settle in to enjoy that awesome view of the game, you use your smartphone to order a pulled pork sandwich and imported beer delivered right to your seat. Then, when your favorite player scores a touchdown, you use the team's app to watch an instant replay at multiple angles and a stadium-exclusive video feed of the players on the sideline. Later on, when nature calls, the app directs you to the closest restroom with no wait time.

This isn't a far-fetched futuristic stadium experience. It's already available at some venues, and others are rushing as fast as they can to add next generation digital systems that will make attending a game in person an immersive, connected experience.

The race to connect

There are three reasons that stadiums are pushing to improve connectivity:

1. Changing demographics
2. Luring fans away from their big-screen TV at home
3. Boosting revenues

Whether by building from scratch or retrofitting existing facilities, stadiums are in a fierce competition with each other to add the latest technologies.

"There's a bar that was set by the latest arena or stadium that was built, and to open up the next venue you have to be above that bar," said Chip Foley, vice president of technology for Forest City Ratner Companies, which owns Barclays Center, in Brooklyn, New York.



Changing demographics

The changing demographic of fans is one of the reasons stadiums are adding Wi-Fi. Connectivity is especially important to younger fans, particularly those in college. At college games, fans often leave at halftime if they can't connect to the internet or upload photos to social media. The pro teams are taking notice of this phenomena and taking early action, before the college-age fans graduate and can better afford to attend pro games.

A Cisco report revealed that the internet is as important as air, water, food and shelter to one in three college students and young professionals.

"There is a changing demographic that obviously the sports owners, the venue owners want to tap into. Forget about putting my kids in time out, it's all about connectivity. If you turn off the internet or shut off Instagram, that's punishment. The demand for connectivity is incredible," said Chris White, general manager for Cisco's sports and entertainment group. Cisco has provided the connectivity for more than 200 venues around the globe, including Barclays Center, AT&T Stadium in Arlington, Texas, Staples Center in Los Angeles, and Manchester City's Etihad Stadium in the UK.

Michelle McKenna-Doyle, senior vice president and CIO of the NFL, said, "It does bear out in the research that as generational shifts happen, the expectation level goes more from a 'this would be nice to have' to a 'what, you don't have it' kind of feature. I have a lot of contacts in college sports, and it is definitely the case where they are seeing some of their younger fans leave if they don't have connectivity."

John Brams, director of sports and entertainment for Extreme Networks, said, "Kids leave at halftime at college games because they don't have connectivity, and they don't want to be in a connectivity black hole."

Joe Inzerillo, executive vice president and CTO for MLBAM, the interactive/digital media



The Dallas Cowboys play at AT&T Stadium, another one of the world's most high tech stadiums.

At college games, fans often leave at halftime if they can't connect to the internet or upload photos to social media.

subsidiary of Major League Baseball, said, "In our mind, connectivity is like running water at this point in time, especially for the younger generation of fans. When you really look at it, it's not 100% proactive, but we're doing it now rather than getting to a point where the next generation of fans are frustrated with the connectivity.

"The younger generation of fans, if they're cut off from Twitter or Facebook or their email or instant messaging or whatever, all of that is vitally important to their life. It makes sense that we're supporting that the best we can so they don't feel like they're going into a black hole of connectivity where the internet doesn't exist," Inzerillo said.

Pleasing younger fans is one of the reasons the National Hockey League is adding connectivity. "The younger fans take it for granted. That's how they share their experience. They're very quick to post things." He said that surveys show that, "in the order of priorities, it's the number one thing they won't give up. For them it's an expectation that it's going to be there," said Peter DelGiacco, executive vice president and CTO of the NHL.



Competing with the big screen TV

Teams have faced the reality that it's a lot cheaper, and a lot easier, for a fan to watch the big game in their family room. So the teams have to make it more appealing than ever before to lure fans to the stadium. A recent Cisco study showed that 57% of fans prefer to watch the game at home.

"It's pretty expensive to take your family out to an event these days and the competition is a nice warm couch, your own bathroom, and a big TV," White said.

The connectivity, the added services and apps all aim to provide a vastly improved fan experience at the stadium and keep people coming to games even when they have a 50-inch TV and comfy chair at home.

With the added features through Wi-Fi, the fan gets an experience at the stadium that they cannot get anywhere else. And the best part is that they get to brag about it to their friends on social media in real time, which is part of the fun. When fans can connect, "it enriches the experience because human beings are fundamentally collaborators. They want to share the experience," White said.

More evidence as to the need to appeal to the wants-to-stay-at-home fan is apparent in the mindset pushing the design of the upcoming Levi's Stadium in Santa Clara, California. This future home of the San Francisco 49ers will be the most connected stadium in the world when it opens in July 2014.

"The 49ers said what they're really competing against to sell the stadium is the at-home experi-

ence. They believe to sell the stadium they need more than putting a great football team on the field. They need to provide Wi-Fi with instant replays with different camera angles, the ability to order food and access other applications that are in the stadium," said Mike Tighe, executive director of data services at Comcast, which signed a 10-year agreement with the San Francisco 49ers to deliver a variety of Ethernet, cloud-based voice, Wi-Fi and broadcast services at Levi's Stadium.

Boosting revenues

Another big reason stadiums are adding connectivity is simple — it makes more money through additional purchases, whether from food and drink, or merchandise or seat upgrades.

One person with solid opinions on the financial benefits is Denise Taylor, CIO for AEG, which owns, controls or is affiliated with more than 100 entertainment venues around the world, including Barclays Center, Staples Center and international facilities including Allphones Arena in Sydney, Australia; MasterCard Center in Beijing, China; Tele2 Arena in Stockholm, Sweden; and The O2, a 28-acre development that includes a 20,000-seat arena in London, England. AEG is also developing Farmers Field, a 72,000-seat stadium and event center in downtown Los Angeles.

Taylor said, "From a global perspective there is so much business potential. There are opportunities for revenue generation whether through ticketing platforms where we're able to offer up-sales on tickets, or build products based on having more customer data. For the US, and at a global level, if we implement a connected stadium with an HD Wi-Fi solution, it adds to the ability to know who our customers are and which products to develop. We can look at the different markets and instead of taking one venue in the US and creating products for that, we can create products

"It's pretty expensive to take your family out to an event these days and the competition is a nice warm couch, your own bathroom, and a big TV."

~ Chris White, Cisco





Image: AEG

across the world and standardize that and build customization as needed.”

Data is collected on fans, and then that’s used to help the venue make more money by more narrowly targeting items to sell.

“It gives us the ability to gather the big data on our customers. It really also allows us to tailor our applications. How we develop that application and interact with consumers is having their information and how they interact with our Wi-Fi solution, and understanding how they act throughout,” Taylor said.

“The other big area on the business side which has really helped us with the HD Wi-Fi is how it’s allowed us to look at using tablets and handheld devices rather than the traditional proprietary hardware. In any of our venues where we have HD Wi-Fi we’re able to offer in-seat ordering using a mobile phone or tablet. It speeds up the process and it’s an overall better experience, which returns on investment,” Taylor said.

“There are so many new revenue opportunities that come off of it, whether sponsorship activation or speed of service to increase sales, or point of cost for a lower cost solution. Or a better understanding of your fan and their likes and interests. Being able to offer a solution like Cisco StadiumVision Mobile gives a fan that moment of exclusivity. Or the ability for them to view that show or event at the way they like to see it. Instant replay, a certain angle. But that only works if you have an HD Wi-Fi solution in place,” Taylor said.



Image: Cisco

TOP: The Staples Center in downtown Los Angeles is another high tech stadium on the West Coast. ABOVE: Cisco’s Connected Stadium solution provides multiple camera views for fans at a Brooklyn Nets game using the team app.

The leagues are upping their game

Professional sports leagues around the country are taking a leading role in the challenge to add connectivity to enhance the fan experience.

The NFL has asked its stadiums to provide free Wi-Fi access to fans by 2016, said McKenna-Doyle. As further proof of the drive toward added a big tech upgrade, McKenna-Doyle is the first CIO in the history of the NFL. The league hired her in 2012, as it realized the need to up its game when it comes to technology.

At the NHL, DelGiaccio said, “Wi-Fi at the arenas is very important to us. We look at it as true



“There’s a bar that was set by the latest arena or stadium that was built, and to open up the next venue **you have to be above that bar.”**

~ Chip Foley, Barclays Center

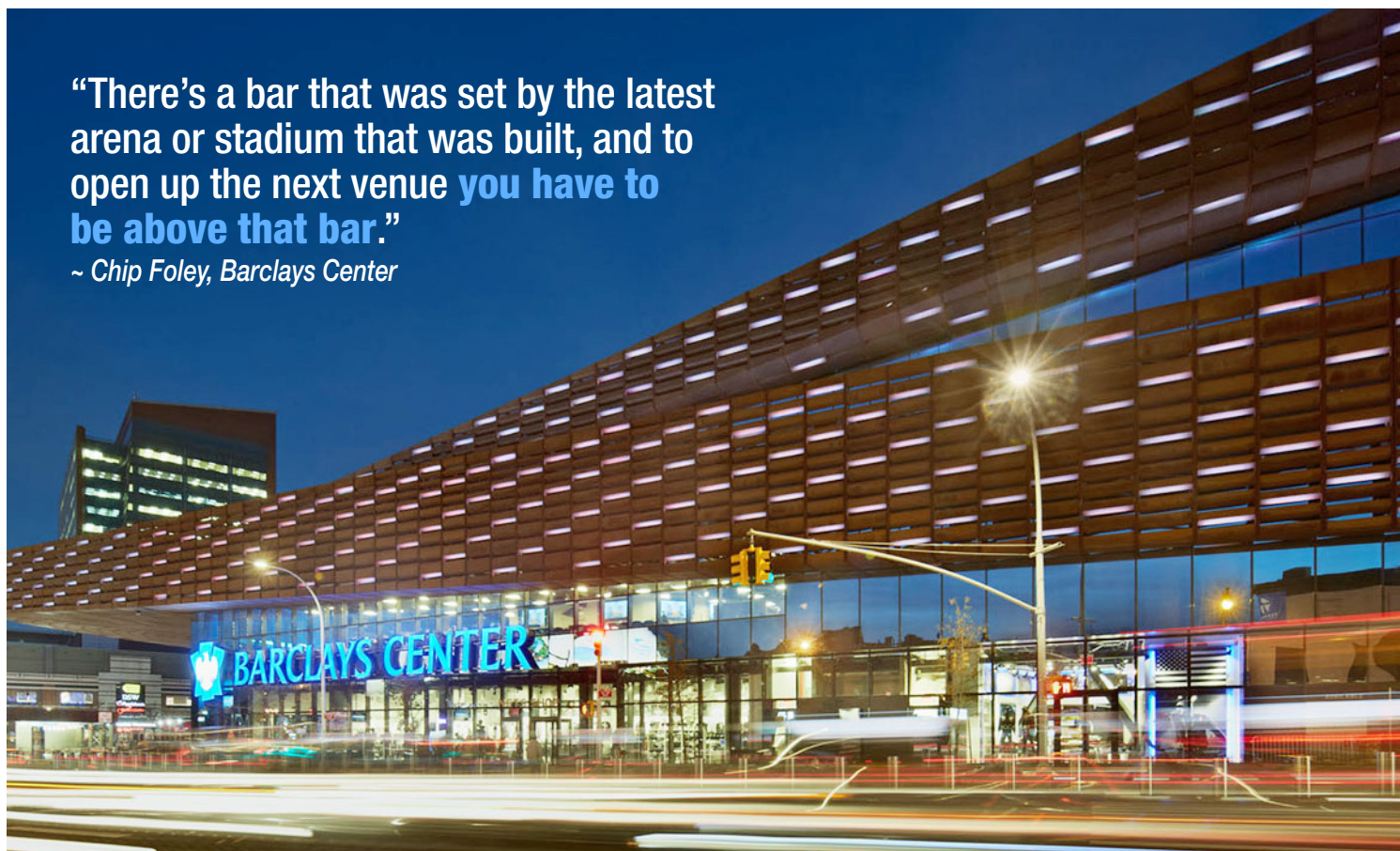


Image: AEG/Bruce Damonte

Barclays Center, in Brooklyn, New York, also features a shopping area for fans.

Wi-Fi or getting to a level where we can increase the fan engagement especially through an immersive mobile experience.”

The NBA’s CIO Michael Gliedman said, “Wireless is one of those strategic things that our teams are all very focused on because it is a way for them to stay connected while they’re at the venue, and participate in things that go on. We have an incredibly huge social media presence. We have over 550 million likes and followers across the league and teams, so we know our fans are heavily invested in social media. Wireless is a way for them to stay connected to social media while visiting one of our arenas.”

The updates won’t happen overnight. It is a long process to design and incorporate connectivity into sports venues. As Inzerillo, from the MLB’s technology subsidiary, said, “This is a marathon, not a sprint.”

Technology changes fast, so the stadiums will need to constantly work and update equipment in order to stay current. Inzerillo said, “The technology is going to change and evolve over time. What we really did is make a long-term commit-

ment not just to the equipment but [to] updating it over time. I completely expect by the time we finish the last ballpark, we’ll be looping back to the first ballpark. It’s like painting the Golden Gate Bridge, because people’s appetite for connectivity is growing at an astronomical rate.”

Out of the 30 major league baseball stadiums, 12 are either already connected, or are in the process of getting connectivity. While there is no set deadline, Inzerillo said, “We want to get as many teams in the league done as possible.”

Barclays Center redefines the fan experience

Barclays Center, which opened in September 2012 and is home to the Brooklyn Nets, is considered the most connected stadium in the world. It will fall to second place when Levi’s Stadium opens this summer but it remains the gold standard for the moment.



Foley said his focus when developing Barclays Center was to create an unforgettable fan experience at pro and college basketball games as well as concerts and other events.

He's accomplished his goal, with an average of 4,000 to 5,000 fans accessing the 17,500-seat arena's Wi-Fi on any given night, and using the in-house team app to get instant replays and watch multiple camera angles on their mobile devices. Fans can also order drinks and food from their seats, and upgrade those seats as soon as they walk into the arena. All of the equipment is from Cisco, and it includes Cisco's Connected Stadium network for free high-density Wi-Fi and 275 access points.

"One of the challenges from the technology firms was to hide the technology. We wanted to make it look different from a standard sports arena," Foley said. He's been pleased with the dependability of the technology. "We've been open a year and a half, we've had no outages, no technology issues. If you build it robust enough, when a show comes in, it's an easy add on. They need a 10 [Mbps] pipe, boom, we give them a 10 [Mbps] pipe."

Fans also get the option for easy seat upgrades. "If you're sitting in the upper bowl and you want lower bowl, you can log in and upgrade your seat for \$40. It drops to \$30 in the second quarter, and every quarter it gets cheaper," Foley said.

They're also going to add in cameras that show the restroom lines, and fans will get notifications on which restrooms near them have the shortest wait times, Foley said.

There's nearly an equal division between fans uploading photos and downloading data. "It's close to 50/50, but it might favor uploads a little bit. They're posting photos, they're sending images, they're sending videos. The NBA loves it. They love when people are tweeting with pictures saying, 'I'm watching the Nets.' That's where we see the bulk of the data. The guys that use the bulk of the bandwidth are the press," Foley said.



Image: Denver Broncos

A four-stage retrofit began in 2012 at Sports Authority Field at Mile High stadium in Denver, Colo. It resulted in an upgrade of the entire network infrastructure of the stadium.

Mile High Stadium's winning play

The Denver Broncos play at the 13-year-old Sports Authority Field at Mile High stadium. The team did a four-stage retrofit beginning in 2012 that resulted in an upgrade of the entire network infrastructure, said Russ Trainor, vice president of information technology for the team.

The upgrade was based on 10 Gigabit switches and accompanying wireless controllers and 500 wireless access points from Cisco. At the same time, the team upgraded its Ethernet, PRI connection, and HD video services from Comcast.

The team has added additional wireless access points, and is currently at 587, and plans to add more before next season for areas in the upper bowl and media areas that need extra capacity, Trainor said. "We cover the parking lots, too. We have a good tailgating crowd. People arrive early and meet friends and family. So we wanted to make sure we had a good connection point and touchpoint with them."

Right now, only Verizon customers can get free Wi-Fi, but Trainor said he's talking to Sprint and AT&T to provide similar access.

The wireless LAN can support 25,000 concurrent connections in the stadium, and the team gets about 9,000 unique Verizon users per game, with 4,000 to 4,400 concurrent subscribers per game, he said.

The Wi-Fi stays on 24/7, so that the other 330 events in the stadium each year also allow con-



nectivity for those attending, and by having it on non-stop, if something goes wrong, Trainor said he will immediately know. Some of the residents in homes near the stadium also get game day Wi-Fi, but it's not enough to overwhelm the network. The Wi-Fi in the parking lot is turned down during the off-season and during events other than football games, he said.

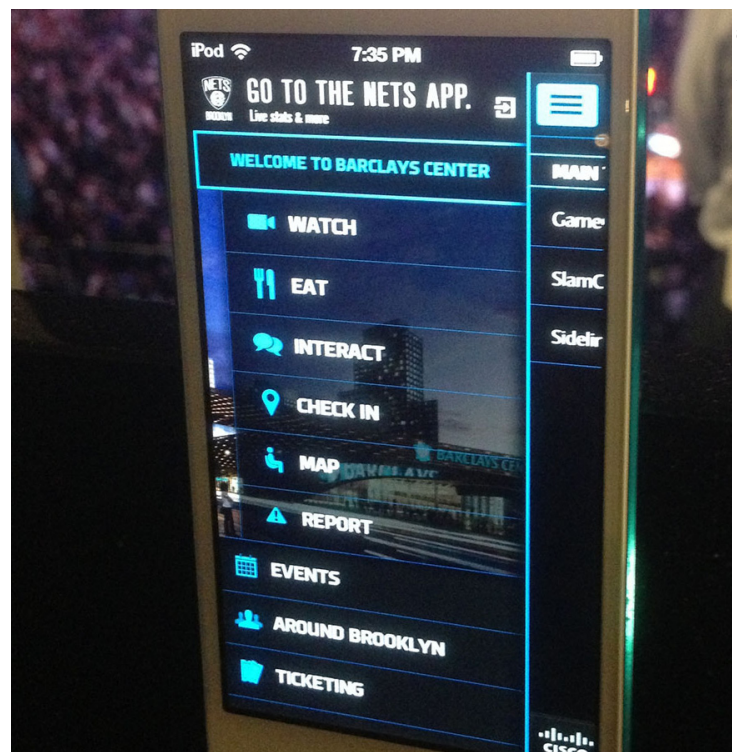
As for range, both 2.4 GHz and 5 GHz are used. But there has been a recent shift. 2.4 GHz dominated until mid-2013, when 5 GHz began to take the lead, due to new iPhones and Android phones that use that range, and because there are more uploads than downloads as people post photos on social media sites, Trainor said.

"The gap seems to be separating even more. The downloads were 25% more in the 2012 football season, and now it's 25% more in uploads than downloads," he said.

There are two 100 Mbps Ethernet lines from Comcast. The first provides direct internet access to connect the scoreboard, the TVs and Wi-Fi users. The second is a private fiber connection that allows the team to transmit data between the stadium and the team's training facilities and headquarters 20 miles away in Englewood, Colorado.

The team uses video of each game and practice to work with the players. "In the past you'd have to record our video, and take it back to the valley that night and do cutups and get the video prepped for the coaches and now they can do all of that from the stadium live. It's a very low latency connection so that's very helpful from the connection side. On game days, too, if players bring iPads to the locker room, I see all these lights up on Wi-Fi so I know the players have arrived. We can feed the video and give them real-time video updates to their iPads as well. It's much more efficient than [what] we had in the past," Trainor said.

"That pipe is scalable to 10 Gigabit. We have a 100 [Mbps] connection now, but we want to increase that to 200 or 300 [Mbps] in the off-season," Trainor said.



Brooklyn Nets' fans use a team app to access stadium-exclusive features.

As a result of added connectivity, the fan experience of the near future will be vastly improved, both in dealing with traffic patterns and determining the best route to get to and from a stadium, and during the event itself.

Comcast has also provided connectivity to the Celtics and the 49ers to make the teams more efficient.

Comcast's Tighe said, "With the Celtics and the 49ers, their practice team and where the team does operations are several miles from the stadium. What they've also purchased is 100 [Mbps] dedicated Ethernet connection. During the game the scouts and the team officials are filming the game and player performance and right after the game they push 100's of gigs of content to the team headquarters and practice operations. For every player they have a video profile of how each player did, areas for improvement."





Fans score with free Wi-Fi at Gillette Stadium

The New England Patriots also did an upgrade in 2012, and everyone in Gillette Stadium now has access to free Wi-Fi, said Fred Kirsch, publisher and vice president of content for the team.

“We had been thinking about it for many years prior to that, but the technology just wasn’t there yet for the high-density type of environment. It gets a lot more complicated when everybody is in the same place trying to use it at the same time. In 2012 after looking at several vendors, we decided to work with Enterasys, which is now merged with Extreme Networks. Connectivity is important for fans. The phone is part of any event they go to, whether sharing the experience or looking up information to enhance the experience. Not every fan does it, but enough fans do it so that you need connectivity,” Kirsch said.



Image: CBS News

TOP: The New England Patriots play at Gillette Stadium, which underwent a tech facelift in 2012. ABOVE: New England Patriots tight end Rob Gronkowski plays at Gillette Stadium.





Image: Cisco

Better connectivity enables the Brooklyn Nets' team app to include a lot more functionality.

There are 360 access points within the stadium. The Wi-Fi network is robust enough to allow about 40% of the 70,000 fans in the stadium to access video simultaneously.

"Uploads have certainly increased. What you want to look at is the time of day. Just before kickoff, the hour before kickoff, you will see much more upload bandwidth than download. That's people who have just arrived, they're posting to Instagram or Facebook, they're tweeting, telling their friends, 'I'm here.' Once the game starts, uploads are still heavy. In the past year they've gotten even heavier. Then downloads start to come. They're downloading stats or accessing video we make available. The retrieving of information happens more during the game," he said.

Fans also can find out how long the wait time is for restrooms in their section by accessing the in-house app, Patriots Gameday Live. Approximately 10,000 fans use the app during a typical game, Kirsch said.

The 49ers' 10 Gigabit stadium

As a result of added connectivity, the fan experience of the near future will be vastly improved, both in dealing with traffic patterns and determining the best route to get to and from a stadium, and during the event itself.

Fans will head to a stadium and use their mobile device to assist with finding an empty parking spot, to upgrade their seat as soon as they walk into the facility, to order food and drinks once settled

into their seat, and, when nature calls, to find out which nearby restroom has the shortest wait time. Again, some of these options are already available at the most connected venues, but it's yet to come for others.

There are numerous considerations before embarking upon a Wi-Fi deployment in such a high-density environment, including the layout of the stadium and how many people will attend each event. Obviously, it's easier to include Wi-Fi in a newly built stadium or arena if it's included in the original building plans. But existing facilities can be retrofitted to accommodate Wi-Fi.

When Levi's Stadium opens this summer, 49ers' fans will have access to the latest in connectivity due in part to the facility being built from scratch to provide the best in technology.

Comcast's Tighe said, "There is a growing expectation that a stadium is Wi-Fi enabled. As we were doing a lot of work with the 49ers, they had a lot of opportunity to design their stadium from the ground up to create what they called the ultimate fan experience.

"A lot of it is the ability. The 49ers' [stadium] holds 68,000 or 69,000 — for everyone in the stadium to be connected to Wi-Fi, they had to do a lot to do that. They started thinking about what applications we'd want the fans to be able to access, whether Google Glass, etc., instant replay, etc," Tighe said. "Some of the things are the ability to order drinks or food. One of the more interesting applications is the ability to understand how long the line is at the bathroom."

"From our standpoint to help enable that experience, fans require very, very robust interact access. We've done a lot of work with the stadiums. For the 49ers, we're delivering redundant, 10 [Gigabit] access to the stadium. That's the fastest we've provided," Tighe said.





The mobile app at the Brooklyn Nets games give fans a bird's eye view of the game.

What fans are doing with all that Wi-Fi

“Normally, internet traffic is very asymmetric. The content people are accessing is five to six times what they publish to the internet. But that’s very different from a football stadium, whether it’s fans updating Facebook or pushing photos to their social media sites. There’s as much traffic going upstream as there is going downstream,” Tighe said.

The NFL partnered with Extreme Networks to provide Wi-Fi analytics and solve the challenges associated with connectivity in stadiums. Extreme Networks has been in the stadium Wi-Fi market for three years. The New England Patriots was the first team that the company worked with, and the next was the Philadelphia Eagles at Lincoln Financial Field, Brams said.

“What we found is that when you’re providing Wi-Fi connectivity, a lot of organizations want to know what people are doing. Not how many people are on the Wi-Fi network, but the second level, what applications are they using, what

A Cisco report revealed that **the internet is as important as air, water, food and shelter** to one in three college students and young professionals.

bandwidth are they using, what’s important to the fans,” Brams said.

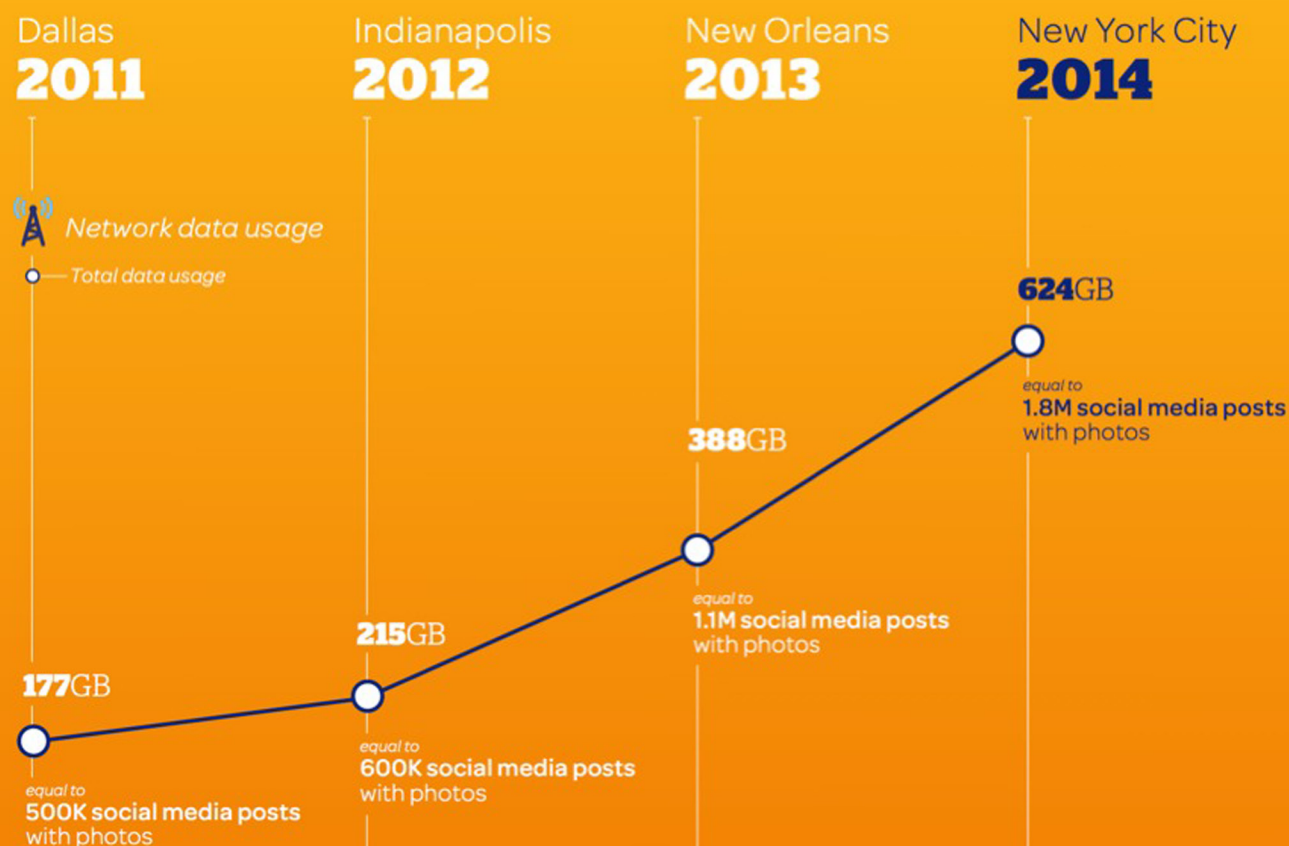
So now, Extreme Networks is the official Wi-Fi analytics partner for the NFL, even producing an infographic of the top 10 things it learned about the NFL’s Wi-Fi at the Super Bowl.

In the 2011 Super Bowl, there was 177 GB of network data usage, equivalent to 500,000 social media posts with photos. In 2014, this jumped to 624 GB, the equivalent to 1.8 million social media posts with photos. The peak hour for data traffic has traditionally been the hour before kickoff, with the exception of the 2013 Super Bowl, when data usage reached its peak during halftime and the power outage at the stadium.



AT&T Network at the Big Game

Data usage continues to surge at biggest sporting event of the year*



For the past four years, AT&T has tracked data usage at the Super Bowl.

Boosting the mobile networks

Chad Townes, vice president of the Antenna Solutions Group (ASG) at AT&T, said he provides Distributed Antenna Systems (DAS) to keep mobile phone customers connected in high-density environments, from stadiums to airports, race-tracks, casinos and high-rise buildings. He said AT&T has 90% of the NFL stadiums covered by its network, and 75% of NBA, NHL and MLB stadiums are covered. "We plan to have baseball completely covered by the start of the 2015 season," he said.

AT&T serves as a neutral host, with carrier-agnostic DAS that covers all frequency bands. "It ultimately means we have a significantly less expensive overall build," he said.

"We have criteria — less than 1% of data or calls to fall off network. We want 99% of traffic to stay on and complete the first time. That's the starting point of our design criteria," he said.

Townes said there's clearly a phenomenon that takes place during bigger games. "It's the 'hey, look at me' effect. Last season, if you looked at average game traffic throughout the season at the Superdome, upload and download traffic were fairly equal on weekend games. You throw in a Monday night game with more mystique to it, your upload number went higher. You definitely saw an uptick in social media traffic as it started to skew more toward upload. Then Drew Brees broke a passing





Levi's Stadium in Santa Clara, California is expected to be the world's most high tech stadium when it opens in July 2014.

“There is a changing demographic that obviously the sports owners, the venue owners want to tap into.” ~ *Chris White, Cisco*

record, with a lot of hype in the second half of the game, so upload traffic went through the roof. The last 30 minutes of the game was almost all uploaded traffic. And then you get to a playoff game or World Series or Super Bowl and upload traffic at those games is always higher than download. It's the hype around the game, the bigger the event.”

College games result in more uploads than downloads when compared to a pro game, Townes said.

“The data intensity is higher in a college event than a pro event. The average amount of usage per subscriber, we'll typically see the usage for a college game is as much if not higher as at a professional game, even if the attendance is lower,” Townes said. “In a few of our college stadiums, we've even intensified the design in the student area. We definitely design it with smaller sectors in that area to allow for more capacity.”

“Another thing we've done from a design perspective is focusing not just on interior of stadium, but exterior, tailgating and transition zones. Our DAS networks now cover areas immediately surrounding the stadium. They didn't use to,” he said.

“We build a network out in the stadium and it's always on. The radios themselves might shut down if there's no usage during the game. There's enough capacity to handle any load, and they will automatically fire themselves back up. In the case of the exterior sectors, it will carry traffic for cars driving near the area. In the case of AT&T Stadium, there is a baseball stadium next door. It will carry parking for a Rangers baseball game because they share the same parking lot,” Townes said.



High density connections

There are complications with getting a stadium connected. As Cisco's White explained, "We jumped into this market five years ago. If 50,000 or 100,000 people show up to a venue, connectivity isn't very good."

"We undertook an engineering effort to come up with a customized, specialized antenna technology to do what we call HD Wi-Fi. It's engineered to work in a high-density environment and fine-tune that depending on the difference in the environment. Radio waves reflect differently off of different surfaces. A soggy soccer field in Europe will be different than a shiny basketball court in Barclays Center in New York," White explained.

It hasn't always been easy to get sports venues connected, White said. "There was a lot of resistance in the early days when owners and stadiums said, 'We don't want to bring technology in here because this is a heads up experience; why would I want someone distracted when I brought them in here to see the Cowboys or the Mets or whoever play?' But in the last month I've been to the Staples Center, which is a great customer for us, to see the Grammys, and 90% of the audience had their cell phone in their hand, taking videos, sharing photos on Instagram."

White said, "I truly see that there are two great plays here. One is really enriching the fan experience from a number of different ways and, two, helping these

business owners be more successful in business. And that's even without sensors on shirts, new camera angles, and 4K camera technology kicking in. We're seeing that trend explode around the world. And not just in green field environments. The Real Madrid stadium is almost 100 years old, and those guys are looking at ways of putting technology in the stadium."

The technology behind the connectivity is often a combination of a full-blown DAS solution as well as a high-density Wi-Fi solution. AEG's Taylor said that combination works best.

"Say you're handling 3-4 carriers on DAS, you won't be able to handle traffic load of the type of interaction that the fans want. That Wi-Fi solution that the fans want allows them to react on apps the way they want, to upload to Facebook and Twitter, or upgrading seats. It's a two-plug ap-



In their first season in the Barclays Center, the Brooklyn Nets have become one of the most high tech teams in sports.

Image: CBS Sports.com



Another big reason stadiums are adding connectivity is simple
— **it makes more money through additional purchases,**
whether from food and drink, or merchandise or seat upgrades.

proach. If you just went with DAS or you just went with Wi-Fi, the demand is growing so rapidly, it wouldn't be as successful if you didn't have both of them in play," Taylor said. "There are certain applications that wouldn't work over a DAS solution based on the sheer magnitude. With that type of traffic you need a robust DAS solution and a high-density Wi-Fi solution."

The NHL's DelGiacco said he also supports a dual solution. When connecting a stadium, "It's not one without the other. You definitely need to have both DAS and Wi-Fi, and you want one of the DAS systems to be carrier agnostic. From a fan perspective, whether you're Verizon or AT&T, the best perspective is to make them agnostic so that they can connect out. If you keep the Wi-Fi internal, the fan isn't going to be able to leverage the social experience with Pinterest and Facebook or however they want to post."

The need for connectivity for everyone changes how events are staged, he said. "It also changes your way of thinking. You now need to consider, you're going to have a fairly large event, do I have the bandwidth to accommodate that? With the outdoor games especially, we pay a lot more attention to the network capacities from a DAS perspective so that fans can tweet about it and send messages. It also helps from a marketing side of things. It builds a larger scale."

Barclays Center uses a fully converged network, with different technologies building out over the core infrastructure. The arena also offers DAS for all the cellular carriers, so fans can text and tweet from the carrier side if they don't want to use Wi-Fi.

Cisco StadiumVision Mobile is used at Barclays Center to deliver live video of the Brooklyn Nets' games to fans' mobile devices through the Nets Official Mobile App. White said the other teams currently using StadiumVision Mobile are Real Madrid, which plays soccer at Estadio Santiago Bernabéu in Madrid, Spain, and Sporting

Kansas City, a soccer team that plays at Sporting Park in Kansas City, Kansas.

The road ahead

The demand for connectivity is also spreading internationally.

"Tele2 in Stockholm is our most recent opening and it is a fully connected stadium, HD Wi-Fi, Cisco Stadium Mobile solution. It's just something that the fans are requesting. Everyone knows the continual advancement of mobile phones and tablets is everywhere, not just in the [US]," Taylor said. "We are currently going through a retrofit process at the O2 [in London] and adding HD Wi-Fi into the venue."

"From the international perspective even in the brand new venues that we're building in South America, the infrastructure is probably trailing years behind the states in what they can do with bandwidth, but it's still built into each of these solutions to build a DAS and an HD Wi-Fi solution. The international front is equally as driving as it is in the United States," Taylor said.

The number of mobile-connected devices will exceed the world's population by the end of 2014, and by 2018 there will be more than 10 billion mobile-connected devices, representing 1.4 mobile devices per capita, according to the Cisco Visual Networking Index.

Cisco's White said, "We're in exciting times where the industry is going to go through several changes and evolutions and the experience will get better and better. And the team will have a connection once fans leave the stadium, through social media. This gives the team more stickiness."

As far as whether it's truly that important or not to be connected 24/7, MLB, at least, withholds judgement. Inzerillo said, "It just sort of is the way it is. Whether it's good or bad that everyone is plugged in and connected all the time is a debate for philosophers. We just try to predict where our fans are going to go." ■

About TechRepublic

TechRepublic is a 21st century online magazine that empowers the people of business and technology. It provides feature stories, profiles, tutorials, analysis, best practices, and case studies aimed at technology decision makers and tech thought leaders.

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