



High-Density, Stadium-Grade Wi-Fi Drives Fan Engagement

BALTIMORE RAVENS

ENVIRONMENT

- Over 71,000 Seats
- Open-Air Stadium

TECHNOLOGY NEEDS

- Mobile Point-of-Sale
- Mobile Ticketing
- Guest Wi-Fi
- Game Day App
- Streaming Video
- Incident Management App
- Security Systems
- Wired and Wireless

PRODUCTS UTILIZED

- **ExtremeWireless**
 - APs, Wireless Controllers
- **ExtremeSwitching**
 - Switches
- **ExtremeControl**
 - Access Control
- **ExtremeManagement**
 - Management Center
- **ExtremeAnalytics**
 - Application Analytics

The Baltimore Ravens are a professional football team based in Baltimore, Maryland. Competing in the National Football League, the Ravens are part of the AFC North division and plays its home games at M&T Bank Stadium. With a capacity of over 71,000, M&T Bank Stadium hosts a wide array of events annually, in addition to the eight football games played at the venue each year.

M&T Bank Stadium, without a doubt, is where NFL excitement begins any given Sunday. And that's because Baltimore Ravens home games and M&T Bank Stadium have become synonymous with winning. Since capturing their first Super Bowl title in 2000, the Ravens have compiled an impressive home record, 94-34, the NFL's second-best winning percentage since 2015.

While the Ravens' on-field successes continue to meet and surpass fan expectations, off the field, the team acknowledged that some improvements and enhancements were necessary.

Better Connections: In-Venue and to the Outside World

The Ravens knew that an in-venue Wi-Fi investment would be a huge asset for optimizing game day operations and enabling in-stadium fans with full connectivity and unrestricted use of their mobile devices. The team would have an improved ability to enhance the in-venue experience with differentiated game day content delivered through the Ravens' team app, including live streaming and on-demand video. In addition, a unified and robust network with stadium grade Wi-Fi would help with the support of mission-critical business functions and the advancement of digital marketing initiatives.

"For the Ravens, it's not about a sponsorship-led deal, it's about ensuring it works for our guests and for our fans and for the people that are employed here. The technology was the main driver."

ROY SOMMERHOF VP OF STADIUM OPERATIONS, BALTIMORE RAVENS

The Ravens had evaluated Wi-Fi solutions for a number of years, but their first step toward improving mobile connectivity in-venue was the installation of a DAS (Distributed Antenna System) to bolster cellular-based capabilities at M&T Bank Stadium. That said, the team was ready to take the next step to allow more guests and fans to be connected to the outside world. In order to provide fans with the best game day experience possible and to compete with the in-home experience, Wi-Fi was a necessity.

BALTIMORE RAVENS (CONT.)



PCM SOLUTION COMPONENTS

- Network Design and Installation
- Project Management Lead
- Managed Services



ABCOM SOLUTION COMPONENTS

- Telecommunication Rooms Build-Out
- Conduit and Cable Pathway Installation
- Redundant Single-Mode Fiber Installation
- Horizontal Category 6A Cable Installation
- Wireless Access Points and Antennas installation

INSTALLATION PROCESS

- 42 Telecomm Rooms
- 380,000 Feet of CommScope Cat 6a Cable
- 50,000 Feet of CommScope Fiber Optic Cable
- 81 Miles of Total Cable Installed



A Trifecta of Partners Deliver a Winning Solution

Ultimately, the Ravens issued an RFP for vendors to submit bids. As they evaluated Wi-Fi solutions, the Ravens compared the competing vendors on:

- Network design and deployment approach
- Ability to meet the technical requirements outlined by the NFL
- Breadth and depth of experience deploying high-density, stadium-grade Wi-Fi

It was critical that the evaluation process focus on the technical parameters of the solution and the performance of similar Wi-Fi deployments, rather than being a sponsorship-led discussion. Extreme Networks was ultimately chosen for having the most experience and for demonstrating proven results in other sports and entertainment venues, including other NFL partner teams. The final Wi-Fi solution was provided by a trifecta of partners that included Extreme as the official Raven's Wi-Fi network provider, PCM as the Managed Services provider who designed and retrofitted M&T Bank Stadium with the Wi-Fi network, and ABcom who installed 81 miles of cabling at the stadium, an essential task to power all 792 wireless APs installed in-stadium. Working together, Extreme, PCM, and ABcom outfitted M&T Bank Stadium with the necessary infrastructure and a purpose-built Wi-Fi solution designed specifically to handle the unique challenges that come with providing reliable, simultaneous network access to thousands of fans in a large, open-air stadium.

With the ability to allocate bandwidth and device privileges accordingly, the new high-density Wi-Fi network is able to provide uninterrupted and tailored service for the wide-variety of internal applications that run over the network: media and photo uploads and downloads, mobile ordering for concessions, mobile ticketing and ticket scanning operations, all guest and internal devices, and the delivery of differentiated in-venue content via the Ravens Game Day App.

"In our first year with Wi-Fi, we really only scratched the surface in terms of the services we provided and the way we leveraged the network. There's certainly a lot more to come."

NICK FUSEE
DIRECTOR OF IT, BALTIMORE RAVENS

THE PRIMARY MOTIVATORS TO INSTALL HIGH-DENSITY W-FI WAS TWO-FOLD

1. Continue to be on the cutting edge of technology and deliver the best game day experience for their 71,000+ fans
2. Fulfill the NFL league requirement that all NFL stadiums have Wi-Fi installed by the end of 2016

As the Ravens investigated the deployment of a high-density Wi-Fi solution they worked with the NFL and talked to other teams in the League who had installed a similar solution. Their top concerns were the speed of the installation – *it needed to be fully installed and operational in time for the 2015 football season* – and ensuring there was enough bandwidth, throughput, and redundancy built in to support high user and device usage in critical situations during game day. With a small IT staff, the Ravens also needed help with the ongoing network management and maintenance.

To quickly socialize users to the new network, the Ravens deployed a patented Wi-Fi Coach Program. This mobile IT help desk provides real-time assistance and in-person troubleshooting with the fan base to ensure all network-related questions, including gaining access to the Wi-Fi, is immediately addressed in real-time. It also provided another touchpoint with Ravens' fans in-venue. Furthermore, the ongoing network management support provided by PCM Managed Services made it possible for the Ravens to allocate just one IT person to help coordinate between stadium operations and PCM Managed Services, all the while empowering the Ravens IT team with the institutional knowledge and best practices to apply to future seasons.



Scoring Points with Fans and Management

In just one year, the Ravens went from a DAS system that provided fans with the baseline mobile ability to make phone calls and send text messages, to a unified and robust network with high-density Wi-Fi that enable fans to be fully connected while they are in-stadium, allowing them to enjoy uninterrupted access to social media, fantasy stats, streaming of live video, team content, and much more!

Based on usage averages from the 2015 season, the new Wi-Fi network was able to fully support 23,912 peak unique users and 17,259 concurrent users, with a peak adoption rate of 44% of in-venue fans connected to the Wi-Fi at one point during the season. The secure and reliable Wi-Fi connectivity at M&T Bank Stadium has dramatically improved the mobile experience for Ravens fans, allowing them to experience and share the game's excitement with family and friends – both in-stadium and out. Fans are able to receive unique in-game content such as access to the Red Zone channel, instant replays of any play with different camera angles, while also staying updated on what's happening outside the NFL.

The Ravens now use the network to further enhance the fan experience and support game day operations at M&T Bank Stadium. Supporting game day functions have been augmented, as services such as mobile POS for Hawkers have optimized and mobilized the sale of food and beverage items. The Wi-Fi network has also improved event management with the introduction of tablets and smart phone devices used by the security and guest services team to identify, track, monitor and document event incidents.



Through their use of ExtremeAnalytics, the Ravens discovered actionable intelligence to further improve game day at M&T Bank Stadium. Different pockets of Wi-Fi networks were identified around the stadium; including HD wireless cameras, personal Wi-Fi hotspots, and other sources of interference. Which upon elimination, bolstered the network experience for fans and simplified network management for the IT team.

“The problem was, since 2011 we had all this exciting functionality and compelling content incorporated into our Ravens Game Day App, but it didn’t really work to the fullest extent because we did not have the infrastructure to support it. Now we do.”

DAVID LANG
SENIOR MANAGER, DIGITAL MEDIA AND MARKETING
BALTIMORE RAVENS

On the digital marketing side of the house, the Ravens’ Game Day App was being used by Wi-Fi connected fans, but usage was not as high as the team had originally anticipated. Visibility has allowed them to shift their focus from expanding the featured content on the app to improving the usage/adoption rate. By observing application usage on the network, the Ravens recognized that SnapChat was consuming more bandwidth than Twitter or Facebook in-venue, demonstrating the social preferences of the Ravens fan base; it is valuable insights like this into the mobile engagement patterns of in-venue fan, that will help shape the Ravens digital media and marketing strategy in future seasons, and help them to deliver more targeted and differentiated content to in-venue fans, while piloting promotional offerings and in-venue mobile services.

“From the network design and construction phase, through implementation, to the managing and fine-tuning of the network, we have been very satisfied with our experience in working with PCM, Extreme, and ABcom.”

ROY SOMMERHOF
VP OF STADIUM OPERATIONS, BALTIMORE RAVENS



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