Cisco Connected Stadium Wi-Fi Solution

The Cisco Connected Stadium Wi-Fi solution delivers high capacity and blanket coverage throughout a stadium to support a mix of back-office and guest access applications. The solution extends the stadium's network using purpose-built and proven Cisco products and technologies in a unique, validated design to keep guests connected, offer new insights and drive business growth

Cisco has designed and deployed Connected Stadium Wi-Fi networks in some of the largest and most visible stadiums and arenas around the world. From these experiences, our team of industry and mobility experts has developed a deep understanding of how to meet the many challenges of building High Density wireless networks in these stadiums. The Cisco Connected Stadium Wi-Fi solution:

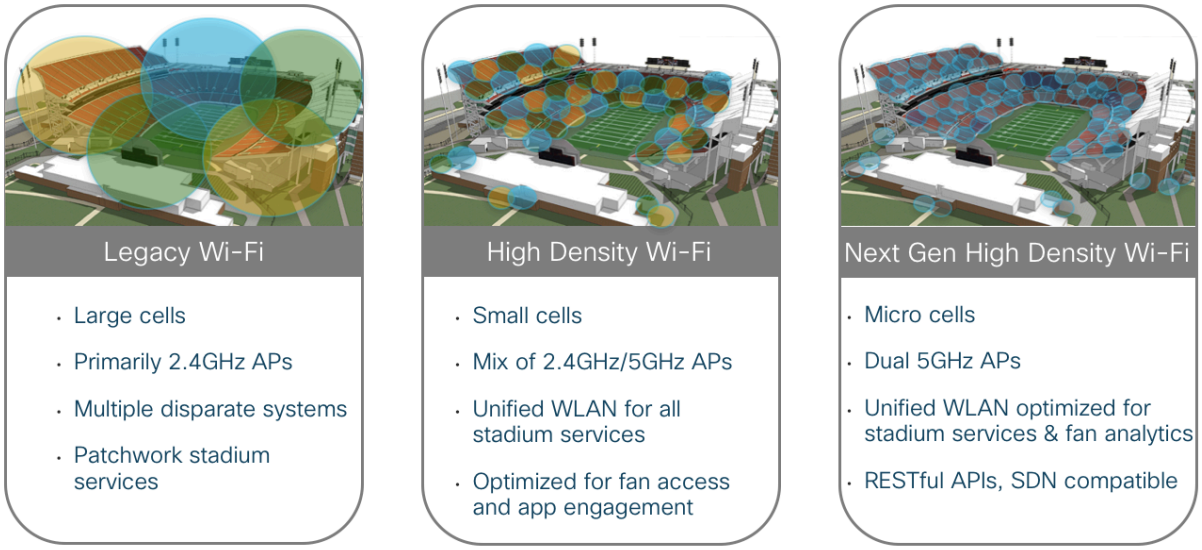
- Supports the demanding access and security requirements of the different Wi-Fi networks used in stadiums, such as Point of Sale, Ticketing, Business Management Systems, Guest and Contractors, Special Events, and Internet and walled garden access for fans
- Optimizes the capacity for all client devices
- Meets the stringent aesthetic requirements of stadiums
- Overcomes radio frequency (RF) interference often introduced by wireless devices brought in for special events
- Provides system-wide features for securely managing hundreds of access points and thousands of users
- Powers Cisco Connected Mobile Experiences (CMX) solutions to enable location based services and analytics
- Complements Cisco Vision for Sports and Entertainment (formerly Cisco StadiumVision) dynamic signage and IPTV experiences by enabling more relevant location based services and fan engagement opportunities
- Seamlessly integrates with the Cisco Connected Stadium platform to provide a flexible, secure and scalable platform for innovation and growth

To address these needs, the Cisco Connected Stadium Wi-Fi solution employs highly directional antennas and high-performance, dual-band access points along with software algorithms to automatically tune the wireless network to the constantly changing RF environment. It also uses CleanAir technology, which provides integrated, silicon-level spectrum intelligence that detects, classifies, and mitigates RF interface.

For network management and visibility, the solution includes feature-rich WLAN controllers and Cisco Prime Infrastructure, while providing seamless extensibility for advanced High Density Wi-Fi monitoring solutions such as Cisco's Mobility Insights Services.

The Cisco Connected Stadium Wi-Fi solution uses advanced Radio Resource Management (RRM) features and high-gain antennas to deliver potentially thousands of micro Wi-Fi cells throughout a stadium, with each cell supporting high capacity and a diverse set of WLAN devices. As shown in Figure 1, this tighter packaging of micro Wi-Fi cells makes it possible to support a greater number of data users.

Figure 1. Improving Coverage and Capacity with Cisco Connected Stadium Wi-Fi



Successful deployment of this solution requires:

- A comprehensive assessment to understand the needs and challenges that are unique to each stadium
- Careful planning to help ensure an adequate number of access points and their correct placement to support the required capacity
- An understanding of deployment best practices to securely integrate any existing wireless networks that may be present in the stadium
- Fine-tuning of access points channel assignments and RF power levels during implementation to help ensure proper coverage

Cisco Advanced Services offers a range of services for the Cisco Connected Stadium Wi-Fi solution to support you from the assessment and planning stages through deployment and tuning. Using their experience in implementing the solution at multiple stadiums, the Cisco Advanced Services team of stadium specialists provides unmatched experience in assessing, designing, deploying, and tuning this comprehensive Wi-Fi solution.

Cisco Connected Stadium Wi-Fi Benefits

The Cisco Connected Stadium Wi-Fi solution is designed to address the unique challenges of providing comprehensive WLAN coverage in sports and entertainment stadiums. Specifically, the solution addresses the need for wireless fan access within the stadium "bowl." Fans at these events are the most challenging user group to accommodate considering the high density of users, the openness of the area, and physical challenges of placing WLAN access points in the bowl.

The results benefit the fans, the team, league, cellular service providers, and affiliated partners like food and beverage providers, sponsors, and advertisers.

- **Benefits for fans:** Fans now have reliable access to an increased array of data applications that work well over a high-capacity wireless network. In addition, due to the data offload, voice and text services are improved.
- **Benefits for the team and league:** With the improved coverage and capacity, clubs and leagues have expanded options for creating more engaging mobile applications to enhnace the fan experience. Clubs and leagues can provide access to exclusive, in-stadium, experience-enhancing applications for way-finding, food and beverage purchase, and more. And all the while, teams can gain deeper insights into fan profiles, needs and behaviors.
- **Benefits for service providers:** Because the 3rd Generation/4th Generation (3G/4G) network is no longer as burdened with bandwidth-hungry data applications, voice calls and texting work again, eliminating the customer complaints often heard by service providers regarding the use of cell phones in this type of demanding environment.
- **Benefits for sponsors:** With Cisco Connected Stadium Wi-Fi delivering reliable mobile connectivity, fans can enjoy unique stadium experiences. In addition, stadiums, teams and their sponsorship and advertising partners can engage fans in more relevant ways by extending their reach beyond the big screen and displays throughout the venue. In tandem with Cisco Vision for S&E, all parties reap the benefits of a more immersive, digital experience.

The foundation of the Cisco Connected Stadium Wi-Fi solution is Cisco Connected Stadium, a single connectivity platform for sports and entertainment stadiums that enables innovative engagement models and enhanced fan experiences, as well as, new stadium revenue growth opportunites.

Cisco Connected Stadium Wi-Fi Components

The components that make up the Cisco Connected Stadium Wi-Fi solution have been carefully selected and tested to ensure that the solution provides the sports stadium with adequate wireless LAN coverage and capacity. When deployed correctly, the solution helps provide fans in the stadium with reliable wireless access, including good voice and text service. To provide their validated benefits, it is important that the design and the selected components meet the approved Cisco Connected Wi-Fi design best practices that reflect the experience and expertise of hundreds of deployments.

Table 1. Cisco Connected Stadium Wi-Fi Solution Requirements

Category	Product	Function
Access Points	Cisco Aironet® 3802p / 3702p Access Points (with external antennas)	Used for bowl seating and other high-density areas that require the Cisco High-Gain Stadium Antenna
	Cisco Aironet 3802i / 3702i Access Point (with internal antennas)	Used for low-density coverage in carpeted areas, clubs, and suites where an access point can be mounted on ceiling tile.
	Cisco Aironet 3802e / 3702e Access Point (with external antennas)	Used in carpeted areas, clubs, and suites where external antennas are required.
Antennas	Cisco Aironet 2.4- and 5-GHz High-Gain Multiple-Input Multiple-Output (MIMO) Stadium Antenna	High-gain, directional patch antenna used for bowl seating and other high-density areas. The Stadium Antenna must be used with either the 3802p or 3702p.
	Cisco Aironet 2.4-GHz MIMO Patch Antenna	Directional patch antenna used in clubs and medium-density concourses. Used with 3802e or 3702e.
	Cisco Aironet 5-GHz MIMO Patch Antenna	Directional patch antenna used in clubs and medium-density concourses. Used with 3802e or 3702e.

	Cisco Aironet 2.4 and 5-GHz MIMO Patch Antenna	Directional dual-band patch antenna used in clubs and medium-density concourses. Used with 3802e or 3702e.
	Cisco Aironet Dual-Band MIMO Omnidirectional Antenna	Omnidirectional antenna used in carpeted areas, suites, and other low-density settings.
Wireless LAN Controllers and Management Systems	Cisco 8540 or 5520 series Wireless LAN Controller	Wireless LAN Controllers act as a centralized aggregation point for access point control. There are two options; the 8540 or 5520 series standalone appliances.
	Cisco Prime Infrastructure	Used for centralized management of wireless system.

Cisco Services for the Connected Stadium Wi-Fi Solution

You can realize the full business value of your Cisco Connected Stadium Wi-Fi solution investment with smart, personalized services from Cisco. Cisco Services for the Cisco Connected Stadium Wi-Fi solution incorporate assessment, architecture planning, solution design, and implementation services. These services are designed to help facilitate a smooth deployment and ongoing maintenance of the solution, including hardware coverage and software upgrades.

For more information about Cisco Services for the Connected Stadium Wi-Fi solution, please contact your local Cisco account manager.

Cisco Connected Stadium Wi-Fi Solution Features and Functions

- Support for 802.11 a/b/g/n/ac (802.11ac Wave 2)
- Support for simultaneous dual 5GHz radio configuration within one Access Point
- Industry unique integration with Apple iOS devices through our partnership with Apple
- Wide variety of 2.4- and 5-GHz access points and antennas
- Specialized hardware, such as a stadium-grade antennas and custom chips in the access point for spectrum analysis
- Cisco CleanAir technology for continuously monitoring the RF environment to automatically optimize the wireless coverage and mitigate RF interference and service clients simultaneously
- Full support for 802.11v, 802.11k, and 802.11r for enhanced roaming and association during events
- Cisco ClientLink beamforming technology to improve the uplink and downlink performance of clients
- Cisco Receiver Start of Packet Detection Threshold (Rx-SOP), which addresses problematic clients with weak RF links (sticky clients) and enables efficient load balancing across access
- Cisco Connected Mobile Experiences (CMX) and CMX Engage integration for location-based and captive portal services used within the stadium and surrounding environment that benefits from the Wi-Fi coverage area
- Cisco radio resource management for systematically managing access point channel assignment, power levels, and other tasks required to optimize the performance of the Wireless network
- Seamlessly integrates with the Cisco Connected Stadium network and management platform for a guaranteed interoperability and efficient operational support
- Multicast support for Cisco Vision Wi-Fi connected Digital Media player content upload and display state control

For More Information

For more information about the Cisco Connected Stadium Wi-Fi solution and the benefits it provides, please visit http://www.cisco.com/web/strategy/sports/ or contact your local Cisco account representative.

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