

Cisco Connected Stadium Wi-Fi Solution Frequently Asked Questions

Question: What are the trends driving the need for Cisco® Connected Stadium Wi-Fi?

Answer: The growing adoption of smartphones has a great impact specifically on the sports and entertainment industry. Venues, clubs, and leagues are already creating applications and social networking sites for fans to get stats, the latest scores, and highlights, and to access fantasy sports and view videos of other matches.

The concentrated increase in the use of smartphone data applications within a venue can strain the capabilities of 3rd or 4th Generation (3G/4G) networks and interfere with voice and text services. The Wi-Fi networks within the venue are not typically designed to provide the increased coverage or capacity needed to accommodate data service offload. This can have a negative impact on the overall fan experience in the venue.

In addition, venues recognize that digital media offers new revenue opportunities. First, venues learned how to monetize the one or more “big screen” displays through sponsorship and advertising deals. Then, venues started to deploy solutions such as Cisco StadiumVision®, which enables the display of high-definition video and digital media on thousands of displays throughout the venue. The next step is to capitalize on the tens of thousands of smartphones in a way that also generates revenue.

Question: What are the benefits of the Cisco Connected Stadium Wi-Fi solution?

Answer: The Cisco Connected Stadium Wi-Fi solution benefits the fans, the venue and the league, the cellular service provider, and the sponsors and advertisers:

- Fans have reliable access to an increased array of data applications that work well over a high-capacity Wi-Fi network. In addition, due to the data offload, voice and text services are improved.
- Venues and leagues have expanded options for creating more engaging mobile applications to enhance the fan experience. Venues can provide access to exclusive, in-venue, experience-enhancing applications for way-finding, food and beverage purchase, and more.
- Service providers gain increased customer satisfaction because the 3G/4G network is no longer burdened with bandwidth-hungry data applications. Voice calls and texting work again.
- Sponsors and advertisers can extend their advertising reach beyond the big screen and the concourse TVs to smartphone users.

Question: Where has the Cisco Connected Stadium Wi-Fi Solution been deployed?

Answer: The Cisco Connected Stadium Wi-Fi solution has already been deployed in leading venues, including AT&T Park, Dallas Cowboys’ Stadium, and Pittsburgh’s Consol Energy Center. It is currently being deployed in additional venues, including mega stadiums, hockey arenas, U.S. baseball parks, and entertainment venues in the United States, Canada, and Europe.

Question: Why is Cisco the leader in sports and entertainment Wi-Fi solutions?

Answer: While other companies are looking to develop and deploy high-density wireless offerings, Cisco is unique in its ability to provide a proven solution specifically designed for sports and entertainment venues, coupled with a comprehensive services offering.

Because Cisco has designed and deployed the Connected Stadium Wi-Fi solution in some of the largest stadiums in the world, our team of experts has developed a deep understanding of how to meet the many challenges of building wireless networks in these venues, including:

- Supporting the demanding access requirements of dissimilar networks
- Optimizing the capacity for all client devices
- Meeting the stringent aesthetic requirements of stadiums
- Overcoming radio frequency (RF) interference
- Providing systemwide features for managing hundreds of access points and thousands of users

Also, Cisco is continuing to develop solution enhancements and innovative features for high-density environments. This will enable additional fan experiences and help service providers satisfy their increasingly data-hungry subscribers, while helping teams and stadium operators engage with their passionate and content-hungry fans.

Question: How does Cisco Connected Stadium Wi-Fi differ from Cisco's standard WLAN solutions?

Answer: Although the best practices used for deploying wireless in an enterprise still apply, Cisco Connected Stadium Wi-Fi deployments are tailored to support a very high density of Wi-Fi devices in a relatively small area. This environment is typically found in entertainment venues like stadiums or arenas. These are harsh environments in which to provide good Wi-Fi service. They call for micro-cell design using highly directional antennas and finely tuned systemwide management of the RF power levels and channel assignments across hundreds of access points.

Question: Can High Density Wi-Fi deployments for convention centers, conference halls, auditoriums, and theaters be implemented partially or to coexist with other competing WiFi networks?

Answer: To ensure the maximum performance of High-Density wireless deployments, it is a requirement that the entire venue utilize the same Cisco Unified Wireless Network (CUWN) architecture or adhere to an appropriate RF Policy to de-conflict any competing WLANs in the airspace.

From a general airspace perspective, attempting to overlay separately managed WLAN architectures on top of each other leads to airtime efficiency issues resulting in performance loss. Furthermore, from an RF coverage area perspective, the CUWN architecture must at minimum cover the entire public-facing area and any ancillary areas required for other core venue services such as administration, ticket-scanning, and point-of-sale.

Most existing WLANs in venues today utilize a legacy approach of coverage over capacity. It can be expected that in these legacy deployments, high power and low order data rates are utilized to provide a maximum of coverage at the expense of performance. When deployed alongside legacy networks, modern HD WLANs must contend with this inefficient use of airtime due to the inherent contention algorithms within 802.11 such as physical energy detection (CCA) and virtual carrier sense (NAV).

For perspective, Cisco has observed channel utilization as high as 75% in empty venues where legacy networks were simply beaconing their presence, leaving only 25% available airtime for new network communications. Overlaying an HD WLAN on top of that kind of existing utilization would lead to severe performance issues for any HD clients.

From an HD coverage perspective, attempting to partially deploy an HD architecture in the venue, even in a pristine RF environment, can present severe challenges. This is largely due to the effects of Client Induced Interference (CII) that Cisco has observed in deployments around the world. When attempting to deploy a partial HD deployment, the WLAN designer is artificially limiting the amount of radios in the bowl available to clients, which has an impact on the RF performance even for the intended clients. Clients in the bowl (be they mobiles, tablets, or laptops) will consistently send out probe requests for WLAN networks previously cached in their scan lists. This is one component of CII and is typically quieted down when clients have a radio to associate to. Partial venue deployments by their nature do not provide appropriate coverage for all potential clients in the airspace, leading to increased levels of CII. Additionally, APs in partial deployments can be expected to have many clients associated to them at the minimum mandatory rate, as they pick up clients located outside their intended HD cell area. Clients that would normally be served by their own HD cell in a standard deployment.

Cisco has found throughout the course of its experience in deploying HD Wi-Fi venues throughout the world that failing to adhere to proper HD Wi-Fi design approaches (attempting partial deployments, attempting overlay upon legacy WLANs, no RF policy in place, etc.) can lead to reduced performance, reduced effective coverage areas, and increased customer satisfaction issues.

For more information on defining and enforcing a proper RF Policy, please see the following URL:
http://www.cisco.com/c/en/us/products/collateral/wireless/spectrum-expert/prod_white_paper0900aecd8073bef9.html

Question: Does Connected Stadium Wi-Fi take advantage of Cisco CleanAir technology?

Answer: Yes, Connected Stadium Wi-Fi uses the Cisco Aironet 3700 Series Access Points, which include CleanAir technology. Cisco CleanAir technology uses silicon-level intelligence to create a spectrum-aware, self-healing, and self-optimizing wireless network that mitigates the impact of wireless interference and offers performance protection for 802.11n networks.

For more information about CleanAir, visit: <http://www.cisco.com/en/US/netsol/ns1070/index.html>

Question: What is radio resource management and why is it needed?

Answer: Radio resource management, also known as auto-RF, adjusts the channel (using dynamic channel assignment) and power (using transmit power control) to maintain the RF coverage area. It adjusts the power level of the access point to maintain baseline signal strength with neighboring access points. It adjusts the channel of the access point when it notices nearby interference sources on the channel on which the access point is currently located. It continues to optimize the RF coverage for the best reception and throughput for the wireless network, detecting the loss of the access point and increasing the adjacent access point's power to automatically fill the coverage hole. Radio resource management is crucial to the efficient radio management of the hundreds of access points throughout the stadium.

Question: What are the network requirements for Cisco Connected Stadium Wi-Fi?

Answer: The recommendation is to use a validated Cisco Connected Stadium infrastructure design, which is based on Cisco's Borderless Network architecture.

The network requirements required for Connected Stadium Wi-Fi solution include:

- Gigabit ports on the access switches connecting to the access points
- Access switches that have 802.3af Power over Ethernet (PoE) as minimum or 802.3at PoE+ ports (recommended) for powering access points
- Cisco Catalyst ® security features (for example, port security and the Bridge Protocol Data Unit [BPDU] guard feature) for securing the access ports
- Switch ports for access points assigned their own VLAN separate from other services (for example, voice)
- Quality-of -service support for prioritizing and queuing traffic through the network
- 10 Gigabit Ethernet uplinks to the core or distribution switches (recommended)
- Dynamic Host Configuration Protocol (DHCP) server capable of serving the thousands of requests that come in during an event. Cisco Network Registrar is recommended.
- Domain Name System (DNS) or DHCP server for facilitating Cisco Wireless LAN Controller discovery by the access points

For more information about the Cisco Connected Stadium Wi-Fi solution, visit: <http://www.cisco.com/go/sports>.

Question: What services are offered for Cisco Connected Stadium Wi-Fi?

Answer: Please see the services data sheet for a list of Cisco Advanced Service offerings for Connected Stadium Wi-Fi: <http://www.cisco.com/go/sports>.



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