

Cisco Connected Stadium Wi-Fi and Meraki Positioning

The Wi-Fi market today offers a number of solutions that our Customers can consider, including two solutions available from Cisco:

- Cisco Connected Stadium Wi-Fi
- Cisco Meraki

This document provides a brief overview of each offering, guidelines on positioning to guide the reader to the appropriate solution. This document is not meant to be an in-depth technical comparison of the solutions. As with any solution, understanding requirements will ultimately determine the right solution for the particular market segment.

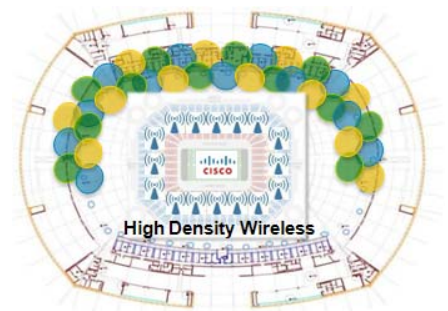
Connected Stadium Wi-Fi Solution

The Connected Stadium Wi-Fi solution is a single, converged wireless LAN platform for guests, venue employees and operations. It delivers reliable Wi-Fi coverage to thousands of users throughout a venue, targeting densities as low as 2 clients per square meter to accommodate thousands of wireless devices in the same airspace. The solution is optimized for data offload from the 3G/4G network, thereby enhancing the performance of data applications and improving voice and text services.

The Connected Stadium Wi-Fi solution supports a mix of back-office and guest access applications. It allows Wi-Fi devices to seamlessly access to media-rich applications in the venue, enabling venues to offer new revenue-generating mobile applications.

The solution is designed specifically to address the unique challenges of a sports and entertainment property, including:

- Supporting the demanding access and security requirements of the different Wi-Fi networks used in sports and entertainment properties, like point of sale purchases, ticketing, business management systems, guest and contractor access, special events, and Internet and walled-garden access for fans
- Optimizing the capacity for all client devices
- Meeting the stringent aesthetic requirements of sports and entertainment properties
- Overcoming the radio frequency (RF) interference often introduced by wireless devices brought in for special events
- Providing system-wide features for securely managing hundreds of access points and thousands of users



Benefits of the Cisco Connected Stadium Wi-Fi Solution

The Cisco Connected Stadium Wi-Fi solution has been designed to specifically fulfill the needs of the Sports and Entertainment market including the fan, the venue and league, the cellular service provider, and the sponsors and advertisers. The Cisco Connected Stadium Wi-Fi solution provides the following benefits and has some unique characteristics that differentiate it from the Meraki Solution.

- All control, configuration, optimization, and mobility control is local to the venue.
- 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 will be 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 saturated with bandwidth-heavy data applications resulting in increased voice and texting quality.
- Sponsors and advertisers can extend their advertising reach beyond the big screen and the concourse TVs to Smartphone users.

Also, the Connected Stadium Wi-Fi solution requires a high-touch sales and service model to handle the complexity inherent in serving such a dense population of users in an event-based business.

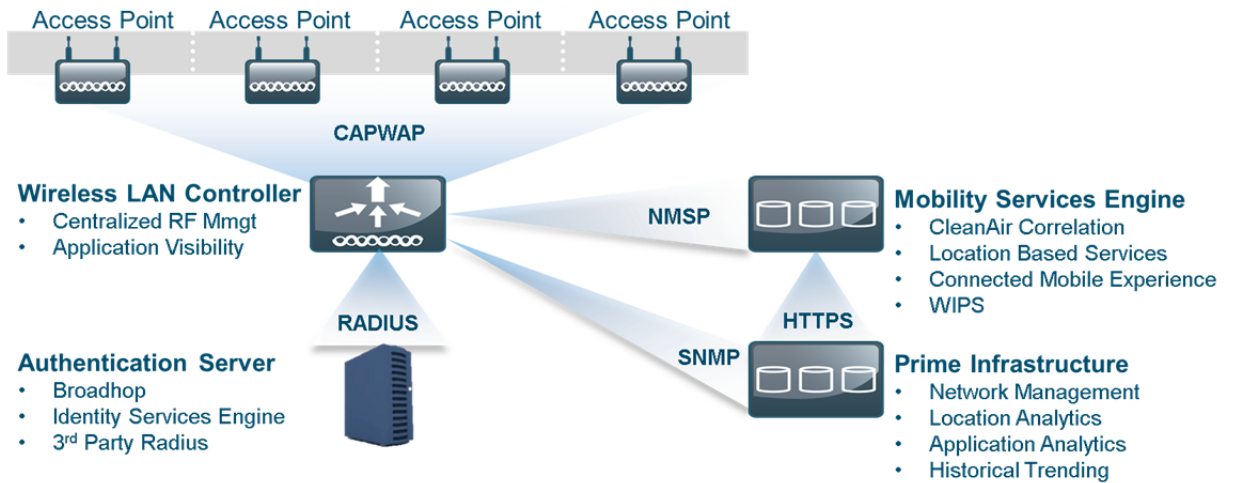
Architecture

The Cisco Connected Stadium Wi-Fi architecture is based on the Cisco Unified Wireless Network architecture, in which WLAN configuration and control is centralized in the Cisco WLCs. This architecture allows the entire WLAN to operate as an intelligent information network that enables seamless roaming and eases the management of large numbers of access points.

The architecture incorporates Cisco access points along with standard antennas and special-purpose “stadium” antennas, which are critical to supporting the required small-coverage cells and high capacity throughout the venue’s crowded areas. The dual-band, high-gain multiple-input multiple-output (MIMO) antenna was specifically designed to address the tight beamwidth, constrained mounting, and challenging aesthetic requirements of high-density venue seating areas.

The architecture uses lightweight, dual-band access points that support both the 2.4-GHz and 5-GHz bands and splits the 802.11 MAC functions with the WLC. This “split MAC” architecture enables seamless mobility and support for a number of advanced features in an elegant and scalable way.

The WLAN is an overlay network tunneling wireless client traffic associated with a specific Service Set Identifier (SSID) to the WLC, where it is bridged into VLANs. Each VLAN is then routed to a specific destination depending on the service that is provided. For example, fan traffic maybe securely routed to the Internet or a captive portal. Traffic from cash registers is routed to the PoS servers, while employee traffic is routed to the property’s intranet, and traffic from the ticket scanners is routed to the ticketing servers.



In addition to the access points and the specially-designed stadium antennas, the architecture includes:

- **Wireless LAN Controller** - Provides centralized management of the Access Points and enables network wide functions like mobility, RF, QoS and security.
- **Authentication Server** – (Optional) Provides secure sign-on to protected Wi-Fi networks, including identity verification, policy enforcement, and security compliance.
- **Mobility Services Engine** - Enables location-based information, services, and analytics. It supports location services for up to 2500 access points. For example, the MSE is used to:
 - Track and locate interferers, rogues, Wi-Fi clients, and RF tags
 - Detect presence and receive geo-fenced or zone-based alerts
 - Show system wide interferer details and correlation
 - Visualize interferer zone of impact
 - Heighten customer experience by integrating indoor navigation experiences into loyalty apps
 - Increase app usage by automatically connecting to the Wi-Fi network and launching loyalty apps upon arrival
- **Network Management** - simplifies and automates many of the day-to-day tasks associated with configuring and managing the end-to-end network infrastructure. Prime Infrastructure delivers wireless management capabilities, including radio frequency (RF) management, user access visibility, reporting, and troubleshooting, along with network infrastructure lifecycle functions such as discovery, inventory, configuration and image management, compliance reporting, integrated best practices, and reporting.

Cisco Connected Stadium Wi-Fi Services

The Cisco Stadium Wi-Fi solution requires a specific skill set and therefore deployment services are offered in the following packages:

- **Day 1/Deployment** - Cisco Advanced Services have a defined deployment methodology to successfully install and customize the solution to the architectural and RF environment needs of each individual customer. This includes Cisco quality milestones set forth to accomplish all Customer requirements and help ensure the success of a deployment.

An enablement program has been created for qualified partners that encounter these opportunities often within their theatre. Partners that qualify for this program go through an enablement process that includes deployments and training courses to ensure that the partners understand the deployment methods, preferences, and requirements in this environment.

- Day 2 - RF environments are generally very dynamic and are constantly changing from event to event. Cisco offers a Day 2 service which allows customers ensure that the deployment that has been delivered maintains its quality throughout a period of time in which changes out of the control of the Venue owner may have occurred.

For More Information

Additional information about the Cisco Connected Stadium Wi-Fi solution can be found at:

http://www.cisco.com/web/strategy/sports/stadium_wifi.html

Cisco Meraki

The Cisco Meraki solution has evolved over time to address a wide breadth of markets including large and distributed enterprises, branch offices, retail, hospitality and Wi-Fi hotspots.

Benefits of the Cisco Meraki Solution

The Meraki solution provides the following benefits and has some unique characteristics that differentiate it from the Cisco Connected Stadium Wi-Fi solution.

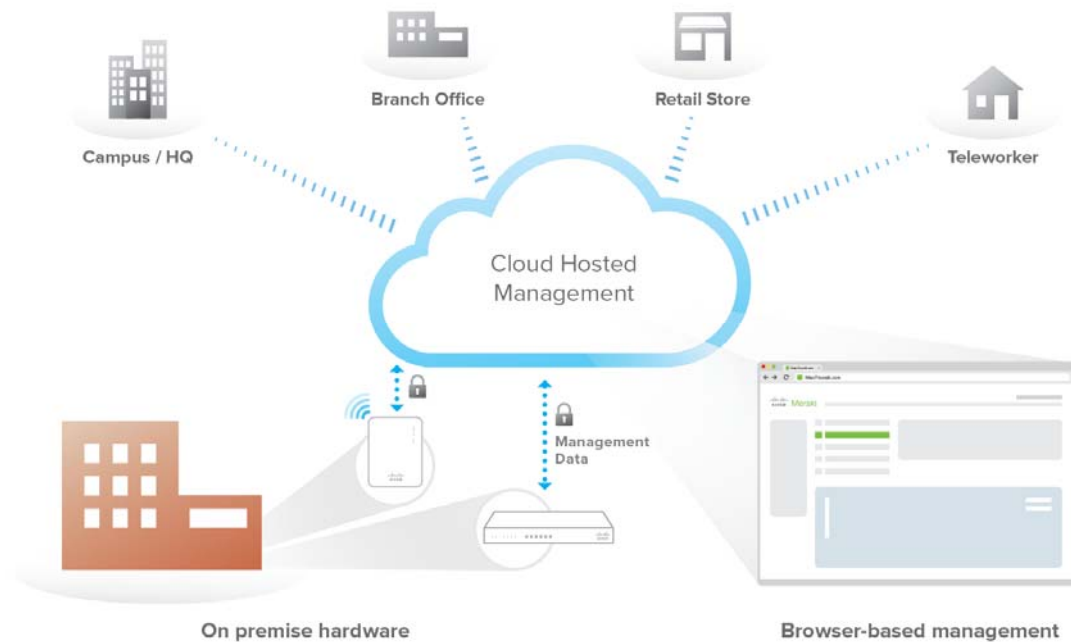
- All control, configuration, optimization, and mobility control is centralized in Meraki's data center.
- Simple to deploy and manage through plug and play APs, intuitive web-interfaces, centrally managed APs that can be deployed locally or remotely
- Affordable, license-based solution that is accessible for customers who have quality requirements but limited budgets
- Ultra-high availability data centers and geographic redundancy that benefit the enterprise without incurring the expense of multiple redundant controllers.
- Elimination of potential performance bottleneck because the data traffic does not flow through the Cloud Controller.
- Scalable with capacity of up thousands of access points per network, and an unlimited number of networks per Meraki Cloud Controller account.
- Easy to monitor multiple sites, including branch offices and multiple divisions, from a single remote console..

Architecture

The Cisco Meraki solution uses a much different architecture and product set to address the Wi-Fi market across a breadth of customer bases. In the same way that hosted software applications, or Software as a service (SaaS), offer significant advantages over the client server model, the Meraki Cloud Controller architecture provides a simpler, faster, and more cost effective deployment model for wireless networks over a large area.

Meraki's hosted architecture offers some advantages over hardware controller based systems. In the Meraki architecture, there is only one hardware component: the access points. All control, configuration, optimization, and mobility control is centralized in Meraki's data center. Meraki APs tunnel back to the Meraki Cloud Controller (MCC). An administrator logs into the Meraki Cloud Controller through a web browser, providing access to all of the

wireless networks in his account, regardless of geographical location. An administrator can make configuration changes and obtain reporting information, either on a specific network or in aggregate. The system sends alerts if there is a problem in one of the networks and runs troubleshooting and diagnostics tools to pinpoint the issue.



Characteristics of the Meraki architecture include:

- **Data Flow** - The Meraki Cloud Controller is out of band, which means that client traffic never flows through it. This is important both for performance and security reasons. To ease installation, APs initiate the connection through the corporate firewall, eliminating the need to create new firewall exceptions.
- **Security** - Control traffic flows between the APs and the Cloud Controller via a persistent tunnel. All sensitive data, such as configuration details, user names, and passwords, are encrypted. Availability is also important. Multiple geographically distributed data centers are used to ensure that networks continue to function even in the event of a catastrophic failure.
- **Management** - All management is done remotely through a Web browser. Unlike other Enterprise Wi-Fi solutions, installing and maintaining a separate management server or appliance is not necessary. The administrator can also remotely diagnose the APs, using standard tools like ping, from the Meraki remote management interface.
- **Address Assignment** - APs can operate either in bridge mode or NAT mode.
 - In bridge mode, clients receive their IP addresses from a DHCP server running on the LAN. Clients appear to be on the LAN and can communicate with local and internet hosts. This mode is most useful when clients need access to resources such as printers and file shares, or when clients will be monitored by existing network monitoring systems.
 - In NAT mode, clients receive an IP address from a DHCP server running on each access point. Each AP runs an algorithm that ensures unique IP addresses are received on each client. NAT mode eliminates

the need for an existing DHCP server and reduces IP address space requirements. It also allows operators to easily use multiple Internet egress points, such as multiple DSL lines, which may be useful in large, public access networks.

Cisco Meraki Services

The Cisco Meraki solution is deployed exclusively by approved Cisco Meraki partners.

For More Information

Additional information about the Cisco Meraki can be found at:

<https://meraki.cisco.com/products/wireless>

Sports and Entertainment Customer Requirements

Sports and entertainment properties have a unique set of services that drive business requirements. These business requirements, in turn, translate into WLAN design requirements. The high-level services offered in a sports and entertainment property include:

- Common wireless services
 - Administration and contractor access to Internet and local services
 - Mobile ticket scanning
 - Wireless point-of-sale devices
 - High-performance Wi-Fi access for the press and media
- Advanced wireless services
 - Fan access to the Internet and local services
 - Voice over Wi-Fi for sports and entertainment property staff
 - Location services for asset and lost-child tracking
 - Video surveillance over wireless
 - Wireless remote control units
 - Streaming Live Video

Wireless LAN Requirements

The high-level WLAN requirements of sports and entertainment properties may include the following. The requirements are expanded in more detail in the following chapters.

- **Wi-Fi device support:** Support for 802.11a/b/g/n clients.
- **Easy, secure network access to visiting contractors:** This includes the implementation of web authentication for visiting contractors and 802.1X or Cisco Network Admission Control (NAC) integration for employee-authenticated access.
- **Wi-Fi for point-of-sale (PoS) devices and ticketing:** Support PoS and ticketing Wi-Fi devices with network segmentation for separating this traffic from general property operations traffic.
- **Higher-capacity areas (press and media area, clubs):** The press and media area typically requires higher-bandwidth connections to the Internet and has a high number of devices in a small area. Also

overflow press areas must be accommodated if a property hosts special events such as a Super Bowl or World Series game.

- **3G/4G offload:** The sports and entertainment property WLAN must support smartphones with Wi-Fi capabilities and possibly provide access to cellular authentication servers for allowing cellular customers to connect to the property Wi-Fi.
- **High-density coverage and capacity:** Support for sufficient application bandwidth and high numbers of Wi-Fi devices in the general seating area and throughout the property.
- **Extension of the full benefits of integrated network services to nomadic users:** IP telephony, IP video, point of sale, and ticketing are supported over the WLAN, requiring that traffic handling be prioritized and seamless roaming be supported.
- **Location services:** Simultaneous tracking of hundreds to thousands of Wi-Fi and active RFID devices from directly within the WLAN infrastructure. There's been much interest in implementing location services within sports and entertainment properties for asset tracking, as well as for lost-child services.

Note: Location accuracy requires strategic placement of access points for triangulation. It is extremely challenging to achieve accuracy in high-density areas like the bowl because of the limitations of access point placement. Location requirements must be clearly identified and careful planning is required to help ensure that these requirements can be met.

- **Video surveillance and remote control unit WLAN coverage:** RF coverage and capacity to support streaming surveillance video and priority traffic handling for remote control unit messaging.
- **Securing the WLAN from unauthorized, unsecured, or "rogue" WLAN access points:** IT managers must be able to easily and automatically detect and locate rogue access points and the switch ports to which they are connected. They must be able to manage the active participation of both access points that are providing continuous scanning and monitoring of the RF environment.
- **Centralized WLAN management:** Easily deploy, operate, and manage hundreds of access points and thousands of users.
- **Enhanced security services:** Provide WLAN intrusion prevention system (IPS) and intrusion detection system (IDS) control to contain wireless threats, enforce security policy compliance, and safeguard information.
- **Existing WLANs:** Traditionally, separate WLANs have been deployed for different functions (for example, operations, point of sale, ticketing systems, and so on) within a venue. To provide good WLAN service to all functions, these WLANs must be consolidated onto a single WLAN infrastructure so that the RF environment, security, and operations can be centrally managed.
- **Access point mounting restrictions:** Because general seating areas have limited overhead structure, access point placement is limited and aesthetic restrictions must be adhered to.
- **Streaming of Live Video:** Video has come to the forefront of new services stadium, teams and leagues want to offer their fans. This places the requirement of providing a scalable way of distributing video to thousands of fans on the WLAN.

Solution Comparison

Having reviewed the Wi-Fi requirements of Sports and Entertainment properties, let's now compare the feature sets of both Cisco Meraki and Cisco Connected Stadium Wi-Fi.

	Cisco Meraki	CSWF
Positioning and Long term strategy	<ul style="list-style-type: none"> • HD Lite deployments • Back of House Deployments • Retail/Hospitality • Cloud based • Low Configuration Demands • Application Push 	<ul style="list-style-type: none"> • High Density Deployments • Most challenging RF environments • Robust Location Services • SP Wi-Fi Offload
Marquee Deployments	<ul style="list-style-type: none"> • Westfield USA • BoH Wimbledon • Thomas Cook 	<ul style="list-style-type: none"> • London 2012 Olympics • Super Bowls 45-49 • MLB World Series
Selling strategy	<ul style="list-style-type: none"> • Operability Ease • Low implementation cost • Interoperability with CMX and ISE • Low Requirement Short Term Deployments • All products sold per renewable License 	<ul style="list-style-type: none"> • Advanced Services quality • Compatibility with other Cisco Technologies • Managing of Services
Deployment options	<ul style="list-style-type: none"> • Partner Only 	<ul style="list-style-type: none"> • Advanced Services • Enabled Partner

Positioning Based on Functional Requirements

Meraki and Connected Stadium Wi-Fi both use robust and top of the line architecture approaches to meet different requirements encountered within the Sports and Entertainment industry. Every vertical, however, will have different requirements which both technologies approach differently through a set of features developed exclusively to meet these challenges.

In general, the Connected Stadium Wi-Fi solution lends itself to more demanding RF scenarios and complex location based designs. However, the Cisco Meraki architecture provides benefits around ease of setup and corresponding reduced costs.

The following table illustrates how well the features of each offering address the requirements of many customers.

Requirement	Cisco Meraki	Cisco CSWF
Difficult RF environment		Primary
Ultra High Density		Primary
Ease of Setup	Primary	Secondary
App Push Capability	Primary	Secondary
Scalable Video over Wi-Fi		Primary
Local content injection	Secondary	Primary
High configuration requirements		Primary
Limited deployment timeline	Primary	Secondary
SP Wi-Fi Authentication		Primary
Additional Cisco Technologies	Secondary	Primary

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- **Difficult RF Environment:** Connected Stadium Wi-Fi components have been carefully selected and customized to meet the challenges faced in a non-licensed shared radiofrequency spectrum. Use of radio-sensitivity, RF Analysis, and customization in Radio Resource Management features gives the Connected Stadium Wi-Fi solution an edge over Meraki Products. **Choice: CSWF Solution**
 - **Ultra High Density:** A combination of RF feature sets and custom made antennas dedicated to a High Density deployment allows the Connected Stadium Wi-Fi solution to excel in highly populated areas where high quality service is needed. **Choice: CSWF Solution**
 - **Ease of Setup:** Various events in this industry have short-time framed windows of execution; Meraki's user-friendly GUI and configuration sense allows a deployment to be carried out with greater speed and without the need of specially HD trained engineers. **Choice: Meraki Architecture**
 - **App Push Capability:** Meraki offers the possibility for a customer to push a house or a sponsor's application directly to the user based on various parameters that fit the customer's target profile. This allows for ease of interaction between customer and user. **Choice: Meraki Architecture**
 - **Scalable Video over Wifi:** StadiumVision Mobile, a scalable video over Wi-Fi streaming technology, requires a well-balanced RF environment and is designed to be used with specific Connected Stadium Wi-Fi components. This feature gives the Connected Stadium Wi-Fi solution an advantage in terms of services a customer can offer. **Choice: CSWF Solution**
 - **Local Content Injection:** The capability for venues to provide guest users/fans the ability of their apps to access local content such as live video. Often times there are content licensing restrictions that preclude the use of specific content beyond certain geographical boundaries. **Choice: CSWF Solution**
 - **High Configuration Requirements:** Meraki has an architecture that is aimed at customers with low IT resources and requirements. Its ease of installation makes it an attractive architecture for managing a network with very minimal interaction and configuration. The industry, however, has various customers with a broader technical scope that connect internal departments, services, campuses, and stadiums which requires a robust network with added flexibility and security. **Choice: CSWF Solution**
 - **Limited Deployment Timeline:** Where tight timelines exist for the design and commissioning of temporary deployments, etc. **Choice: Meraki Architecture**
 - **SP WI-FI Authentication:** Various customers in this industry tend to be Service Providers whose requirements are concentrated on onboarding their clients and potential roaming clients. SPs use different authenticating techniques that allow them to easily identify who is accessing their network; the Connected Stadium Wi-Fi solution has the necessary robustness to support authentication methods used by these SPs, such as EAP-SIM. **Choice: CSWF Solution**
 - **Additional Cisco Technologies:** Cisco offers a wider range of services, products, and technologies that many of the customers in this industry might want to use to enhance the services being provided or to improve the efficiency of their workforce. Meraki has a limited compatibility with other Cisco services and products, which limits merging of various networks to one homogenous one. Today, Meraki's compatibility with Cisco wireless is limited to CMX and ISE integrations. **Choice: CSWF Solution**

The following table illustrates how well the features of each offering address the requirements that are typically set forward by customers in RFPs or when making a vendor selection.

Requirement	Cisco Meraki	Cisco CSWF
General		
Location Based Services	Secondary	Primary
CMX		
Facebook Login	Either Solution	Either Solution
Visitor Connect		Primary
CMX Application API		Primary
Security		
ISE	Either Solution	Either Solution
Management		
Cloud Based WLC	Primary	Secondary
Detailed Reporting Capabilities	Secondary	Primary
Analytics		
EMSP	Secondary	Primary
CVA	Secondary	Primary
Application Integration		
App Push	Primary	
Other		
Cost	Primary	Secondary

In some cases, the customer requirement may be achieved by either offering. In this case, the end-decision is determined based on the strong points of each offering.

Positioning Based on Vertical Market

Within the various verticals in which these two architectures fit, let's look at a comparison in terms of how each one performs among the general requirements and difficulties faced by most representative customers of each industry.

Vertical	Cisco Meraki	CSWF
Leagues/ Mega Events		Primary
Sports/Music Venues	Secondary	Primary
Short Events	Primary	Secondary
Convention Centers	Either Solution	Either Solution
Casinos/Clubs/Theaters	Either Solution	Either Solution
Theme Parks	Primary	Secondary
Sports Bars	Primary	Secondary

- Leagues/Mega Events:** These customers generally have very high attendance, high national/global visibility, or high technical requirements. Connecting a mega event, such as a Super Bowl or the Olympic Games, requires a robust network that is highly redundant and highly capable of maintaining services for tens of thousands of spectators. Connecting leagues requires the capability to have very customizable configuration capabilities in order to meet the challenges faced at each stadium, datacenter, or

interconnected venue. The Connected Stadium Wi-Fi solution is the only architecture that can produce the performance expected from our customers to achieve a successful deployment. **Choice: CSWF Solution**

- **Sports/Music Venues:** Individual venues will have different needs based on the services which need to be provided and both architectures can address these requirements to certain levels. Meraki has the capability to serve customers whose scopes are segmented or limited, back of houses, VIP areas, shops, and very small venues; these customers have traditionally required less area to be covered, limited amount of users to be on-boarded, and limited services that will be offered. **Choice: Meraki Architecture**
With customers that have a higher scope (e.g., full venue, large high-density areas, multiple services) a Connected Stadium Wi-Fi solution architecture is preferred due to the customizability and vast range of configuration options that the Connected Stadium Wi-Fi solution portfolio presents to address all different challenges encountered and services to be provided. **Choice: CSWF Solution**
- **Short Events:** In some instances customers require an installation to be set up in a short time frame and with less demanding quality requirements. Meraki's ease of installation and management and low cost, makes it a very attractive options for these environments. Full, partner-lead deployments allow for costs to be maintained to a minimum and the time licensing structure allows for the customer to buy licensing only for the time that the equipment is needed. **Choice: Meraki Architecture**
- **Convention Centers:** This vertical can range from very small venues to centers with a capacity reaching the tens of thousands. This leads to the need of understanding what RF environment currently exists and is projected to be deployed, what services need to be deployed, and the scope of expected guests to be on boarded. **Choice: CSWF Solution**
- **Casinos/Clubs/Theatres:** These verticals are a good fit for both architecture depending on the overall customer requirements needed. The Connected Stadium Wi-Fi solution and the Meraki architecture have features that address different use-cases the customer may have and therefore, both solutions should be evaluated. **Choice: Meraki Architecture**
- **Theme Parks/Sports Bar Chains:** These verticals generally present lower requirements and quality needs but with high customization on services to be provided. The App Push function Meraki offers allows users to easily interact with the customer through an application that is easily provided. Smaller bars or a chain of bars can have limited local IT resources if at all and a cloud based solution will allow minimum IT personnel to overlook a larger number of locals. **Choice: Meraki Architecture**

Summary

Cisco Meraki and the Connected Stadium Wi-Fi solution are both architectures that are designed to address the needs of a diverse category of customers with different requirements within various environments. When positioning a solution for a customer it is important to take use-cases, timelines, business and technical requirements, and budgets under consideration; both architectures offer different approaches to solve similar requirements. A differentiating factor however is the robustness of a solution required, the radiofrequency environment in which it will be deployed, and the expected user density which will receive the service.

The Connected Stadium Wi-Fi solution addresses customers who face extremely high density areas, harsh RF environments, and robust network requirements.

Meraki addresses the challenges of customers with lack of IT personnel, budgetary and time restrictions, and needing an easy installation and deployment.



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