Cisco Connected Mobile Experiences

Wireless Architecture for Improving Onsite Customer Experiences and Business Insights

What You Will Learn

When customers are on your premises, you have an important opportunity to engage their attention and give them better service though your Wi-Fi network. Cisco® Connected Mobile Experiences (CMX), working with the Cisco Unified Access™ infrastructure and the Cisco Mobility Services Engine (MSE), let you to make a profit center of your in-house Wi-Fi network. Cisco CMX collects data and analyzes it, and can then push information to individual customers in your venue. You can choose types and levels of analytics, various types of engagement with your customers, device- and onsite-specific applications, and more, and share information with sales, marketing, and service personnel.

Reaching Out to Customers on Your Premises

When customers are on your premises, they're often connected to your Wi-Fi network. That gives you the chance to create a new relationship with them and even to give them better customer service. Through your Wi-Fi network, you can track their locations within your venue, observe their behavior, and deliver special offers or promotions to them-while they're right there. You can also analyze traffic flows so as to better position sales personnel or displays, if you're a retailer, and match offers they may be researching on the websites of competitors. You can advise them of local amenities, if you're a hotel, or if you're located on a campus, guide them around through maps. You can give customers many other kinds of information and assistance as well.

When you create these new ways of reaching your customers, you'll be at the sweet spot of two intersecting trends:

- The world is going mobile. By 2017, there will be more mobile-connected devices-some 10 billion of them-than the world's projected population[1].
- Online services are becoming more personalized. Search engines and e-commerce systems now collect and analyze massive amounts of data, which give you insights into how customers behave, what information they find useful, and what offers and messages resonate with them.

If you can make use of your customers' mobility and the growing amount of information you can gain about them, you can:

- **Increase revenues** by positioning relevant content and offers, as well as third-party advertising, at customers' fingertips
- **Improve customer satisfaction** by providing a better experience on your premises
- **Gain greater insight into customer behavior** to optimize your venue (for example, better positioning products or staffing service locations according to traffic and time of day)

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[1] Cisco Visual Networking Index, 2013

- **Facilitate a closer partnership between IT and your lines of business**, using data from the wireless infrastructure to directly inform sales, marketing, and customer service operations

These capabilities can transform your wireless infrastructure from a cost center to a revenue generator and a strategic platform for end-user services.

Cisco CMX, based on the Cisco Unified Access infrastructure and the Cisco MSE, provides the platform through which you can build this new relationship with your customers. It combines context-aware intelligence from your wireless infrastructure and from mobile applications to collect data about your customers and analyze it. Cisco CMX helps you engage your customer on an individual level, no matter what the size of your enterprise.

Reaching Out in Action

You already rely on your wireless network to connect employees and devices. Increasingly, customers on your premises expect to have connectivity there as well. Whether they are checking email, looking up information on the web, or using an app, wireless connectivity gives you a window into their real-time locations and behavior - information you can act on in powerful ways.

Rather than simply providing an Internet connection, you can deliver relevant content and services that benefit both your customers and your enterprise. These include:

- **Providing contextual, location-based content:** You can push personalized offers and messages to customers connected to your wireless network through "geofencing" applications, which track their movements and trigger the sending of content and offers to them as they move through specific locations or zones. An example: A retailer could identify customers near a specific department or display and send special product offers to the customer's web browser or app.
- **Engaging customers with loyalty programs in real time:** Cisco CMX lets you bridge the gap between the online world - characterized by fine-grained analytics describing customer preferences and trends - and the brick-and-mortar experience. For instance, a retailer can offer special prices or promotions when they are using the store's app as they shop, based on their profile and past purchasing history.
- **Augmenting the in-venue experience:** You can use your wireless infrastructure to enhance the physical experience of the customer or end user. "Wayfinding" applications, for example, provide interactive maps that help customers and visitors find what they're looking for more quickly and access additional information and services relevant to a specific location. A museum could give visitors an interactive map of exhibits on their smartphones, with the ability to access information and multimedia about specific exhibits as they pass them.

These are just a few examples. Others could include:

- A shopping mall giving stores the ability to push special offers to shoppers as they walk by retail shops
- A retailer combating "showrooming" - shoppers in your store comparing products before ordering them online - by sending price-match offers and incentives to them if they browse competitors' websites
- A grocery store tracking customer traffic flows to understand how best to position products within the venue, which displays are capturing customer attention, and where customer service staff should be increased
- A hotel or hospitality chain sending guests real-time notifications of nearby amenities or selling third-party advertising that appears in the guest's browser or app

- A national retailer using its smartphone app to identify when high-value customers are shopping at a brick-and-mortar location and sending them personalized "VIP" rewards and discounts
- A college or hospital campus providing interactive maps to help people locate destinations and services

The possibilities for personal mobile services are virtually unlimited. But capitalizing on them takes more than a run-of-the-mill wireless infrastructure and location applications. You need a connected mobility platform that:

- Protects the security of your business and the privacy of your customers
- Enables seamless, transparent onboarding, with the ability to connect to users in multiple ways
- Puts mobility data and tools in the hands of your lines of business - not just the IT department
- Provides the flexibility and scalability to support new services and third-party applications as your in-venue engagement strategy evolves

A Powerful Architecture for Customer Engagement

Built on the Cisco Unified Access infrastructure, the Cisco CMX solution is based on the unique interoperation between Cisco wireless infrastructure and the Cisco MSE. These elements communicate with each other to detect information on mobile device users' presence, behavior, and location. They track all Wi-Fi signals in real time and collect and aggregate data on mobile device locations and users' online behavior. They also collect demographic data from social media, and subject all this data to fine-grained analytics and reporting.

Cisco CMX delivers these capabilities through a three-layer architecture that encompasses mobile application services, mobile network services, and the underlying network elements that deliver them (Figure 1).

Figure 1.   Cisco CMX High-Level Architecture
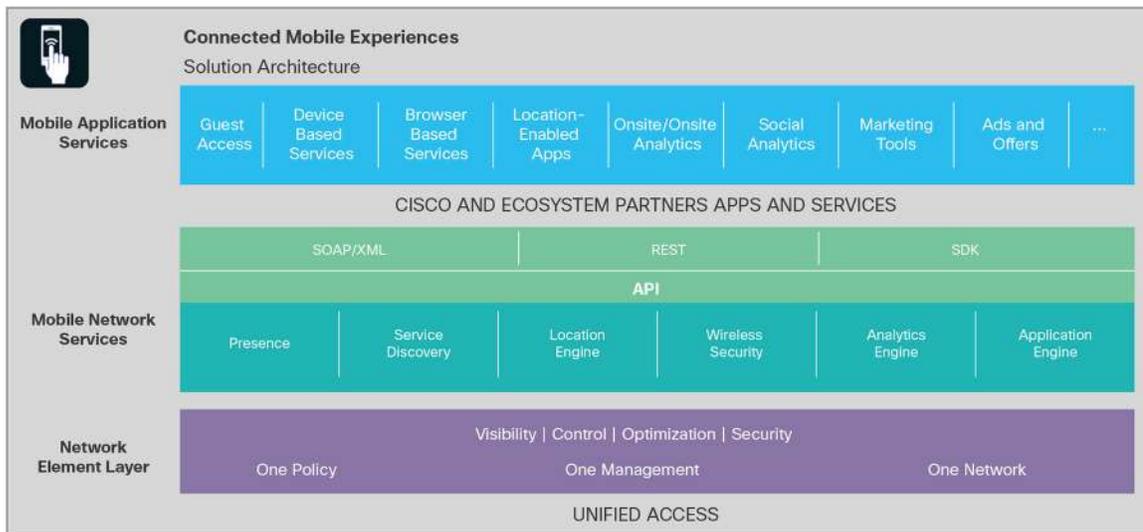
Network Element Layer

Cisco CMX is built on the Cisco Unified Access foundation. This intelligent network platform combines wired and wireless network infrastructure, policy, and management into a simple and manageable solution. Cisco Unified Access was designed to make it easier to support new network requirements such as integrating users' personal devices and connecting "Internet of Everything" devices with the business environment. Employing its own capabilities embedded in Cisco wireless access points and wireless controllers, along with Cisco Prime™ Infrastructure, Cisco Unified Access provides a strong foundation for new in-venue mobile experiences.

Mobile Network Services

Cisco CMX includes a mobile services abstraction layer to support your in-venue engagement applications. This layer uses the native location and service processing capabilities of the Cisco MSE to deliver a wide range of end-user services. These services include pushing real-time notifications to user devices, capturing in-depth analytics, and exposing Cisco CMX capabilities to third-party applications via the open Mobility Services API. The mobile network services layer provides:

- **Presence analytics:** Applications detect the presence of mobile devices and gather data about them such as the time a device enters and leaves the venue, the time onsite, and the percentage of people who have walked by versus entered the venue,. These aggregate presence analytics are ideal for smaller sites with one or two wireless access points, where there is no need to track device locations in the venue.

- **Service discovery**: If devices have embedded the Mobility Services Advertisement Protocol (MSAP client), the wireless network can give them information about nearby services, using the new 802.11u protocol. (See the following "Mobile Application Services" section for more details.) This means that users can discover available services on their devices before they even connect to the Wi-Fi network, regardless of whether they have the company's app on their device.

- **Location analytics:** In locations with multiple Wi-Fi access points, the Cisco MSE communicates with Cisco wireless controllers and access points to calculate the precise location of devices on the Wi-Fi network. This processing is done "out of band," so it doesn't slow down your Wi-Fi performance or make it harder to scale. Using location analytics data, you can offer advanced location services such as sending alerts when a user enters a specific location (geofencing), providing interactive wayfinding apps, analyzing how much time users spend in different parts of the venue, and more. And you can do it using your own wireless network.

- **Wireless security:** Cisco Unified Access controllers and access points allow you to detect and mitigate rogue wireless devices as part of their core capabilities - with no additional licensing. When paired with the Cisco MSE, you can extend these capabilities to detect, locate, and mitigate rogue devices over the air as well.

- **Analytics engine:** The Cisco MSE tracks and aggregates data from all Wi-Fi signals to provide in-depth, actionable analysis and reporting of onsite user behavior. You can define fine-grained criteria to gain information such as dwell times, crowding index, and traffic paths. You can also set thresholds and configure policy-based alerts for use with customer relationship management (CRM) systems.

- **Application engine**: The Cisco MSE provides an application engine to extend a variety of location-based applications to customers. One example is CMX Browser Engage, an HTML5-based marketing platform that lets you insert customized content into the web browsers of people using your Wi-Fi services. Another is CMX Connect, which allows you to securely onboard visitors to the Wi-Fi network with a custom, location-aware portal experience.

- **Open APIs:** Cisco CMX uses powerful yet simple open Mobility Services APIs to expose mobility services to higher-level apps. This means that both third-party applications and Cisco CMX native applications can call on Cisco MSE services and maintain two-way communications with the Cisco wireless infrastructure and the tracked devices. Data can be obtained in either XML or JSON format, based on the requesting client. In addition, for applications that use the push model of gathering data only for certain events, the Mobility Services API notification data supports XML, JSON, and protocol buffer formats and can be streamed over HTTP, HTTPs, or TCP.
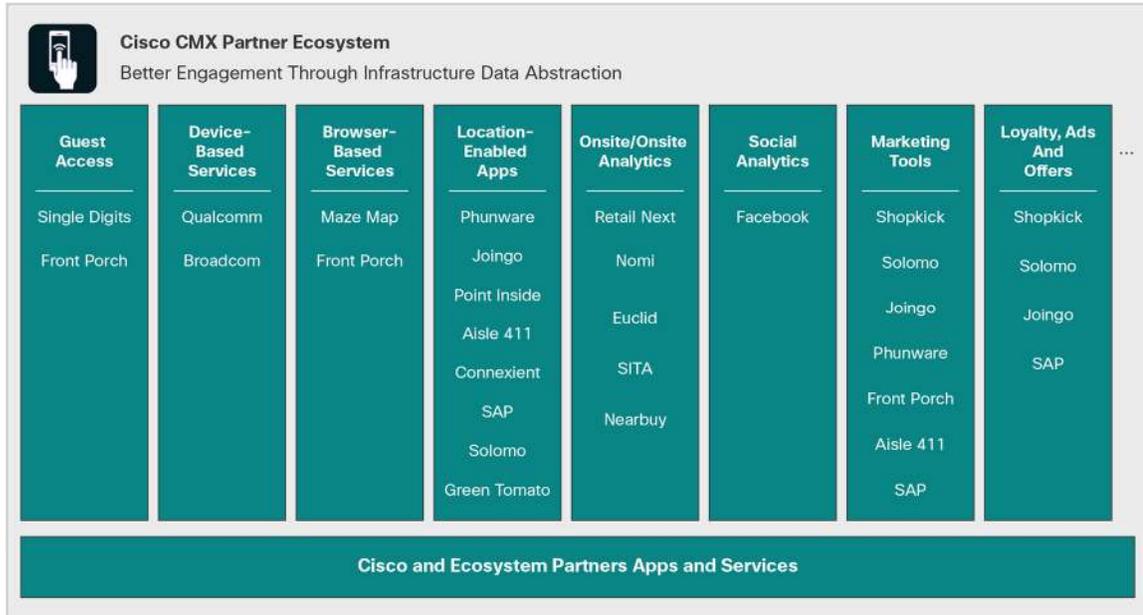
Mobile Application Services

Cisco CMX includes native applications for seamless onboarding, in-depth analytics and reporting, mobile campaign creation and management, and more. But the solution's modular architecture and open APIs extend its location and mobility capabilities to a broad range of third-party applications as well.

By drawing on Cisco applications plus the growing ecosystem of third-party Cisco CMX partners, you can take advantage of best-in-class mobility applications and a wide range of industry-specific solutions (Figure 2). These include solutions for:

- **Guest access:** Cisco CMX and its partners extend useful tools to onboard customers to the Wi-Fi network, providing them with terms and conditions, free or tiered access, and customizable landing experiences. With Cisco CMX Connect, you can customize the onboarding and landing experience using a captive portal. Partners such as Facebook, Single Digits, and FrontPorch also provide unique guest access solutions.

- **Device-based services:** Cisco CMX even lets you engage users who don't have your app and aren't connected over your Wi-Fi. The solution supports the new generation of mobile devices with location-aware Wi-Fi chipsets that use MSAP, part of the IEEE 802.11u Wi-Fi standard, to discover available services. MSAP-capable devices detect available services in your venue and display an alert to the user. The user can then view and access all of the available services within range. Partners for device-based services include Qualcomm and Broadcom.

- **Browser-based services:** When customers or visitors accessing your Wi-Fi opt in to connectivity, you can push out web-based, targeted communications that have measurable impact. You can place customizable, context-sensitive menus, banners, and services within the user's mobile web browser. This could include notifications of promotions or nearby amenities, third-party advertising, offers to opt into loyalty programs, etc.

- **Location-enabled apps:** You can capitalize on your enterprise's smartphone app while users are in your venue by making the app context- and location-aware. The user's app communicates with Cisco CMX using an open API, and prompts the user when the app is in range of available services or information. You can then offer tools to help users locate products or services, access maps and navigation, receive notifications of targeted promotions, and much more.

- **Online and onsite analytics:** You can collect information about user behavior in your venue that helps you improve your customers' experience and target your marketing more effectively. With Cisco CMX fine-grained analytics, you can begin to answer questions about where customers are spending their time, what's capturing their attention, how they are moving through your venue, and more.

- **Social analytics:** When engaging visitors with apps, you can also collect more detailed demographic information, especially if customers log into those apps via a social sign-on (for example, logging in via Facebook). In this way, your analytics can go well beyond location, to include onsite, online, and social activity.

- **Marketing tools:** Cisco CMX engagement tools may sound technical on the surface, but you don't have to be an IT person to use them. There's an easy-to-understand dashboard with role-based access that sales, marketing, and service personnel in your various lines of business can use. The Cisco CMX dashboard gives sales and marketing teams everything they need to create, update, and measure mobile campaigns using Cisco CMX engagement tools. Users can customize graphical elements, messages, and behavior-

driven communications, such as when and where users receive notifications, and access in-depth metrics on how users are engaging with mobile campaigns.

Figure 2.   Cisco CMX Application Partners

Cisco CMX Partner Ecosystem
Better Engagement Through Infrastructure Data Abstraction

Guest Access	Device-Based Services	Browser-Based Services	Location-Enabled Apps	Onsite/Onsite Analytics	Social Analytics	Marketing Tools	Loyalty, Ads And Offers	
Single Digits	Qualcomm	Maze Map	Phunware	Retail Next	Facebook	Shopkick	Shopkick	...
Front Porch	Broadcom	Front Porch	Joingo	Nomi		Solomo	Solomo	
			Point Inside	Euclid		Joingo	Joingo	
			Aisle 411	SITA		Phunware	SAP	
			Connexient	Nearbuy		Front Porch		
			SAP			Aisle 411		
			Solomo			SAP		
			Green Tomato					

Cisco and Ecosystem Partners Apps and Services

Cisco CMX Gives You Unique Capabilities

Cisco CMX gives you the infrastructure, network services, and applications to support a new world of location-based services. These capabilities start with a simpler, more flexible, and more manageable Cisco Unified Access infrastructure. Drawing on open APIs, your network can combine powerful mobility services with a wide range of applications that engage your users and enhance their experience at your business.

Only Cisco has this combination of intelligent unified infrastructure, open mobility services, and dynamic mobility applications, all tightly integrated into a single solution. The Cisco CMX approach to in-venue engagement is:

- **Secure:** With Cisco CMX, third-party applications communicate with the services layer via the Cisco MSE - not directly with wireless controllers and access points. The Cisco MSE captures all the relevant wireless and location information, processes it, and exposes the right data at the right time to third-party applications. As a result, you can support mobility and location applications without having to expose your network infrastructure to external parties.

- **Confidential:** In the same way that you protect your own environment, you can use the Cisco MSE services layer to protect your customers' privacy. You don't have to expose people's personal information to third-party partners to use their applications; you can keep customers' unique data and MAC addresses private.

- **Scalable:** Some location applications communicate directly with wireless controllers and some with access points themselves. This makes scaling a significant challenge. With Cisco CMX, the Cisco MSE extends centralized control and management to your mobility and location services.

- **Capable:** Conventional mobility solutions collect user data and push it out to external, third-party location services and analytics platforms to perform location computations and reporting. But this adds extra layers

of complexity to your engagement applications and introduces multiple external parties into your environment. With Cisco CMX, you can provide these functions from your own environment.

- **Flexible:** By providing access to mobility and location services via an open API, Cisco CMX gives you more flexibility in how you evolve your solution and integrate third-party applications. You can choose which services and data to expose to which partners and define your own engagement processes. You can also define your own business models, for example, basing billing arrangements on the number of calls partners make to your infrastructure. This is a much more versatile model than solutions that require separate APIs to interface with each partner.
- **Comprehensive:** Only Cisco offers all of these advantages as part of an end-to-end mobility solution, including infrastructure, robust native services with the Cisco MSE, and a full ecosystem of third-party application partners.

Build Better Onsite Experiences, Today and in the Future

Whatever else the future may bring, count on at least two current trends persisting: You will continue to use wireless infrastructure in your venue, and your customers and guests will continue to use their mobile devices onsite. Why not turn an operational cost center and predictable visitor behavior into a win for your enterprise?

Cisco CMX gives you the tools to create a better onsite experience for your users, gain vital insight into visitor behavior, and deploy marketing and contextual information at the time and place where it will matter most. Drawing on the modular Cisco CMX architecture and the powerful capabilities of the Cisco MSE, you can exploit these capabilities in a secure, scalable, and flexible way. And you can build a long-term foundation for engaging your customers and guests.

To learn more about Cisco CMX, visit http://www.cisco.com/go/cmx.