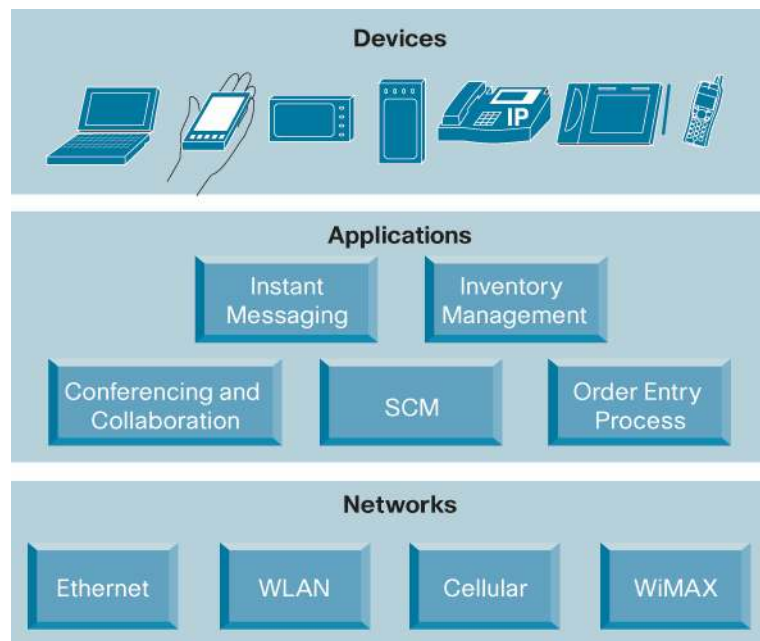


Ensure Continuity of the Business Experience through Cisco Mobile Intelligent Roaming Solution

Executive Summary

Business opportunities today are no longer limited by geography or time zones. Employees are now increasingly dispersed and mobile as businesses take advantage of the growth offered by a global economy. However, to be successful at their jobs, workers need access to relevant productivity tools and business applications while on the go. The Cisco Mobile Intelligent Roaming Solution as part of the Cisco Unified Wireless Network helps to ensure the continuity of the mobile worker's business experience. The solution comprises of the Mobile Intelligent Roaming software hosted on the Cisco Mobility Services Engine (MSE) and integrates with 3rd party application partners via an open API and a variety of mobile devices to enable the seamless roaming of business applications across networks and devices. The solution drives employees' productivity especially as they use a variety of client devices and applications while traversing different networks (Figure 1).

Figure 1. Cisco Mobile Intelligent Roaming Solution: Business Experience Continuity across Multiple Applications, Devices, and Networks



Business Challenge

Currently, notebook computers equipped with embedded Wi-Fi or third-generation (3G) cards are very popular with mobile workers. In the future, business notebook computers are expected to support multiple radio interfaces such as Wi-Fi, 3G High-Speed Packet Access (HSPA), EVDO, WiMAX, and so on, providing multiple options for business users to stay connected while they are on the move. There has recently been a surge in the usage of dual-mode (Wi-Fi and cellular) phones within the business as well. Revenues from the sale of these devices are expected to

constitute 90 percent of all the Wi-Fi handhelds sold by 2009.¹ In addition to the business notebook computers, dual-mode handsets are increasingly viewed as productivity tools by mobile employees who want to maintain a single device and contact number as they roam between the cellular network or their corporate WLAN or a hotspot. This, in turn, improves their reachability, and gives them higher bandwidth for applications, and they can also benefit from the improved in-building WLAN coverage where cellular coverage may be poor.

Despite the frequent use of mobile devices such as notebook computers and dual-mode phones, the end user's business experience across these devices is typically not maintained and hence is not consistent as they roam from one network to the other. A consistent end user experience implies not only application continuity, be it voice or data, but also continuity of the user profile, such as security settings, authentication, and so on.

Some Examples

The following three scenarios exemplify business experience continuity as they relate to business applications:

Scenario 1: A mobile sales person originates a conference call using a wired IP phone while at work. During the course of the call, he realizes he needs to collaborate with a colleague on another floor. He invokes a mobility function on the wired IP phone to have the call sent to his dual-mode device. The call automatically moves to his dual-mode device and since he is inside the corporate WLAN, his phone uses WLAN for transport. He is now able to move around and collaborate with his colleague as needed. While still on call, he needs to start driving for his next appointment. As he starts to exit the building, the call automatically transitions from the WLAN to the cellular network, so he can continue the conversation while commuting for his next appointment.

Scenario 2: A driver who delivers containers of manufactured goods accesses the same inventory management application whether he is accessing it from his rugged PDA over his warehouse's WLAN or over the cellular network when he is in route to the distribution center. Once at his destination, he continues his interaction with the inventory management system, which he now updates in real time over the WLAN at the warehouse to reflect the status of his delivery. All of this takes place seamlessly, without requiring the driver to switch between applications or have to log in multiple times as he moves across multiple networks.

Scenario 3: A doctor is on his dual-mode phone over the cellular network providing critical instructions to the ER team as he's on his way to the hospital. He realizes he needs to conference in a pulmonary specialist. He looks up his contacts and initiates the three-way conference while he is still on the phone. As he walks into the emergency room, his network seamlessly switches to the secure WLAN of the hospital to take advantage of least-cost mobile routing. The doctor is able to continue providing the information, without any disruption in the service or call continuity.

Currently, there are several vendors that offer different solution architectures to enable a seamless roaming experience. All of these solutions tend to focus on voice call continuity only. Furthermore, there are different approaches, depending on whether it is a service provider solution for consumers or an enterprise solution for business users. However, none of the other solutions currently offered for seamless roaming take into account the need for session persistence for both voice and data applications. Further, these solutions operate independent of the WLAN network and hence make local decisions based purely on signal strength.

¹ Source: Infonetics Research, Inc. WiFi Phones Equipment Market Share and Forecast, 2006

How Mobile Intelligent Roaming Works

A key component of the Mobile Intelligent Roaming solution is software hosted on the Mobility Services Engines as part of the Cisco Unified Wireless Network. This software provides a notification to enable devices to intelligently roam to the next available network. The premise of the solution, which is based on the knowledge of the enterprise network, is that as mobile workers roam from the WLAN to the cellular network and vice versa, the corporate WLAN has the most accurate information regarding the strength of the signal, availability of the network, and its quality of service (QoS) to support the running applications and the type of device. Based on this information, the Cisco Mobile Intelligent Roaming Software sends a notification to the client device, which can then decide if it wants to seamlessly switch networks. Since the corporate WLAN is tightly managed by IT, IT can use the Cisco Mobile Intelligent Roaming Solution to help ensure a pervasive coverage of the network for application continuity. In locations where IT is aware of the presence of coverage holes, they can be proactive and use alternative solutions to provide a consistent experience.

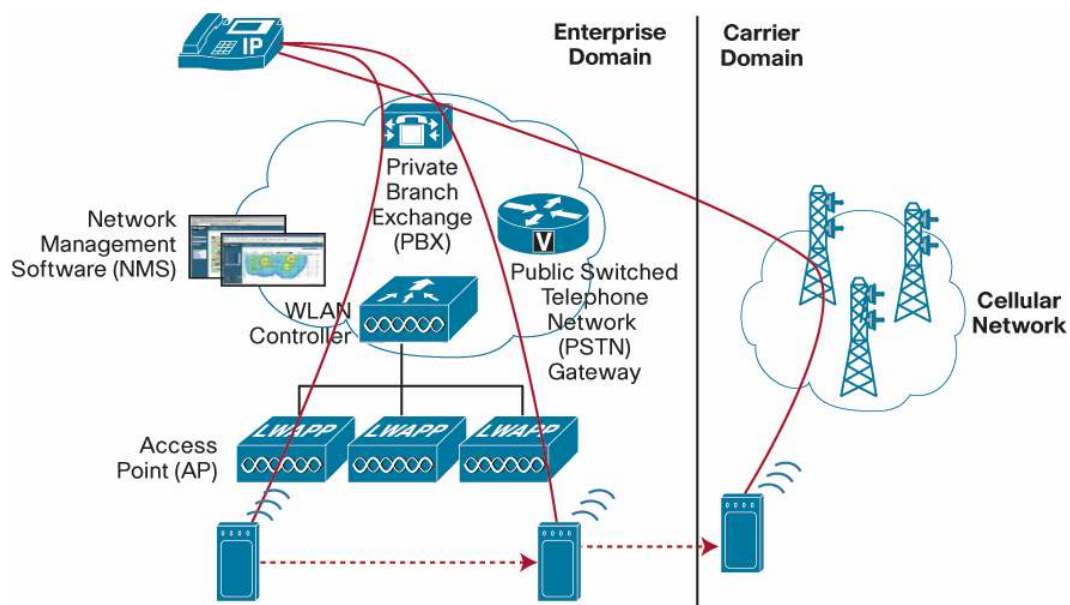
Hand-Off and Hand-In

The Cisco Mobile Intelligent Roaming Solution enables client devices to traverse networks in two ways: hand-off, which is the seamless roaming of the client device from the WLAN to the cellular network, and hand-in, which includes seamless roaming from the cellular network into the corporate WLAN.

In most commonly supported architectures today, the hand-off process is initiated based on the received signal strength indication (RSSI) power level or the strength of the network signal. The device client in this case initiates a hand-off notification either directly or via a third-party gateway to the enterprise PBX, which in turn bridges the call with the cellular network. This approach by itself is not very robust since the drop in the WLAN signal might be temporary and the cellular coverage to hand off to in-building might not be strong. This can result in the call being transferred back to the WLAN network resulting in lost connectivity and a poor end user experience.

In order to initiate the hand-off notification at the most optimal and relevant time, it is important to take into consideration other network parameters, such as location of the access points in the network and their client load, to get the most accurate coverage information before initiating the hand-off. Figure 2 shows the typical process in handing off the call from the WLAN to cellular network. Note that the example in Figure 2 shows the hand-off process only for voice applications.

Figure 2. Client Controlled Hand-Off Process



The Mobile Intelligent Roaming Solution is a critical component of Cisco's fixed mobile convergence strategy. This service builds upon and works in conjunction with the capabilities offered by Mobile Business Solutions from Cisco (specifically business productivity features such as [single-number reach](#)) to enable [seamless mobile collaboration](#).

Device, application, and gateway vendors can all access Cisco Mobile Intelligent Roaming software for seamless roaming between Wi-Fi and cellular and vice versa via open API available on the Cisco Mobility Services Engine. As a result, the Cisco Mobile Intelligent Roaming Solution is the most vendor-inclusive offering of its type on the market. The open API aims to meet the varying infrastructure and deployment needs of different enterprises.

Solution

The different components of Cisco Mobile Intelligent Roaming Solution are as follows.

Client Devices

These are voice and data devices, including mobile Internet devices (MID), used by the mobile worker, and they can run on multiple operating systems and multiple wireless networks. The form factor of these devices varies based on the end user's needs and work environment. The Cisco Mobile Intelligent Roaming Solution will initially focus on client devices that support both the Wi-Fi and cellular networks, because these devices are more available today. However, the solution may be enhanced in the future to include other wireless networks such as WIMAX, passive RFID, and more.

[Cisco Unified Wireless Network](#)

This is the only multipurpose, wired and wireless network that offers simplified deployment and troubleshooting solutions in addition to advanced services such as the Cisco Context-Aware Mobility Solution. A pervasive deployment of the Cisco Unified Wireless Network is optimal for powering the Mobile Intelligent Roaming Solution.

Cisco Mobility Services Engine (MSE)

A central element of the Cisco Unified Wireless Network, this platform hosts the Mobile Intelligent Roaming Software and takes advantage of other modular services to provide the intelligent trigger to the client devices that enables seamless roaming across applications.

Cisco Mobile Intelligent Roaming Software

This is software running on the MSE. The software sends a notification to the client device providing visibility of the network status and availability, so that the client device can then make an informed decision on when and how to seamlessly roam to the next available network.

Open API

Once the Cisco Mobile Intelligent Roaming software has all the information it needs to generate a roaming trigger, client devices can register themselves with the MSE through an open API, which will then allow them to receive the trigger information. The API is based on Simple Object Access Protocol (SOAP)/XML protocols. The API will be made available to technology partners for integration into customers' business processes

Cisco Compatible Extensions for Client Devices

In order for client devices to fully benefit from the innovative features offered by the Cisco Unified Wireless Network as they relate to security, QoS, battery savings, and so on, it is highly recommended that client devices participate in the Cisco Compatible Extensions program. Participation in this program will also enable client devices to take full advantage of features advances such as those offered through the Cisco Unified Wireless Network.

As part of the Cisco Unified Wireless Network, the Mobile Intelligent Roaming Solution is based on Cisco Service-Oriented Networking Architecture (SONA) for enterprises supporting deployments to build an adaptive, agile, intelligent network that will serve as the platform for delivering superior customer experiences.

Business Benefits

Unlike fixed networks, a wireless network is always transient, adjusting itself to meet the connectivity needs of its client devices. At the same time, as the number of dual-mode devices within the enterprise increases, the wireless network needs to be optimized so that the devices can use the best network available. The Cisco Mobile Intelligent Roaming Solution offers several benefits as highlighted below:

- It ensures continuity of the business experience, which results in enhanced end user interaction and improvement in productivity as the user does not have to log in multiple times.
- It enables a superior in-building experience by choosing the best network (WLAN or cellular) from a coverage and bandwidth perspective.
- By selecting the right network to run the application, the service helps ensure that the resource utilization of the network as well as of the client devices is optimal, resulting in benefits such as battery savings.
- The ability to roam seamlessly from the cellular to the WLAN network for application continuity also provides a least-cost routing solution to end users, resulting in savings on cell phone bills.

Why Cisco?

As a result of its expertise in networking, Cisco is the only company that can offer a robust, versatile, and inclusive solution for seamless roaming compared to any other solution providers in this space. By taking advantage of the intelligence available in the network as a platform, the Cisco Mobile Intelligent Roaming Solution integrates with third-party devices, applications, and middleware thereby meeting customers' needs for application continuity. For additional information on Cisco Mobility Services, please visit <http://www.cisco.com/go/mse>.

For More Information

For more information about Cisco Mobile Intelligent Roaming Solution, visit:

<http://www.cisco.com/go/mobileroaming>

As a Cisco partner, find more information on the Cisco open API at:

http://www.cisco.com/cgi-bin/dev_support/access_level/product_support

For more information about the Cisco Mobility Services Engine, visit: <http://www.cisco.com/go/mse>

For more information about the Cisco Unified Wireless Network, visit:

<http://www.cisco.com/go/wireless>



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