



Easy Wi-Fi at Retail Locations

***A Devicescape Application Note
January 2009***

Introduction

The Devicescape Easy Wi-Fi solution makes it easier for the user to get network access in a variety of Wi-Fi environments, such as home, work and public locations. This application paper describes how Easy Wi-Fi can be used to implement a location-specific service for a retail environment (the hypothetical "XYZ Electronics").

For more detailed information about the functionality of Easy Wi-Fi, refer to the "Connect White Paper" available from Devicescape.

The Retail User Scenario

XYZ Electronics is a large consumer electronics retailer selling everything from computers to home entertainment systems. XYZ Electronics has many physical stores located in strategic suburban locations and also has a strong online sales presence. The typical XYZ Electronics customer will browse the store often, and will visit the online website on a regular basis.

To improve sales, XYZ Electronics would like to draw more existing and new customers into the store and provide a better experience to the customer while in the store. Leveraging their in-store IT infrastructure, XYZ Electronics would like to offer free Wi-Fi and other online promotions while the customer is visiting the store. The service would have a "coolness" factor that would appeal to customers and be a differentiator from other electronics retail stores. Moreover, there is a direct link between time spent and purchasing behavior, and XYZ can ensure that useful information is made available to help purchasing decisions.

The proposed idea has several challenges. First of all, nearly all of the devices that will use the Wi-Fi connection will be smart phones and other handheld devices, as it is very unlikely that a customer will bring their laptop into the store. To appeal to a wide audience the approach must avoid technical challenges and be easy to use. Unfortunately, connecting to a Wi-Fi network using a smart phone is a tedious and cumbersome process that requires the user to navigate a web page with a tiny screen, and then typing in the login information using a small numeric keypad. Moreover, any promotional features should be displayed automatically without the user having to manually navigate their browser to the XYZ Electronics web page.

The login process can be simplified by leaving the hotspot network open, however XYZ Electronics wants to tie in-store users to their existing loyalty program and avoid parasitic usage of the network by others who have no intention to shop at XYZ Electronics. Tying service to their loyalty program has the added benefit of identifying users and allowing focused targeting of promotions. XYZ would prefer to have users register for the Wi-Fi service at their online website to market both their physical and internet presence.

Using Easy Wi-Fi

Devicescape Easy Wi-Fi contains the technology to automatically connect the user to a preferred Wi-Fi hotspot, and then automatically log the user into the hotspot to gain network access. Moreover, Easy Wi-Fi can automatically provide additional messaging when the user logs on or off the network.

Easy Wi-Fi can be rebranded as an XYZ Electronics client, extended into a more focused client, or integrated into an existing XYZ Electronics application. This makes available a wide number of attractive features. Here's how it would work:

1. XYZ Electronics promotes their Client both in-store and online to generate interest.
2. A customer sees the XYZ Electronics Wi-Fi Client application on the website and downloads it for their smart phone, filling out a registration form which ties the client to their loyalty program.
3. The Wi-Fi client can be used to display a list of store locations or other helpful information.
4. The next time the customer visits XYZ Electronics, the Wi-Fi Client will automatically log the customer onto the in-store hotspot network. Once logged in, the Wi-Fi Client can provide the customer with the following advanced features:
 - Automatically display promotional content during login, such as sale offers that are not available online or to regular in-store customers.
 - Provide unlimited free Wi-Fi access while in the store
 - Page a sales associate for customer assistance using a dedicated "page" button on the Wi-Fi Client.
 - Access inventory and pricing information by typing in the SKU into the device. For special sales offers available only to smart phone users, the price could reflect the discount.
 - Perform product searches in a format more suitable for a smart phone.
 - Qualify for additional discounts by displaying a bar code to the cashier at checkout.
 - Automatically display promotional content after a purchase or during logout, such as a "thank you" message or an updated points total for a loyalty program.

This approach saves the users from manual steps of logging in manually with their loyalty number. Easy Wi-Fi allows for network changes to be managed without any update to the device, which would be useful should XYZ change their network infrastructure. Even better, the same client can be used should XYZ's parent company - "Megaco Conglomerates" - wish to extend a similar service to additional stores with different brands and network names.

Easy Wi-Fi Implementation

The Devicescape Easy Wi-Fi client is written in C source code and is thread-safe to provide maximum portability to virtually any operating system. The hotspot login feature is already available on many operating systems such as Linux, Symbian S60, MAC OS X, iPhone/iPod Touch, Nokia N770/N800/N810 tablets, and all Windows desktop and mobile platforms.

Integrating Devicescape Easy Wi-Fi into the XYZ Electronics client involves the following steps:

1. Port the Easy Wi-Fi Hotspot library to the platform operating system. This library contains the functionality to support hotspot login and logout, device/user registration, communication with the Devicescape server, time and date handling, random number and UUID generation, and HTTP/DNS support libraries. This step has already been done for the operating systems listed above.
2. Integrate the Easy Wi-Fi reference code (written in C) into the XYZ Electronics client. The reference code provides an execution context and state machine for the hotspot library and provides the necessary state machine for Easy Wi-Fi operation. This reference code also contains an API to interface the application to the smart phone connection manager or supplicant.
3. Integrate the XYZ Electronics client (with Easy Wi-Fi reference code included as described in the previous step) with the smart phone Wi-Fi connection manager. The connection manager API is very simple and only consists of seven function calls. This step has already been done for devices that use the managed supplicant included in Easy Wi-Fi.
4. Develop the XYZ Electronics GUI. Wi-Fi control and status would be obtained from the smart phone connection manager or supplicant API, while hotspot login control and status can be obtained directly using the Easy Wi-Fi reference code. If the implementation uses the managed supplicant included in Easy Wi-Fi, a well-defined, comprehensive socket-based control interface for Wi-Fi control and status is available.
5. Extend Devicescape Easy Wi-Fi functionality to support custom user messaging while the user is connected to the XYZ Electronics hotspot network.

Devicescape Easy Wi-Fi is flexible enough to support a variety of user registration and credential storage options. The scenario provided above is only one example of how Devicescape Easy Wi-Fi can significantly enhance the Wi-Fi experience for the user.

List of Acronyms

API	Application Programming Interface
AP	Access Point
EAP	Extensible Authentication Protocol
GUI	Graphical User Interface
IE	Information Element
IP	Internet Protocol
IT	Information Technology
LAN	Local Area Network
OID	Object Identifier
OS	Operating System
QoS	Quality of Service
SSID	Service Set Identifier
STA	Station
UAM	Universal Access Method
UI	User Interface
VoIP	Voice over IP
WFA	Wi-Fi Alliance
Wi-Fi	Wireless Fidelity, aka 802.11
WISPr	Wireless Internet Service Provider Roaming
WLAN	Wireless LAN
WPA	Wi-Fi Protected Access
WPS	Wi-Fi Protected Setup
WME	Wireless Multimedia Extensions
WMM	Wi-Fi Multimedia (same as WME)
WZC	Windows Zero Config