Chapter 11: Internet Applications

In the short existence of the Internet, a wireless aspect has spun off to provide another medium with which to surf the World Wide Web (WWW). Although still limited in its capability, one can no longer discuss the Internet without differentiating between wireline and wireless, which is a relatively new medium. This chapter presents electronic commerce (e−commerce) and mobile commerce (m−commerce) in relation to the Internet.

Emerging Wireless Technologies Standard

Wireless application protocol (WAP) is a communication protocol between a mobile terminal and an IT system (e.g., Internet, Intranet, corporate IT network), providing mobile access to services in a general environment for wireless applications and content. WAP uses wireless markup language (WML), a nonproprietary wireless language as shown in Figure 11−1. WAP is emerging as a standard that is independent of any single carrier or device. The objective of WAP is to stimulate a new generation of wireless services and products. The following are components of WAP:

- **Microbrowser on client device.** The microbrowser makes a request in WML. The request is passed to the WAP gateway (retrieves information from the Internet server) either in standard hypertext markup language (HTML) or WML. If the content is in HTML, a filter in the WAP gateway may try to translate it into WML. Requested information is then sent from the WAP gateway to the WAP client using available and appropriate mobile network bearer services. WAP corresponds to HTML (handheld device markup language [HDML] is proprietary to Phone.com).
- ***WAP gateway/server.*** The WAP gateway/server translates requests from WAP protocol to a WWW protocol stack.
- ***HTTP and transmission control protocol/Internet protocol (TCP/IP).*** Content encoders translate Web content into a reusable format.
- ***WAP software tool kits***
- ***WAP simulators***

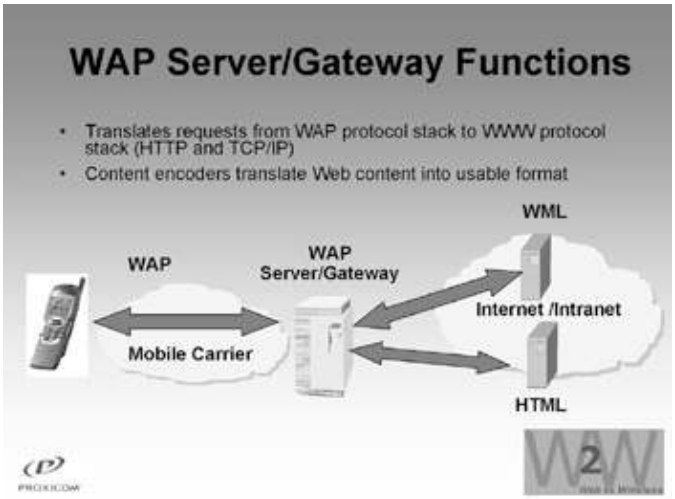

Figure 11−1: WAP server

Wireless Applications

Wireless technology is emerging, but because of issues such as slow connection speeds and limited user mobility, the value is limited. However, a wireless application can still be a valuable tool that complements a wireline application. For wireless applications, each transaction triggers a phone charge; thus a charge accrues each time an individual transmits or receives data. Given the limitation of keyboards with wireless devices, a highly interactive application can be expensive and difficult to use. However, opportunities exist in customer personalization at multiple levels by profiling (e.g., e−mail), personalized business data, personalized shopping, reservations, and ticket purchases. Another advantage of wireless applications is the sending of personalized messages, such as an airlines flight status (e.g., gate change or change of arrival and departure times), to customers on a mobile device. The goal is to require minimum data entry.

Current applications in the areas of wireless banking, stock trading, order entry, and shopping are focused at specific target audiences, are available through a few vendors, and are increasing. Other markets that are applying wireless technologies are mobile enterprises, field services, transportation, financial services, banking, retail, utilities, telemetry, health care, insurance, travel, location−based services, ticketing, auctions, entertainment, and real estate.

Wireless mobile enterprises include a mobile sales force; sales force automation; account, contact, and client database information; access to product inventories; real−time ordering of products and services; checking on previously ordered products; transmission of expense forms; and access to client databases.

Extending the office desktop provides access to corporate databases and a constantly connected work force. Mobile workers need access to the corporate database, e−mail, address and phone books, calendars and GroupWare, and mobile devices in the corporation.

E−Commerce and M−Commerce

E−commerce and m−commerce are relatively new in systems development technologies. Customers want e−commerce, m−commerce, complex applications linked to robust databases, and Web front ends linked to legacy systems. The IT project manager must use architects and developers with backgrounds in the object−oriented world to build wireline and wireless applications. Many different resource talents are required to analyze and build a wireline e−commerce application. The resource pool consists of information and technical architects, Web masters, system quality control engineers, testers, and analysts. However, because wireless devices such as mobile phones, personal digital assistants (PDAs), and two−way pagers currently have limited display space and only allow for a simple graphic image, the team dynamics is focused on content and limited user interaction.

Potentials exist for wireless business opportunities given the growth rate of wireless technology:

- ***Complementing web−based applications by allowing users to communicate and conduct m−commerce on a potentially global level.*** In the next few years, it is projected that almost one half of business−to−consumer e−commerce will be initiated from smart phones.
- ***Offering high value within low bandwidth by focusing on time−sensitive (i.e., real−time) dynamic content such as stock prices.*** Given the relative high cost of using a mobile device as opposed to a personal computer (PC), static content may not offer the best value to customers.
- ***Developing applications that leverage tweezers versus browsers.*** Browsers on a PC can surf the Web and retrieve a large volume of information from potentially many sites at a time. Tweezers from a mobile device pluck small amounts of content (nuggets) from a specific site, which is a relatively quick and inexpensive task. Wireless devices offer either limited graphic capability or none; thus the

users experience is largely based on content. This is a potentially difficult paradigm shift from a Web page that allows a company to use logos and photos to market its brand.

Wireless Communication

Wireless communication is the marriage of voice, video, and data traffic on a single network with high speed. A project manager may exceed the estimated budget if a customer who wants to leverage wireless capabilities into a wireline e−commerce project decides to treat them as completely separate projects. Even though the client devices and mode of communication are different, the backend technologies can overlap in the areas of Web server, content provider, mail server, etc. For example, the same news supplier can be a partner to both wireline and wireless systems. If the news supplier provides extensible markup language (XML) content feeds, then the wireless system can take clippings (a summary of the whole information) while the entire feed can go to a PC.

If a project requirement is to employ an open architecture to make the system open for either third−party servers or other internal servers, then a common language becomes useful. The language to pass objects and aggregate content information has also evolved from corporations using proprietary application program interfaces (APIs) to using standards based on purposes, such as the ability to communicate with systems outside their domain. One language that is emerging is XML. This markup language uses document type definitions (DTD) and schemas to allow the receiver of a message to understand the context of what the sender is conveying. XML is a descriptive way to share concepts in a formalized fashion. If one thinks of XML as a language, then one can also consider that XML has many dialects.

IT managers should understand and prepare for the influence of the wireless information revolution by addressing the following issues:

- Which standards in communication protocols or devices are the most cost−effective while allowing the flexibility that users demand?
- What relationships should be fostered with key players in the wireless information value chain?
- How will support and security issues be treated?

Wireless services allow customers to select any local provider and deliver always−on high−speed Internet access (12 times faster than traditional dial−up modems) and competitive long−distance rates. Wireless service is an uncomplicated all−in−one package. The customer puts an antenna on his or her home, and all data and voice requirements are carried through one wireless connection. No new line, excavation or construction, or city or country permits are required. The result is high−speed Internet access with voice service via wireless communication at an unlimited distance (*The Sunday Oklahoman,* April 23, 2000, p. 2−c).

By listening to and understanding the users needs, IT managers can take advantage of the wireless revolution by offering the services that their users want. These wireless services can be access to critical business information, Internet access, integrated organization directories, or wireless meeting scheduling. The following are benefits of wireless services:

- Convenience
- Speed of transactions
- Ease of use
- Ability of information specifications
- Fast delivery
- Paperwork reduction
- Cost savings

- No dealing with sales representatives or catalogs
- Seeing what is being bought
- Time savings
- Short procurement cycles

Extensible Markup Language

XML is a solution for content modeling and creation of standards for content. XML helps IT system developers design application−specific vocabularies. Its popularity is based in part on human readability and ease of understanding. XML facilitates the reuse of content by storing information at an element level rather than a document level. With XML the developer can author the information once and produce it many times without additional work.

XML is also a tool for database projects. A visual designer thinks of XML in terms of client side issues such as presentation and style sheets (North, 1999). XML allows a developer to express some concepts (inheritance) in the schema so that objects can be passed from one system to another with the use of DTDs and schemas.

In XML, a project can use a DTD and schema to attach with an XML document to allow other systems to understand the message. Various standards organizations have formed, such as the World Wide Web Consortium (W3C), to define XML standards to ensure that XML can be used to exchange information with companies that are interested in the same content. The markup adds information about the quality of the data, but the different parties must agree on how to interpret the markup. Industry standards bodies, such as the Open Travel Alliance, have also been established for defining a common standard in which travel−related industries (e.g., airlines, car rental companies, and hospitalities) can communicate with one another and their customers. For example, one airline can use the same XML schema as another airline to communicate. Eventually the same schema can be proposed throughout the industry, possibly becoming a de facto standard. Given that the entire industry in this context would share the same vocabulary, it can allow some constructlike subclassing because all of the servers in the airline industry understand it. In XML, a project can use a DTD and schema to attach with an XML document to allow other systems to understand the message (www.w3c.org; www.opentravel.org).

Application of object−oriented concepts to XML would impose a definition of rules in DTDs or schemas. All interested parties should agree to and apply these rules since there is no inherent engine for XML that imposes rules. Extensible style sheet language (XSL) allows transformation from one vocabulary to another. WML is similar to HTML and is a derivative of XML. Wireless devices usually come equipped with little memory relative to a PC. WML is optimized for small devices and for wireless efficiency. The code is compiled at the gateway into and from binary that decreases latency, decreases usage costs, and increases battery life of the device. WAP−enabled telephones use a microbrowser to make a request and receive the response in WML. However, the application server may generate an XML response that is translated in the WAP server into WML, compiled into a binary format, and sent to a mobile network carrier to transmit to a user.

To illustrate the savings achieved by using WML instead of HTML, the IT manager should consider an average HTML page that has a request of 39,896 bytes and a response of 80,451 bytes, totaling 120,347 bytes. The corresponding average WML page has a request of 383 bytes and a response of 111 bytes, totaling 494 bytes.

XSL specifications define how to translate one XML document into another. Inclusive of this translation is XML formatting objects that can describe visual display, sidestepping the problems associated with plain HTML.

BlueTooth

BlueTooth is a key enabler for the mobile handset. It enables numerous devices to communicate wirelessly and form small ad−hoc wireless networks called *Piconets* (two to eight devices [slaves] with one master). BlueTooth has a low−cost transceiver chip (1 Mb) embedded into various devices, which allows communication via a low−power radio (2.4 GHz). It is supported by more than 1500 companies, including IBM, Intel, and Motorola, which are BlueTooth Special Interest Group (SIG) members.

BlueTooth technology is built into a 9 X 9 mm microchip. It broadcasts in a 10−meter radius at 720 kbps. BlueTooth requires little power and is intended for transmitting small amounts of data over short distances. BlueTooth is designed to work in a noisy radio environment using a fast acknowledgment and frequency hopping scheme to make secure links. BlueTooth hops to a new frequency after transmitting or receiving a packet to avoid interference (www.bluetooth.com). BlueTooth requires web sites to be rewritten in WML; translation of HTML is not as effective because it uses text instead of binary data.

Handheld Device Markup Language

HDML is a proprietary language for coding web sites for wireless applications. The concept is to create a very thin client that is appropriate for wireless communication. Components that are required are a microbrowser on client devices and a server/gateway that must be licensed from Phone.com, a software development kit (SDK), and a simulator.

Information Architecture

Information architecture contains necessary data ranging from a server to a display. The user input influences this architecture for designing the system. Current Internet call centers deliver interactive customer touch points to what was originally an anonymous and passive environmentthe Internet. Solutions on the current market begin to provide the possibilitiesa holistic view of customer interactions, preferences, behavior, affordability, and ease of use. The business goals differentiate between the service and sales channels by creating a winning Internet commerce strategy with enough flexibility to evolve in this rapidly changing marketplace. Some business goals are as follows (*Internet Telephony, 76,* February 2000):

- Reduce costs by optimizing core business processes.
- Improve communications and coordinate the efforts across business functions.
- Ensure effective customer relationship management.