WAP: An Overview with Respect to Computer Networking

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ABSTRACT

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Today the wireless network is mainly used for voice communication, where, voice mail is the most popular value-added service. WAP has added a new dimension to the use of mobile phones through the introduction of new data-oriented mass-market services. In this paper we try to present the functioning, uses, limitations and security associated with WAP. WAP is the future of the wired LAN/MAN and it is gaining popularity due to its ease of use, simplicity and efficiency.

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KEYWORDS: WAP, Network Security, Mobile phone, Hand Set

0. INTRODUCTION

Today the wireless networks are mainly used for voice communication, where, voice mail is the most popular value-added service. WAP (Wireless Access Protocol) has added a new dimension to the use of mobile computing through the introduction of new data-oriented mass-market services. In this paper the structure of WAP, its working and its limitations are discussed.

WAP is an underlying protocol or a set of rules that allows access to the Internet and World Wide Web from any wireless device using any of the manufacturer operating systems through any digital network.

WAP has become an emerging industry standard with the common objective of providing wireless Internet like services and content to the mobile users. Mobile users have reconfirmed the power and usefulness of the web by desiring the following:

· Access to the wireless-Internet using their cellphones, pagers and PDAs to check the stock quotes, to access bank accounts, to get restaurant information and make reservations online.

· Access to web away from home or work to surf the net.

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Components of the WAP network environment

1. Micro browser embedded in the digital handheld device
2. WAP gateway or proxy server
3. WTA servers
4. Web servers

User Agent is the correct terminology for a browser. We will use the term micro browser, used by almost everyone, to describe a browser on Wireless-Internet. User Agent or (UA) is a software that interprets Wireless Markup Language (WML), WML Scrip and Wireless Transmission Application Interface (WTAI) and other forms of a code.

1. WORKING OF WAP

The client (micro browser embedded in the digital handheld devices) generates a request for information. This information is transmitted in binary code to WAP gateway through the 'bearer'.

WAP gateway processes the requests, translates in into a HTML document and communicates it to the web server across the Internet.

WAP gateway also receives the information, which is formatted as Wireless Markup Language (WML), known as a 'deck'.

WAP gateway then transmits the complied request (in binary code) as a 'deck of cards' to the client for display and/or processing. A card of WML is equivalent to HTML web page.

The client retrieves the first card of the deck and displays it.

WAP network environment enables wireless service providers the capability to use their telephone applications and processes, and mobile users access to Web servers, simultaneously. It has provisions to control the telephony aspects of WAP-enabled devices because it is being implemented within a cell phone or other digital handheld devices. For example, a user may wish to find a local restaurant. Using a WAP cell phone, the user consults a 'yellow pages' directory and locates a place to dine. To make a reservation the user just 'clicks' a button displayed by the WML card and the phone dials the restaurant. This is obviously much easier than writing down the phone number, ending the WAP session, and dialing the number manually. This has lead to the possibility of creating Web like applications for digital handheld devices as well as integrating telephony services with Wireless-Internet use. Mobile users in WAP network environment can access the following servers to receive and/or exchange data:

- Web servers across the Internet –through a WAP gateway or proxy server.
- Wireless Telephony Application (WTA) server.

Communication between WAP-enabled digital handheld devices and web servers is routed through an intermediary server- WAP gateway or proxy server, that provides protocol translation and optimizes data transfer. Transmission between WAP-enabled digital handheld devices and WAP gateway is through wireless binary code. This is used for greater compression of data and is optimized for long latency and low bandwidth. (Latency is the amount of delay associated with a connection and bandwidth is the amount of network capacity required to support a connection).

Wireless network supports a multitude of bearer networks or carriers of data whereas Internet environment supports only one bearer or network.

2. MICRO BROWSER

A browser in the Wireless Internet environment is called a ' micro browser' because it performs limited functions in comparison to the browser in the Internet environment. For example, DNS services are performed by WAP gateway. It does not have the 'click and retrieve' facility. The micro browser software is embedded within the digital handheld device and interprets information exchanged with WAP gateway. The communication between micro browser and WAP gateway is based on client-server computing. The micro browser is the client and the WAP gateway the server. The capabilities of the micro browser is, of course, limited to the capabilities of the WAP device.

3. WAP GATEWAY OR PROXY SERVERS

WAP gateway is a piece of middle ware, performing the functions of an intermediately and protocol translator between the WAP gateway's client (micro browser) and the web server. WAP gateway is, therefore, also called as 'proxy server' because it is not the server but only a 'proxy'. It provides a link between the wireless network and the Internet which allows WAP-enabled device to access information from the web servers.

WAP gateway performs critical functions-conversion of HTML document into a WML deck and then compression of the WML(Wireless Markup Language (WML) is very similar and simpler but much more strictly defined than HTML. WML is used to create pages that can be displayed in a WAP browser and is included in WAP-enabled device. WML contains no screen formatting instructions and concentrates on returning stimulated data.) pages into a more compact form to save bandwidth and to further reduce mobile phones' processing requirements. It also compiles WML Script programs into a byte code format. Since all WML files are usually only text files the amount of data will 'shrink' up to a fourth of the original size. This makes for a much better transmission rate as the HTTP protocol.

WMLScript, that all micro browsers are required to support, provides client-side procedural logic. It is based on ECMA Script (which is based on Netscape's JavaScript language). It has been suitably amended to support the constrained wireless and digital handheld device environment. It is case-sensitive language. WML Script is precompiled, as WML is, before it reaches the wireless devices. WML contains no WML Scripts, only reference to WML Scripts' URLs, which is not embedded in the WML decks. WML Scripts' URLs, which is not embedded in the WML decks. WML Script compilation unit is compiled into WML Script byte code before in can run on a WAP client (e.g. a WAP-enabled phone). A WAP browser must contain a WML Virtual Machine (VM) to run the compiled script.

4. WIRELESS ENVIRONMENT SECURITY

Wireless environment security relates to the security of information between digital handheld device and WAP gateway. In this environment non-repudiation of information is obligated because the client communicates with a permanent proxy server. WTLS protocol ensures the privacy, integrity and security of the information exchanged between the client and the WAP server.

WTLS offers data privacy through the use of a symmetric algorithm, integrity using an algorithm or/and key exchange and authentication procedures by anyone of the three types (or WTLS classes) of authentication:

· **Anonymous Authentication:** each party cannot be assured of the identity of the other party.

· **Server Authentication:** the client is convinced of the server's identity and sends them confidential data such as credit card numbers.

· **Client Authentication:** the server is assured of the clients' identity and allows them, for example access to restricted resources.

WTLS has been designed to handle secure transactions and processes security algorithms faster by minimizing protocol overhead, more data compression. Hence, WTLS performs security, well within the constraints of a wireless network. These optimizations mean that smaller, portable consumer devices can now communicate securely over the Internet.

5. WAP GATEWAY

WAP gateway bridges the wireless and wired Internet. On the wireless side WTLS is used and on the wired Internet, SSL. Since these two protocols are not directly compatible, a transaction between WTLS and SSL is done inside the WAP gateway. This involves decrypting SSL and re-encrypting WTLS and vice-versa. This transaction between SSL and WTSL takes milliseconds and occurs in the memory of the WAP gateway, allowing for a virtual secure connection between the two protocols. In other words, at some point the data stream is unprotected.

A potential hacker can hack into WAP gateways, gain access to the operating system (which is not very difficult if it's Windows NT based) and install a sniffer program that captures the unprotected steam and save it to a file. Then go back a week later and see how many credit card numbers have been captured.

Currently, this is the most widely used model. Let us imagine if your bank or other institution dealing with sensitive data offers you WAP-enabled services, it is secured and the network (Internet) is well protected (SSL). Then, when data enters the WAP gateway, which is commonly owned and operated by a third party such as mobile operator, the data is decrypted. Is trusting sensitive data with a third party a good idea?

The mobile operator in question could be any mobile operator in the world. You may be on vacation in a country where security is considered a trivial matter. If the mobile operator's networks are vulnerable to attack, so is your data.

6. LIMITATIONS OF WIRELESS NETWORK

Wireless Network is a constrained communication environment in comparison to the Internet communication environment.

Limitation of Power : The power consumption is directly related to the bandwidth. As bandwidth increases, power consumption increases. This reduce the battery life of the digital handheld devices.

Latency : In comparison to the traditional world network, latency is higher. In the mobile-wireless environment it can range from many tens of seconds round-up communication line to, as low as sub-seconds. It differs from network to network and depends on current radio transmission characteristics, network loading, routing, error correction and congestion-avoidance.

Bandwidth **:** Far less bandwidth available than Internet environment.

7. LIMITATIONS OF WIRELESS DEVICES

The digital handheld devices are single-purpose (e.g. voice communication or data transmission) mass market-products that are used in different environment (e.g. hands-free, operation) and a wide range use scenario. Hence, simplicity, size and ease of use are the primarily consideration in its designing. This again presents a very constrained computing environment because of the limitation of form of devices (size and design). It requires miniaturization of its components including the battery. The current devices in comparison to traditional computing devices tend to have:

CPUs less powerful thus limiting the processing capabilities.

ROM and RAM of low values.

Limited power supplies due to the existing battery technology. This restricts transmission, bandwidth etc.

Output display of small screen with low resolution but a wide range of usual display sizes, formatting and other characteristics.

Input devices with limited capacity (for example keyboard) and mostly no pointing device is provided.

8. CONCLUSION

It is now clear that WAP will lead everywhere and give enough boost to mobile computing. The future of WAP is very bright and it is expected to be used in Library and Information Science also.

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