

GRAPHICAL SIMULATION OF WIRELESS APPLICATION PROTOCOL

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ABSTRACT

In wireless market the technology is growing rapidly, for reaching new customers needs, and also by adding new services. To enables operators and manufacturers to meet the challenges of advanced services, differentiation, and fast/flexible service creation. So the technology called Wireless application protocol (WIRELESS APPLICATION PROOCOL) is introduced. This is an open global specification that empowers mobile users with wireless devices for easily access and interacts with information and services instantly. WIRELESS APPLICATION PROTOCOL has become the de facto worldwide standard for providing Internet communications, advanced telephony services on digital mobile phones, other wireless terminals.

In this paper we were discussed about WIRELESS APPLICATION PROTOCOL model, its layers and applications such as Push Mechanism, Wireless telephony Application (WTA).

I. INTRODUCTION

In those day's wireless industries initially faced many number of issues like low connection low bandwidth and stability, to bring its Internet services to the

users. To tackle these issues they came together to form a common forum. This forum is called the wireless application protocol (WAP) is an open, global specification that empowers mobile users with the wireless devices for easily access and interact with services and information instantly. By using the Wireless application protocol technology Internet content can be easily access from the mobile phones. Because of having limited display, limited bandwidth, limited memory and CPU and limited keyboard etc.

The Wireless application protocol is a standard and it is developed by the Wireless application protocol_Forum, a group founded by [Ericsson](#), Nokia, [Phone.com](#) and [Motorola](#). The Wireless application protocol Forum's membership roster now includes computer industry heavyweights such as Oracle, Microsoft, IBM, and Intel along with several hundred other companies. The main goals of Wireless application protocol forum are to bring internet content and advanced data services to wireless mobiles and other wireless terminals, developing a global wireless protocol works across all wireless network technologies. In the network we mainly faced the problems such as latency, bandwidth. By transforming the HTML web pages into binary representation format such as WML, WBMP.

II. WIRELESS APPLICATION PROTOCOL MODEL VS INTERNET MODEL

The wireless application protocol model is easy and similar to that of an working on the Internet model. In Internet a World Wide Web (WWW) client requests a resource stored on a web server by identifying it using a unique Uniform Resource Locator (URL), that is, a text string constituting an address to that resource. To request any application that we have to use in wireless application protocol is very similar concept to the URL concept of use in the Web. Standard communication protocols, like HTTP and Transmission Control Protocol/Internet Protocol (TCP/IP) manage these requests and transfer of data

between the two ends. Key features of Wireless application protocol Model similar to Internet model. Wireless Markup Language, WML script, Wireless Telephony Application (WTA). Services created using HTML would not fit very well on handheld devices since they are intended for use on desktop computers. Therefore a markup language adapted to these constraints has been developed - the Wireless Markup Language (WML). Wireless application protocol is based on well-known internet technology that has been optimized to meet the constraints of a wireless environment. Features of Wireless application protocol include the following.

Interoperability – Wireless application protocol is an open license-free standard, which ensures that Wireless application protocol -compliant devices are interoperable.

Extensibility - Wireless application protocol has been designed as a future-proof technology. It is extensible over time to new networks and transports thereby protecting the mobile network

Scalability - Wireless application protocol applications scale across a variety of wireless transport options like GSM SMS, GSM USSD, IP, CDMA, etc., and also across a wide range of wireless terminals from handsets to powerful PDAs.

Flexibility - Wireless application protocol is a flexible solution that caters to the requirements of various types of applications by providing service options like connection mode and connection-less services, with or without end-to-end security.

Reusability - Wireless application protocol specification extends and adapts existing Internet standards such as HTTP, IP, Proxy technology, SSL, TLS, XML, HTML, etc. to wireless environment instead of defining a new set of standards.

III. WIRELESS APPLICATION PROTOCOL MODEL

In Figure 1 client such as mobiles or hand held devices send Wireless application protocol to a web server. It is routed through a Wireless application protocol gateway which acts as an intermediary between the “bearer” used by the client (GSM, CDMA, TDMA, etc.) and the network used by the client on which the Wireless application protocol gateway resides on. The gateway which processes the request, and retrieves the contents of CGI scripts, Java servlets, or some other dynamic mechanism, then formats data to return it to the client. This data is formatted as WML a markup language based directly on Extensible Markup language (XML). Once the WML has been prepared the gateway then sends the request from Internet to mobile client back in binary form due to mobile device has bandwidth restrictions t for displaying and processing. The client retrieves the first card of the deck and displays it on the monitor.

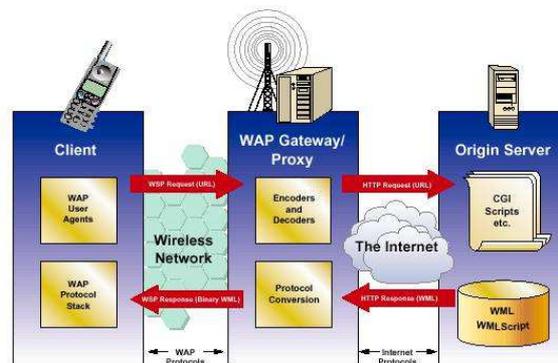


Figure 1 : Client gateway server model

There are three essential product components that you need to extend your host applications and data to Wireless application protocol -enabled devices. These three components are:

WAP Micro browser – residing in the client handheld device.

WAP Gateway - Wireless application protocol Gateway is a piece of software that exists between the mobile device and the external network like the Internet. The gateway does the job of converting Internet content i.e. the WML pages into byte code (WMLC) to reduce the size and number of packets, which can be understood by a Wireless application protocol enabled devices.

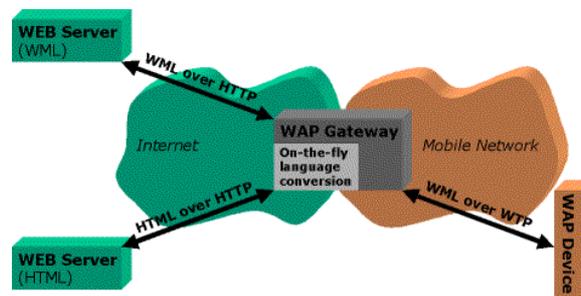


Figure 2 : Wireless Application Protocol Gateway

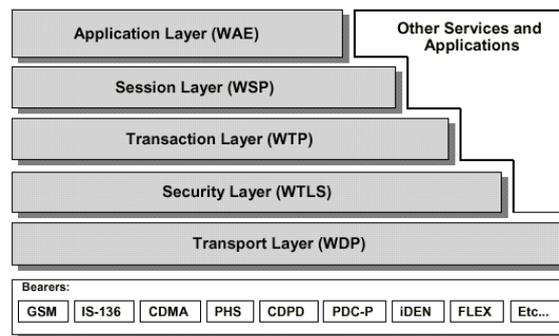
Protocol Gateway

The protocol Gateway translates requests from the Wireless Application protocol stack to the WWW protocol stack (HTTP and TCP/IP).

Content Encoders and Decoders The content encoders translate web content into the compact encoded formats to reduce the size and number of packets traveling over the wireless data network.

WAP sever - residing either on Internet service providers (ISP) infrastructure or on end user organization's infrastructure.

IV. WIRELESS APPLICATION PROTOCOL ARCHITECTURE



Wireless application protocol is designed in a layered fashion in order to be extensible, flexible, and scalable. With the Open System Interconnection model i.e OSI model in mind, the Wireless application protocol -stack basically is divided into five layers:

Application Layer

Wireless Application Environment (WAE)

Session Layer

Wireless Session Protocol (WSP)

Transaction Layer

Wireless Transaction Protocol (WTP)

Security Layer

Wireless Transport Layer Security (WTLS)

Transport Layer

Wireless Datagram Protocol (WDP)

Each layer of the Wireless application protocol stack specifies a well defined interface to the layer above.

WDP

The Wireless application protocol datagram protocol (WDP) is the bottom most layer responsible for moving data from sender to receiver and back again. The Wireless application protocol Datagram Protocol WDP, is a datagram oriented, network layer protocol modeled after the User Datagram Protocol (UDP) used on the Internet. UDP is a member of the TCP/IP protocol suite and is a simple, "best effort" data delivery protocol. WDP provides a connection-less, unreliable datagram service. WDP supports underlying bearer service. The functionality of WDP when operating on IP bearer is exactly same as the Internet standard User Datagram Protocol (UDP).

(WTLS)

Wireless transport layer security (WTLS), an optional security layer, has encryption facilities that provide the secure transport service required by many applications, such as e-commerce. WTLS incorporates security features that are based upon the established transport Layer Security (TLS) protocol standard. Includes data integrity checks, privacy on the Wireless application protocol gateway to client authentication.

WAP Security Model

Wireless application protocol device]

Wireless application protocol gateway]

Content server]

---WTLS---> {unprotected} <---SSL--->

|

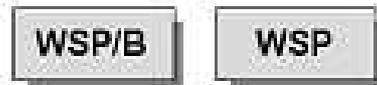
Firewall) || (Firewall)



WTP layer provides a lightweight transaction service, i.e., a request/response service, which can operate efficiently over a secure or insecure datagram service. It provides three classes of services namely,

1. Unreliable push service,
2. Reliable push service,
3. Reliable transaction service.

The features of WTP are selective retransmissions, duplicate removal, segmentation or reassembly, port number addressing, user-to-user reliability (through user-to-user acknowledgements) in addition to protocol acknowledgements, asynchronous transactions, optional out-of-band information, delayed acknowledgements and message concatenation to improve over-the-air efficiency. WTP is message oriented protocol, which makes it suitable for interactive browsing applications.



WSP layer provides mechanisms and semantics based on the Internet standard, Hyper Text Transfer Protocol (HTTP/1.1) along with additional functionalities such as:

1. Protocol feature negotiation (capability negotiation).
2. Compact encoding of data,
3. Session suspend/resume,
4. Long lived session states,
5. Asynchronous request.

Wireless application protocol session protocol (WSP) layer provides a light weight session layer to allow efficient exchange of data between applications. WSP is patterned after the HTTP (Hypertext Transfer Protocol) of the Internet. WSP has two modes

1. WSP connection mode

When WSP is used in conjunction with WTP, a session is initiated by the Wireless application protocol client and is maintained until it is explicitly disconnected. Such a mode is called WSP connection mode.

2. WSP connectionless mode

In this mode no session is created, it is called temporary or connectionless WSP.



WAE provides an application environment framework, which enables a wide range of applications to be used on wireless terminals.

Various components of WAE are

1. Wireless Markup Language (WML),
2. WML Script,
3. Wireless Telephony Application (WTA) environment.

Wireless Markup language (WML)

WML is a tag based markup language, which is derived from XML and is similar to the Internet standard HTML. WML addresses the constraints such as small displays, limited user-input capability, narrow-band network connections, limited processing power and limited memory resources in a wireless device. WML is, in fact, an XML document type defined by a standard XML Document Type Definition (DTD).

The WML 1.1 DTD defined at: http://www.Wireless Application Proocolforum.org/DTD/wml_1.1.xml However the following code gives you an example of a simple WML file.

```
<? xml version="1.0"? >

<! DOCTYPE wml PUBLIC "-//WIRELESS APPLICATION
PROOCOLFORUM//DTD WML 1.1//EN"

"http://www.Wireless Application Proocolforum.org/DTD/wml_1.1.xml">

<wml>

<card id="First_Card" title="First Card">

<p>

Hello World!

</p>

</card>

</wml>
```

The first two lines are required. They give the XML version number and the public document identifier, respectively. From there, all WML decks (one WML file equals one deck) begin and end with the <wml> and </wml> tags.

WML is case-sensitive like XML.

WML Script

WML Script is a lightweight procedural scripting language. It is an extended subset of JavaScript™ scripting language. The purpose of WML Script is to provide client-side procedural logic. It is based on ECMA Script (which is based on Netscape's JavaScript language), however it has been modified in places to support low bandwidth communications and thin clients. Many Web developers regularly choose not to use client-side JavaScript due to browser incompatibilities (or clients running older browsers), additional server-side scripts must still replace this logic. This involves extra round trips between clients and servers, which is something all wireless developers want to avoid. WML Script allows code to be built into files transferred to mobile client so that many of these round-trips can be eliminated. Some capabilities supported by WML Script that are not supported by WML are:

1. Check the validity of user input
2. Access to facilities of the device. For example, on a phone, allow the programmer to make phone calls, send messages, add phone numbers to the address book, access the SIM card etc.
3. Generate messages and dialogs locally thus reducing the need for expensive Round-trip to show alerts, error messages, confirmations etc.
4. Allow extensions to the device software and configuring a device after it has been deployed.

WBMP

WBMP stands for Wireless Bitmap. It is the default picture format for Wireless application protocol. The current version of WBMP is called type 0. WBMPs are uncompressed, monochrome black/white bitmaps intended for use in devices with small screens and narrow bandwidth connection. The constraints when using WBMP are the small screen size, limited graphics capabilities and the limited bandwidths available. As a thumb rule, a WBMP should not be wider than 96 pixels and higher than 48 pixels at 72 dots per inch.

WTA

WTA means Wireless Telephony Application. It provides extensions for telephony services like call and feature control mechanisms, voice mail, messaging, phone-book management, etc., to make them accessible to Wireless application protocol content developers. WTA framework also allows real-time processing of events important to the end-user while browsing. WTA provides a library of telephony-related functions called Wireless Telephony Application Interface (WTAI) that can be invoked from WML/WML Script, WML Script formats.

WAE typically consists of two user-agents: a micro-browser and a telephony application. A micro-browser is similar to a web browser such as Netscape Navigator or Internet Explorer with additional optimizations required to run on a consumer handset. A micro browser interprets WML/WML Script content types. A telephony application is used for providing telephony services offered by WTA to end-user. WWW content (HTML), a filter is used to translate the WWW content to Wireless application protocol content.

Bearers

In order to allow the Wireless application protocol technology to be exploited as flexibly as possible, Use of the protocol can be based on several

different bearers. One of these is part of the GSM (Global Systems for Mobile) standard. Other mobile communication systems can also be used to make Wireless application protocol sessions possible. It is also possible to use the Short Messaging Service (SMS) or a packet oriented data link. If SMS is used, communications between the client and server are maintained with the aid of SMS messages. Up to 140 bytes or 160 characters can be sent in each message. When SMS is used it does not matter how much time elapses between successive actions in the terminal. Only 16 when information is requested or supplied is there any activity on the mobile network and thus charged.

The best option for working with the Wireless application protocol is to use packet switched data links. This communication protocol can be used once the mobile telephone network operator has implemented General Packet Radio Services. (GPRS) With a GPRS connection, the mobile phone is connected to the network via a packet oriented data link (IP). This effectively means that the GSM network is a subset of the Internet, and all of its mobile phones are IP terminals. This approach makes very efficient use of the available network bandwidth. The fees that are charged in this case are based on the amount of data received, rather than on the amount of time used. Other technologies used for bearer services are Code Division Multiple Access (CDMA), Cellular Digital Packet Data (CDPD), Interim Standard (IS)-136 and Time Division Multiple Access (TDMA).

APPLICATION AREAS

E-mail: : Using Wireless application protocol phones, one can access and exchange e-mails.

Personalized information access: The user could maintain a phone book or an address book on a Wireless application protocol -enabled phone.

Events-calendar management: The user could schedule his events and maintain a calendar on the Wireless application protocol phone.

Personal banking: Banking and insurance are purported to be the other sectors where Wireless application protocol is predicted to make a significant difference. In banking, for instance, a Wireless application protocol gateway can provide user access to payment services.

For example

The Delhi-based, Nucleus Software that created Wireless application protocol software called, Bank-o-net to help banks Wireless application protocol enable their services.

Personal billing information: This enables the user to perform on-line shopping as well as make on-line payments.

Customer care application: Information that is of interest to the customer is provided by the operator.

Financial information, stock quotes: Financial transactions are expected to lead as a popular service available to Wireless application protocol phone users. A service category more suited to be successful on Wireless application protocol enabled phone is live stock updates. The phone can easily beep the subscriber when the favorite scrip jumps the cut off

Mark and thereafter help him transact.

City direction guides: The user can obtain small road maps on his Wireless application protocol phone which will guide him.

Information and entertainment: This includes interactive information as well as other entertainment like games and chat.

BENEFITS

Operators

Wireless application protocol promises to decrease churn, cut costs, and increase the subscriber base both by improving existing services, such as

interfaces to voice-mail and prepaid systems, and facilitating an unlimited range of new value-added services and applications, such as account management and billing inquiries.

Content Providers

Applications will be written in wireless markup language (WML). Using the same model as the Internet, Wireless application protocol will enable content and application developers to grasp WML that will pave the way for services to be written and deployed within an operator's network quickly and easily.

End Users

End users of Wireless application protocol will benefit from easy, secure access to relevant Internet information and services such as unified messaging, banking, and entertainment through their mobile devices

FUTURE OUTLOOK

Wireless application protocol Forum has devised and continues to develop a set of protocols that provide a common environment for the development of advanced telephony services and Internet access for the wireless market. The Wireless application protocol browser should do for mobile Internet what Netscape did for the Internet.

The limitations in mobile Internet access are not just the low bandwidths available but also limitations like small display and power consumption. Power consumption is a very critical issue and even if high speeds are available power considerations may limit the data speeds. Services like GPRS are bearer services. Internet access via Wireless application protocol should in fact become much easier with GPRS. Currently, Wireless application protocol access needs a specific connection via an Internet service provider (ISP) in much the same way as a PC accesses. But the system will come into its own with the introduction of another enabling technology, general packet radio services (GPRS), a method of

sending Internet information to mobile telephones at high speed. By allowing mobile to be in always connected state GPRS (or other services like CDPD) will bring Internet more closer to mobile. Mobile commerce is one such application that can open up lots of opportunities for Wireless application protocol. By 2004, there could be more than 700m mobile commerce users. M-commerce is emerging more rapidly in Europe and in Asia, where mobile services are relatively advanced.

CONCLUSION

Wireless application protocol is an tremendous technology that fulfill the needs of mobile users such as browsing internet content, news etc. This Wireless application protocol technology is developed by many of the researchers to fulfill the gap between the mobile world and the Internet, by providing the required facilities to the mobile users, independent of the user and network. In these day's mobiles plays a prominent role in day to day life. For this purpose many web developers and researchers throughout the world are working in order to increase the performance of wireless networks. Only by developing the Wireless application protocol technology fulfill the gap between wireless network technologies and mobile computing networks. Using these Wireless application protocol technology users can easily develop their own mobile applications such as reminders, multimedia messages (MMS), calendar etc.

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