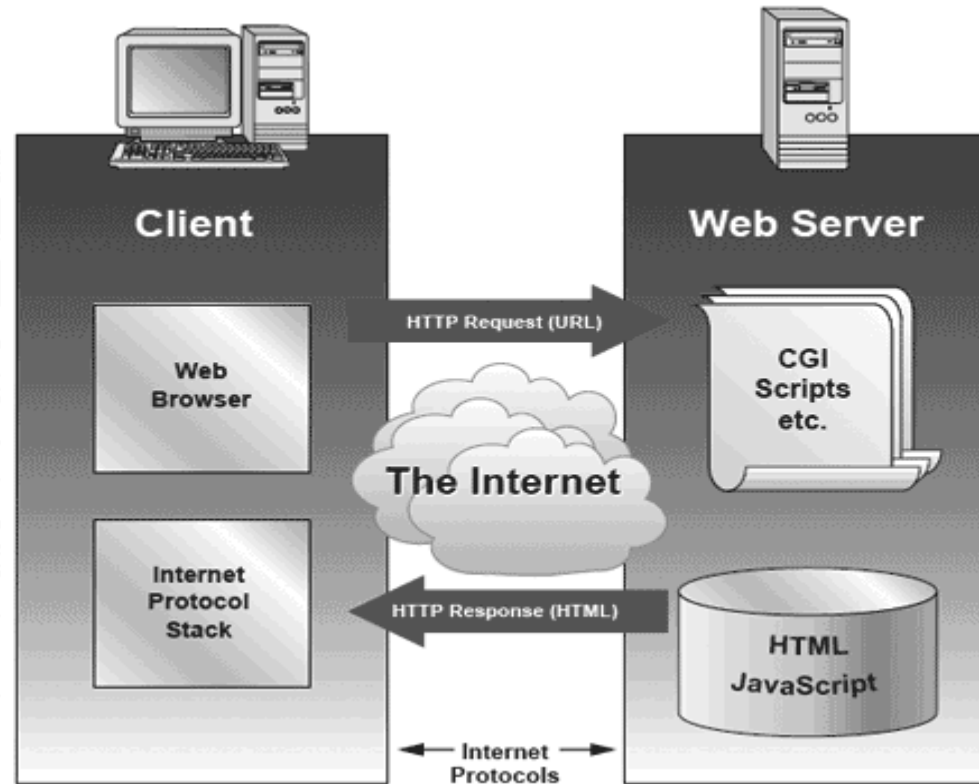# WAP model

The Internet Model

The content available at the web server may be static or dynamic.

Definition of WAP

"Wireless application protocol (WAP)
is an application environment and set of
communication protocols for wireless devices
designed to enable access to the Internet
and advanced telephony services
to the wireless community. "

W@P Forum

WAP

- The Wireless Application Protocol takes a client server approach.

- The interaction happens using HTTP protocol (Hypertext Transfer Protocol).

- Wireless Application Protocol does not include HTTP.

- Instead a Wireless Application Protocol client uses the Wireless Session Protocol (WSP) to retrieve information from the server.

The WAP Model

1 -- WSP Request (URL)
2 -- WSP Response (Binary WML)
3 -- HTTP Request (URL)
3 -- HTTP Response (WML)
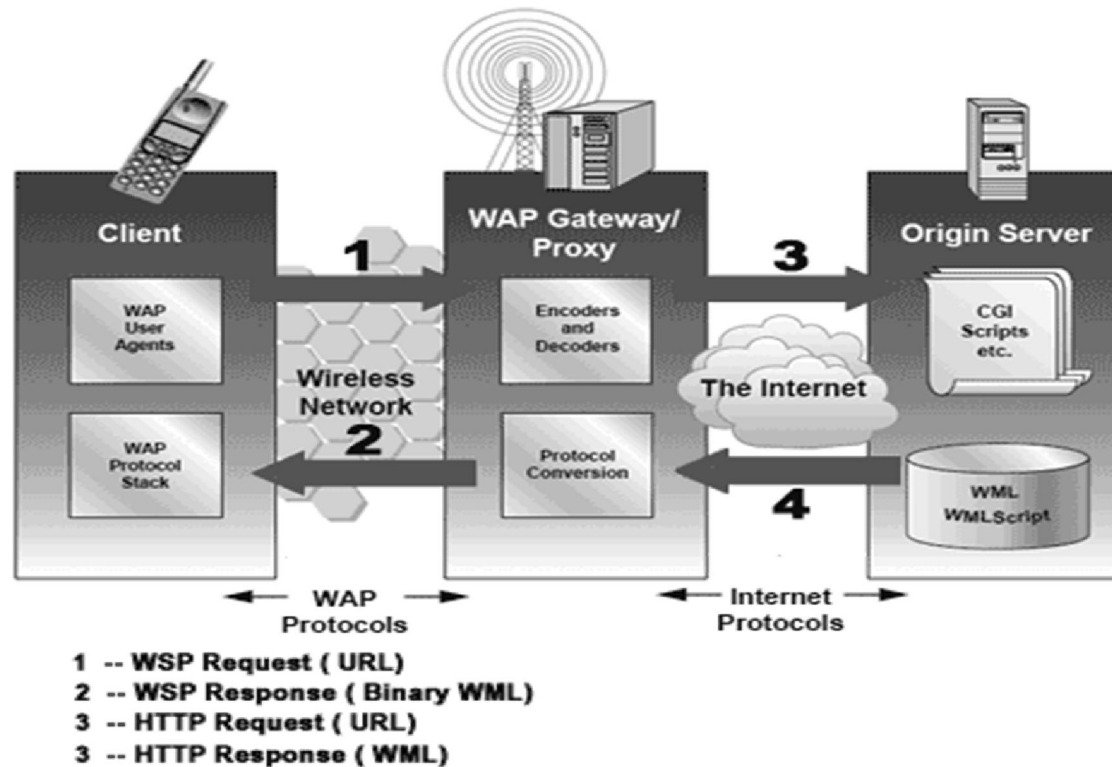
WAP Gateway/Proxy is the entity that connects the wireless domain with the Internet.

Wireless Session Protocol (WSP)

- The request that is sent from the wireless client to the WAP Gateway/Proxy uses the Wireless Session Protocol (WSP).

- WSP is a binary version of HTTP.

- A markup language - the Wireless Markup Language (WML) has been adapted to develop optimized WAP applications.

How WAP Model Works?

- The user selects an option on their mobile device that has a URL with Wireless Markup language (WML) content assigned to it.

- The phone sends the URL request via the phone network to a WAP gateway using the <u>binary encoded</u> WAP protocol.

- The <u>gateway translates</u> this WAP request into a conventional <u>HTTP request</u> for the specified URL and sends it on to the Internet.

- The appropriate Web server picks up the HTTP request.

- The server processes the request just as it would any other request.
- If the URL refers to a static WML file, the server delivers it.
- If a CGI script is requested, it is processed and the content returned as usual.
- The Web server adds the HTTP header to the WML content and returns it to the gateway.
- The WAP gateway compiles the WML into binary form.
- The gateway then sends the WML response back to the phone.
- The phone receives the WML via the WAP protocol.
- The browser processes the WML and displays the content on the screen.

WAP - scope of standardization

- Browser
  - "micro browser", similar to existing, well-known browsers in the Internet
- Script language
  - similar to Java script, adapted to the mobile environment
- WTA/WTAI
  - Wireless Telephony Application (Interface): access to all telephone functions
- Content formats
  - e.g., business cards (vCard), calendar events (vCalender)
- Protocol layers
  - transport layer, security layer, session layer etc.
- Working Groups
  - WAP Architecture Working Group, WAP Wireless Protocol Working Group, WAP Wireless Security Working Group, WAP Wireless Application Working Group

WAP protocol stack
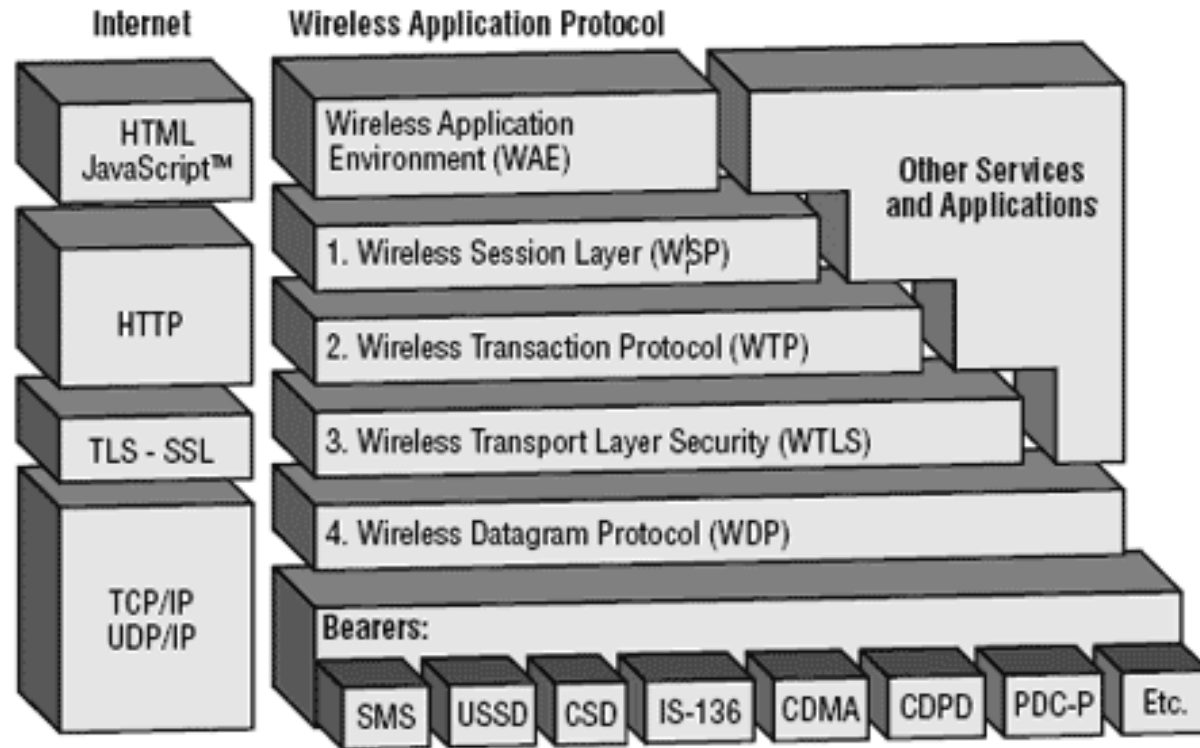
WAP protocol stack is divided into five layers

- **Application Layer**

  Wireless Application Environment (WAE). This layer is of most interest to content developers because it contains among other things, device specifications, and the content development programming languages, WML, and WMLScript

WAP - Environment

- (WAE) provides an environment that enables a wide range of applications to be used on wireless devices. It has following components:

- **Addressing model**

- A syntax suitable for naming resources stored on servers. WAP use the same addressing model as the one used on the Internet that is Uniform Resource Locators (URL).

- **Wireless Markup Language (WML)**

- A lightweight markup language designed to meet the constraints of a wireless environment with low bandwidth and small handheld devices. The Wireless Markup Language is WAP's analogy to HTML used on the WWW. WML is based on the Extensible Markup Language (XML).

WAP - Environment

- **WMLScript**

- A lightweight scripting language.

- WMLScript is based on ECMAScript (European Computer Manufacture Association), the same scripting language that JavaScript is based on.

- It can be used for enhancing services written in WML in the way that it to some extent adds intelligence to the services; for example, procedural logic, loops, conditional expressions, and computational functions.

- **Wireless Telephony Application (WTA, WTAI)**

- A framework and programming interface for telephony services.

- The Wireless Telephony Application (WTA) environment provides a means to create telephony services using WAP.

WAP

- **Session Layer**
- Wireless Session Protocol (WSP). Unlike HTTP, WSP has been designed by the WAP Forum to provide fast <u>connection suspension and reconnection.</u>
- The Wireless Session Protocol (WSP) implements an interface for connection-oriented and connectionless session services.

Transaction Layer

- Wireless Transaction Protocol (WTP).

- The WTP runs on top of a datagram service, such as User Datagram Protocol (UDP) and is part of the standard suite of TCP/IP protocols used to provide a simplified protocol suitable for low bandwidth wireless stations.

WAP

- **Security Layer**
- Wireless Transport Layer Security (WTLS). WTLS incorporates security features that are based upon the established Transport Layer Security (TLS) protocol standard.
- The communication between the mobile phone and this WAP gateway has to be secured.
- A mobile phone has very limited bandwith,memory, computational power and battery power and can not perform heavy (cryptographic) computations. The SSL/TLS protocol.
- It includes data <u>integrity checks, privacy, service denial, and authentication services.</u>

WTLS – WIRELESS TRANSACTION LAYER SECURITY

The WTLS layer implements a security protocol based on the TLS (Transport Layer Security) industry standard. WTLS is intended for use with the WAP transport protocols and has the following features:

Data integrity – WTLS ensures that the data sent between the terminal and an application server is in no way altered or damaged.

Confidentiality – WTLS ensures that the data sent between the terminal and an application server remains confidential and cannot be understood by any other participant who may have intercepted the data stream.

Authentication – WTLS ensures the authenticity of the terminal and of the application server.

Denial-of-service protection –

 Wireless Transaction Layer Security (WTLS) contains features that will recognize and reject data that has been repeated or not verified successfully. WTLS hinders many typical denial-of-service attacks and protects the upper protocol layers. Though, this is not a perfect solution
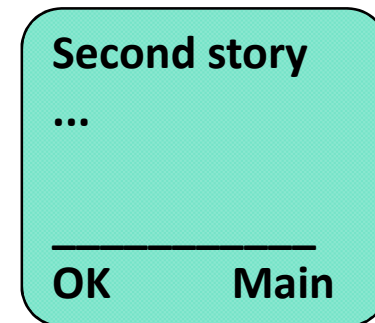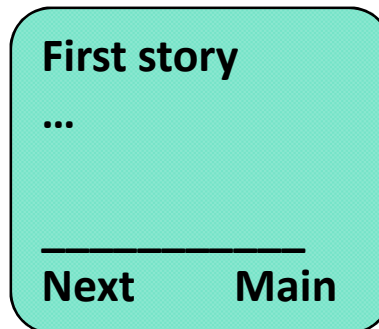
WAP

Transport Layer

- Wireless Datagram Protocol (WDP).
- WDP offers a consistent interface for the upper layers
- The WDP presents a consistent data format to the higher layers of the WAP protocol stack, thereby offering the advantage of bearer independence to application developers.

WML – Wireless Markup Language

- Based on HTML
- WML Script based on Java Script
- Technical collaboration with W3C
- Micro Browser Technology

```
<WML>
 <TEMPLATE>
  <DO TYPE="OPTIONS" LABEL="Main">
   <GO URL="main_menu.wml"/>
  </DO>
 </TEMPLATE>
 <CARD NAME="msg1">
  <DO TYPE="ACCEPT" LABEL="Next">
    <GO URL="#msg2"/>
  </DO>
  First story
 </CARD>
 <CARD NAME="msg2">
  Second story
 </CARD>
</WML>
```

First story

...

_____
Next   Main

Second story

...

_____
OK   Main

Comparison of World Wide Web and Wireless Application Protocol

- WAP uses the Wireless Markup Language (WML) for application contents in the same way what Hyper Text Mark-up Language (HTML) is used in WWW.

- In the Internet model there is a <u>client and a server</u>. The Internet is used for transmission. In the WAP model, the same client server model is used but there is a <u>Proxy/Gateway</u> between the server and the client to allow protocol conversion and encoding plus encoding of WML

Comparison of World Wide Web and Wireless Application Protocol

- WMLScript makes it possible to add procedural logic and computational functions to WAP based services like Javascript in HTML.

- WAP uses the same addressing model as the one used in the Internet (URL). WAP also can use URIs(Uniform Resource identifiers) for addressing resources that are not necessarily accessed using well-known protocols.

- WAP allows Wireless Telephony Applications that are not available in the WWW.

Advantages of WAP

- Wireless Application Protocol is open standard. It is totally vendor independent and Network Standard Independent.

- WAP applications downloaded from the server enable faster service creation and introduction than embedded software.

- using WML you can have your own WAP page (home page) which can be viewed on your future mobile phone.

Disadvantages of the WAP architecture

- It has a thin client architecture. That is one of the reasons why normal web technology cannot be used in the WAP client.

- WAP application interfaces (like menu labels and navigation items) need to be more user friendly.

- The time taken to perform a query on the Internet through the WAP is also not acceptable by the users.

Constraints of handheld devices

- Handheld devices have
- less powerful CPU's. have less memory.
- have lower transfer rates.
- connection is less stable.
- availability is less predictable.
- Power supply and consumption is an important issue.
- Input devices are far from as powerful as those in stationary computers.

Kannel WAP Gateway

- Kannel is an open source WAP gateway. It attempts to provide this essential part of the WAP infrastructure freely to everyone so that the market potential for WAP services, both from wireless operators and specialized service providers, will be realized as efficiently as possible.

- Kannel also works as an SMS gateway for GSM networks. Almost all GSM phones can send and receive SMS messages, so this is a way to serve many more clients than just those using a new WAP phone.