UNIT – I

- WAP
- OSI Network Model
- Wireless Technologies
- WEB Transaction Model
- WAP Transaction Model
- WAP Architecture

What is WAP?

**WAP (Wireless Application Protocol)** is a specification for a set of communication protocols to standardize the way that wireless devices, such as cellular telephones and radio transceivers, can be used for Internet access, including e-mail, the World Wide Web, newsgroups, and instant messaging.

**Analog versus Digital**

Analog

- Thomas Edison – phonograph
- **sound collecting diaphragm-> needle-> rotating aluminum cylinder**
- Eventually modified to become the “modern” phonograph, signals are amplified electronically
- Analog wave is vibration created by sound
- Storage and playback of an analog wave – simple but fidelity is not very good
- Fidelity – the similarity between the original signal and the reproduced signal
Digital
- Goal was to create a recording with very high fidelity and perfect reproduction
- Converts analog wave into a stream of numbers and records the numbers and not the wave
- Analog to digital converter (ADC)
- Digital to analog converter (DAC)
- Sampling rate, sampling precision
- Amount of digital data goes up significantly

Digital communications
* manipulated and managed by software, not hardware.
* Less prone to interference, are more secure and can be run at higher speeds than analog technologies.
* Voice and data look the same.
* Just streams of numbers.

Transports and Protocols
Transport -
Means by which you send information from one place to another.
It’s hardware with limited intrinsic value.
Usually be adapted to more to more than one protocol.

Protocol –
The code you choose to communicate the message contents.
Agreed-upon set of standards that you can use to create higher-level value.

OSI Network Model
Seven –Layer International Standards Organization (ISO) Open Systems Interconnection (OSI) data communications model.
Layers that identify the most common services and interact with each other to make the network work.
Seven layers from top to bottom.

<table>
<thead>
<tr>
<th>Application Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation Layer</td>
</tr>
<tr>
<td>Session Layer</td>
</tr>
<tr>
<td>Transport Layer</td>
</tr>
<tr>
<td>Network Layer</td>
</tr>
<tr>
<td>Data-link Layer</td>
</tr>
<tr>
<td>Physical Layer</td>
</tr>
</tbody>
</table>

Physical Layer – Encapsulates the electrical and mechanical characteristics of a medium that transports communications signals.
Data Link Layer – Defines the format of the signals that are responsible for transporting data across the medium. Low level electrical signals generated by a system’s hardware.
Network Layer – Provides services for identifying and connecting two nodes on a network.
Transport Layer – Designed to provide reliability in network connection. When one device sends a message to another, the receiving device actually gets the message.
Session Layer – To establish (setup), manage and disconnect (teardown) sessions.
Presentation Layer – To negotiate the format of the data that is sent back and forth between two devices.
Application Layer – Executes a specific program such as a file transfer or e-mail exchange.
**Wireless Technologies**
AMPS (Advanced Mobile Phone Service) and European Analog Cellular
TDMA (Time Division Multiple Access)
CDMA (Code Division Multiple Access)
GSM (Global System for Mobile Telecommunications)
CDPD (Cellular Digital Packet Data)

**AMPS**
1. Analog cellular transport used throughout North America.
2. Operates at 800 MHz.
3. Use it with a cellular modem for circuit-switched data communications.
4. Replaced with various competing digital networks.

**TDMA**
1. Digital transport that divides the frequency range allotted to it into a series of channels.
2. Each channel is then divided into time slots. Each conversation within that channel gets a time slot.
3. Transport can be compared to a country’s highway system.
4. Traffic intersection where several lanes merge into one.
5. Individual connections, both voice and data are identified by the location of their time slot.

**CDMA**
Wireless Application Protocol

CDMA Diagram

1. Code Division Multiple Access.
2. It is a digital transport that has been in use by the U.S military.
3. Commercial wireless transport.
4. Pioneered by U.S based QUALCOMM, a CDMA transmitter assigns a unique code to each wireless connection and then broad casts its data out on the character simultaneously with all other connections. The receiver is able to decode each conversation by knowing the unique code assigned to each connection.

**GSM**

GSM, which stands for Global System for Mobile communications, reigns (i.e. power) as the world’s most widely used cell phone technology. Cell phones use a cell phone service carrier’s GSM network by searching for cell phone towers in the nearby area.

GSM carriers have roaming contracts with other GSM carriers and typically cover rural areas more completely than competing CDMA carriers (and often without roaming charges, too).

GSM uses digital technology and is a second-generation (2G) cell phone system.
Advantages of GSM
1. Less signal deterioration inside buildings.
2. Ability to use repeaters.
3. Talk time is generally higher in GSM phones due to the pulse nature of transmission.
4. The availability of Subscriber Identity Modules allows users to switch networks and handsets at will, aside from a subsidy lock.
5. GSM covers virtually all parts of the world so international roaming is not a problem.
6. The much bigger number of subscribers globally creates a better network effect for GSM handset makers, carriers and end users.

Disadvantages of GSM
1. Interferes with some electronics, especially certain audio amplifiers.
2. Intellectual property is concentrated among a few industry participants, creating barriers to entry for new entrants and limiting competition among phone manufacturers. Situation is however worse in CDMA-based systems like IS-95, where Qualcomm is the major IP holder.
3. GSM has a fixed maximum cell site range of 120 km, which is imposed by technical limitations. This is expanded from the old limit of 35 km.

CDPD
1. Cellular Digital Packet Data
2. It is a TCP/IP based mobile data-only service that runs on AMPS networks. TCP/IP which stands for Transmission Control Protocol/Internet Protocol is the protocol underlying the Internet.
3. Because it runs on analog networks, it requires a modem to convert the TCP/IP-based data into analog signals when sending and receiving.

4. Offer analog voice, circuit-switched data and packet data service.

5. Designed for relatively quick set up and teardown, making it similar to packet data connections.

6. Not as efficient as digital-only networks for short, bursty data communications.

WEB Transaction Model
The Internet’s World Wide Web (WWW) provides a very flexible and powerful logical model. Applications present content to a client in a set of standard data formats that are browsed by client-side user agents known as Web browsers (or simply browsers). Typically, a user agent sends requests for one or more named data objects (or content) to an origin server. An origin server responds with the requested data expressed in one of the standard formats known to the user agent (e.g., HTML).
The WWW standards include all of the mechanisms necessary to build a general-purpose environment:

1. All resources on the WWW are named with Internet-standard Uniform Resource Locators (URLs).
2. All classes of data on the WWW are given a specific type allowing the user agent to correctly distinguish and present them appropriately. Furthermore, the WWW defines a variety of standard content formats supported by most browser user agents. These include the Hypertext Mark-up Language (HTML), the JavaScript scripting language and a large number of other formats (e.g., bitmap image formats).
3. The WWW also defines a set of standard networking protocols allowing any browser to communicate with any origin server. One of the most commonly used protocols on the WWW today is the Hypertext Transport Protocol (HTTP).
7. The WWW infrastructure and model has allowed users to easily reach a large number of third party content and applications.
8. It has allowed authors to easily deliver content and services to a large community of clients using various user agents (e.g., Netscape Navigator™ and Microsoft Internet Explorer™.)

**WAP Transaction Model**

WAE adopts a model that closely follows the WWW model. All content is specified in formats that are similar to the standard Internet formats. Content is transported using standard protocols in the WWW domain and an optimized HTTP-like protocol in the wireless domain. WAE has borrowed from WWW standards including authoring and publishing methods wherever possible. The WAE architecture allows all content and services to be hosted on standard Web origin servers that can be incorporate proven technologies (e.g., CGI). All content is located using WWW standard URLs.

WAE enhances some of the WWW standards in ways that reflect the device and network characteristics. WAE extensions are added to support Mobile Network Services such as Call Control and Messaging. Careful attention is paid to the memory and CPU processing constraints that are found in mobile terminals. Support for low bandwidth and High latency networks are included in the architecture as well.

WAE assumes the existence of **gateway** functionality responsible for encoding and decoding data transferred from and to the mobile client. The purpose of encoding content delivered to the client is to minimize the size of data sent to the client over-the-air as well as to minimize the computational energy required by the client to process that data. The gateway functionality can be added to origin servers or placed in dedicated gateways.
The major elements of the WAE model include:

**WAE User Agents**
Client-side in-device software that provides specific functionality (e.g., display content) to the end-user. User agents (such as browsers) are integrated into the WAP architecture. They interpret network content referenced by a URL. WAE includes user agents for the two primary standard contents: encoded Wireless Markup Language (WML) and compiled Wireless Markup Language Script (WML Script.)

**Content Generators:**
Applications (or services) on origin servers (e.g., CGI scripts) that produce standard content formats in response to requests from user agents in the mobile terminal. WAE does not specify any standard content generators but expects that there will be a great variety available running on typical HTTP origin servers commonly used in WWW today.

**Standard Content Encoding:**
A set of well-defined content encoding, allowing a WAE user agent (e.g., a browser) to conveniently navigate web content. Standard content encoding includes compressed encoding for WML, byte code encoding for WML Script, standard image formats, a multi-part container format and adopted business and calendar data formats.
Wireless Telephony Applications (WTA):
A collection of telephony specific extensions for call and feature control mechanisms that provide authors (and ultimately end-users) advanced Mobile Network Services.

The resulting WAE architecture fits within a model:

- That leverages the Internet (i.e., the model takes advantage of standards, technology and infrastructure developed for the Internet),
- That leverages thin-client architecture advantages (e.g., service deployment has significantly lower cost per device due to the device independent nature of WAE and the centralized management of the services at the origin servers),
- That provides end user advanced Mobile Network Services through Network Operator controlled telephony value-added services,
- That provides the means for vendors to build differentiating user-friendly services that can take advantage of WWW and Mobile Network Services and
- That provides an open extensible framework for building wireless services. Typically, a user agent on the terminal initiates a request for content. However, not all content delivered to the terminal.
- It will result from a terminal-side request. For example, WTA includes mechanisms that allow origin servers to deliver generated content to the terminal without a terminal’s request.

In some cases, what the origin server delivers to the device may depend on the characteristics of the device. The user agent characteristics are communicated to the server via standard capability negotiation mechanisms that allows applications on the origin server to determine characteristics of the mobile terminal device. WAE defines a set of user agent capabilities that will be exchanged using WSP mechanisms. These capabilities include such global device
characteristics as WML version supported, WML Script version supported, floating-point support, image formats supported and so on.

**WAP Step-By-Step**

1. A user requests a URL by entering it into a WAP device.
2. A WAP device encodes the request into an encrypted, compact binary format suitable for transmission over a wireless link and sends it to the WAP gateway.
3. The gateway examines the message converts it into a valid HTTP-based URL request and forwards it.
4. When wmlserver.com receives the request, it fulfills it by returning the requested document back to the gateway.
5. The gateway converts the HTTP response back into an encrypted, binary format and ships it off to the WAP device.
6. The WAP device decodes the response and displays the results on the WAP device’s screen.

**WAP Architecture**
OSI Model defines a layered framework for generically describing and designing protocols. WAP has 6 layers and similar approach to OSI.

**WAP Application Environment (WAE)**
It encompasses the devices, the content-development languages (WML and WML Script), the telephony APIs (WTA) for accessing telephony functionality from within WAE programs and some well-defined content formats for phone book records, calendar information and graphics.

**Wireless Session Protocol (WSP)**
It provides a consistent interface to WAE for two types of session services.

1. A connection mode
2. A connectionless service

Services:
Create and release a connection between the client and server.
Exchange data between the client and server using a coding scheme that is much more compact than traditional HTML text.
Suspend and release sessions between the client and server.

**Wireless Transaction Protocol (WTP)**
It provides transaction services to WAP. It handles acknowledgments if a transaction succeeded. It provides retransmission of transactions in case they are not successfully received and removes duplicate transactions. WTP manages different classes of transactions for WAP devices.

1. Unreliable one-way requests.
2. Reliable one-way requests.
3. Reliable two-way requests.
An unreliable request from a WAP device means that no precautions are taken to guarantee that the request for information makes it to the server.

**Wireless Transport Layer Security (WTLS)**

It provides services to protect data including

- **Data Integrity** – Guarantees that the data that is sent is the same data that is received.
- **Privacy** – Guarantee that all transaction between the WAP device and gateway are encrypted.
- **Authentication** – Guarantees the authenticity of the client and application server.
- **Denial-of-service protection** – protection detects and rejects data that come in the form of unverified requests.

**Wireless Datagram Protocol (WDP)**

It provides a consistent interface to the higher layers of the WAP architecture and provides data error connection.

**Bearers or Wireless Communications Networks**

WAP designed to run on a variety of networks including short message services (SMS), circuit switched connections and packet switched networks. Each type of network has pros and cons in terms of performance, delay and errors.
The Wireless Application Environment has four key components:

**The Microbrowser.** The microbrowser defines how WML and WMLScript are interpreted by a WAP-enabled device for presentation to the end user.

**WML.** The Wireless Markup Language is similar to HTML and defines how data should be formatted and presented to the user.

**WMLScript.** Similar to JavaScript, WMLScript provides some programming logic for performing calculations within an application.

**Wireless Telephony Applications.** WTA provides functionality so that developers can integrate microbrowser functions with the telephone. For example, an incoming call may trigger the microbrowser to search your Contact list and show the information at the time the call is received.
UNIT-II

- WAP Components
- Standard Execution Environment
- WAE Components Interaction Diagram
- Main Protocols
- WTP/WSP/WDP (UDP)/WBMP Transport Protocols

WAP COMPONENTS

What is WAP Specification?

✓ The WAP specification defines the public standard architecture.
✓ Set of protocols intended to provide access to data by means of wireless terminals.

KEY SPECIFICATION ELEMENTS

1. The advantages of choosing their model may be considered to be the following.
   - Known programing models.
   - Proven architecture solutions.
   - A wide hanged of existing development tools.

2. Describe how data is presented on the wireless terminal

Use with the restricted capacities of a wireless terminal

Does not assume the availability of a keyboard or a mouse at the terminals.

- WAP service programming model
• Wireless Markup Language (WML)
• The script Language (WML Script)
• The WAP gateway.
• The specification for a micro browser of a wireless terminal.
• The simplified protocol stack minimizes the demands on channel transfer capacity.
• Wireless Telephony Application Model (WTA).

3. Creation of user interfaces on the client side.

WML is static document description, WML has additional capacities.

4. Exchange between the client and the content services carried out a gateway.

Translate all WML content through the internet applying the HTTP 1.1.

5. Manage a user interface similar to web browser on a desktop computer.
• Determine how the WML and the WML script language should be interpreted in wireless terminal.
• How they should interact with the user.
• Resulting code is compact and effective.
• Providing flexibility and capacity.

6. Ability to carry out WAP applications on various types of wireless interfaces.

7. Provides access to functionality of telephony.
• Call control.
• Providing access to the address book.
- Sending network message by means of WML Script modules.

**Standard Execution Environment**

The WAE is the highest level in the general set of protocols. A mobile terminal interacts with WAE by means of a user agent (UA). UA implements the user interface (menus and commands allowing the user to interact with mobile communication services).

The WAE describe the process of executing wireless applications for wireless terminals and supplements other WAP specification protocols.

The process of interaction with a user.

The user who wants to receive access to a service on the WML content server sends a request to it by means of the WML agent (e.g. the WML browser). The WML agent sends the URL request to the WAP gateway.
using WAP protocols. As a rule, at the WAP gateway, the request for
the service is handled in a way similar to a get type of HTTP request.
After receiving the request, the WAP gateway makes an ordinary HTTP
request to a Web server or other system that supports this protocol.
After receiving the result of the external source request, the gateway
processes its content. The gateway transforms the content into the
format best suited to a wireless channel’s limited capacity and
other wireless terminal restrictions. The resulting optimized
information is transferred to the user’s terminal.

The modern version of WAE consists of the following parts

- WML Microbrowser
- WML Script virtual machine
- WML Script standard library
- WTAI – Wireless telephony application interface
- Types of WAP content

**WAE COMPONENTS INTERACTION DIAGRAM**
The WML browser provides a method of interpreting documents written in WML. WML navigation mechanisms include hyper connections similar to those found in the HTML language and navigation tags between cards. These mechanisms also save the navigation history and are similar to navigation mechanisms on the Web that use HTML. The variables, elements and syntax that must be used in a correct WML file also provide.

**The WML Language**

The WAP specification defines the Wireless Markup Language (WML) and the Wireless Markup Language Script (a subset of the WAE specification) as the language for showing and adding the procedure logic for a wireless device that supports WAP.

WML is the tag-based language that provides the opportunity to manage the display (to show text and graphic objects), data input (a text or a choice from a list) and navigation methods based on hyper connections.

WML documents are presented as decks. Each deck consists of cards containing user interaction procedures.

**The WMLScript Language**

It is based on ECMA Script.

The following variable types are supported: Boolean, Integer and Floating point.
The WML Script supports the if then else construction. The naming conventions for WML script variables are similar to that of the WML language namely.

- Alphanumeric characters are valid.
- Underlining may be used inside the name.
- All names are written with lower case characters.
- Names must not begin with a digit.

WML is codes into byte code while WML script must be compiled before sending to the client. Unlike HTML and the JavaScript, WML has links only to URLs.

**Standard Agent Characteristics**

**WML and WTA Agents**

Wireless Telephony Application defines the protocol for providing telephone services in a wireless application.

The protocol includes the following specifications

- Publicly available telephone services.
- General network services.
- Specific services dependent on the type of network.
Wireless Application Protocol

Description of the WML agent

The standard defines:

- The interface from the WTA-WML and WMLScript to a fixed set of the subscriber’s local functions related to telephony – WTAI.
- Network event processing. This means that the subscriber can find events occurring in the network and execute actions in response to their occurrence.
- The repository, which is a container used by a WTA agent for storing content that executes WTA services.

Main Protocols

WAP protocols hierarchy is shown

WAE – Wireless Application Environment

WSP – Wireless Session Protocol

WTAI – Wireless Telephone Application Interface
WSL – Wireless Session Layer

WTLS – Wireless Transport Layer Security

WDP – Wireless Datagram Protocol

WCMP – Wireless Controlling Messenger Protocol

**WTP/WSP/WDP (UDP)/WBMP Transport Protocols**

WSP – Wireless Session Protocol

WTP – Wireless Transaction Protocol

WDP – Wireless Datagram Protocol

WBMP – Wireless BitMap
UNIT-III

- WAP Design and Development
- Data Types in WML
- Basic Parts of a Document
- Navigation in WML
- Parameter Transfer
- Basic Capabilities of WML Script
- Particulars of the Language

WAP DESIGN AND DEVELOPMENT

The language is designed for operation with small wireless devices, usually having the following characteristics.

✓ A small screen size with low resolution.
✓ Limited data entry capabilities.
✓ The limited computation capabilities.

WAP supports the following character subsets - > UTF – 8, ISO-8859-1, UCS-2

Entities – A WML document may contain numeric or character entities describing same character from the set of characters permitted for the document.
Most frequently used entities

<table>
<thead>
<tr>
<th>ENTITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>“</td>
<td>&amp;quat;</td>
</tr>
<tr>
<td>&amp;</td>
<td>&amp; amp;</td>
</tr>
<tr>
<td>’</td>
<td>&amp;appas;</td>
</tr>
<tr>
<td>&lt;</td>
<td>&lt;</td>
</tr>
<tr>
<td>&gt;</td>
<td>&gt;</td>
</tr>
<tr>
<td>Spacs</td>
<td> </td>
</tr>
</tbody>
</table>

Elements: Describe all structural information and the information on a WML.

   <tag> Content </tag>

Tags: A tag is a language element descriptor.

   Specifies the element itself and contains the types of the element, its name and a unique identifier.

Attributes: Describe the qualitative characteristics.

   <tag attr="value"/>

   Written in small letters. Attributes values enclosed in single or double quoted.

Comments: <!-- This is a comment -->

Variables: $identifier,$(identifier) and $identifier: conversion

Dependence upon letter case

CDATA section: <![CDATA [card_name="reseen"]]> This is a text </p>]]>
DATA TYPES IN WML

Character Data Types

CDATA text – include numerical or named character

“$$value$$” name=“value”

PCDATA deployed data – used in elements

Text written <big> IN CAPS </big>

NM TOKEN – comprising any mix of numeric letters and same punctuation marks.

Ex. “text”

-Card1

a.card.name.token

The id Data Type – unique element identifier.

<card id=”card1”/>

The length Data Type – represent the number of pixels on the screen.

<img arc=”test/quunty” hspace=”1” vspace=”1”/>

The vdata Data Type – represents a line that may include references to variables.

<card id=”card1” title=”$(showme)”>

The flow, inline and layout Data Type –

The flow represents the level of a card.
The inline represents to the textual level of information.

The layout type services to end a line.

The Text Data Type – text contains formatting.

The href Data Type – refer either to an absolute or relative universal resource locator (URL)

\[<\text{gohref}\text{=http://wapforum.org//}>\]
\[<\text{card} \text{snsnetforward}”#\text{card2}”>\]

The Boolean Data Type

\[<\text{card} \text{newcontent}”true”>\]
\[<\text{do} \text{optimal}”true” \text{type}”accept”/>\]

The Integer-Valued Data Type

Represent an integer value greater than equal to zero.

Amplification –

\[<\text{em}>\text{an emphasized line}\]<br />
\[<\text{big}>\text{a big emphasized line}</big></em>\]

**BASIC PARTS OF A WML DOCUMENT**

- The prolog (a reference to DTD)
- The `<WML>` tag
- The document header
- The template, which specifies actions common to the deck of cards
 ✓ The set of cards
 ✓ The </WML> tag

**NAVIGATION IN WML**

 ✓ Transition by link specified within a card content in a given deck.

```wml
<a href="http://wap.billing.ru/peterservice/index.wml">English</a>
</p>
```

 ✓ Transition by link to another card in the same deck.

```wml
<a href="#eng">English</a>
</a>
```

 ✓ Moving forward and backward in the history of already displayed cards within a single application.

```wml
<card>
<onevent type="oneventforward">
<go href="#eng" />
</onevent>
</card>
```

Status – Reset, Push, Pop

 ✓ Transition to another address in reply to the occurrences of events.

Ex Prssing of a functional key

Completion of the time period of a timer started.

**PARAMETER TRANSFER**
Wireless Application Protocol

✓ Describe the method of interaction of a WAP browser with a WAP gateway.
✓ Terminal interaction methods of different parts of a WML document.
✓ In the process of WML document interpretation by the browser, variables have the highest priority.
✓ When the WML browser encounters in the text the legal names of a variable in the process of interpretation, it first replaces this name with the current value of this variable.

BASIC CAPABILITIES OF WML SCRIPT

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>WML SCRIPT</th>
<th>JAVA SCRIPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semicolon</td>
<td>Obligatory</td>
<td>Optional</td>
</tr>
<tr>
<td>Support HTML Comments</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Names may include $ symbol</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Supports global variables</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Supports automatic declaration</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

PARTICULARS OF THE LANGUAGE

✓ Sensitivity to lower case and upper case writing
✓ Spaces
✓ Comments
  ▪ Comments String
  ▪ Comments block
Literal – values which are fixed in the program

Integer Literal –

- Decimal integer (base 10)
- Octal Integer (Base 8)
- Hexadecimal integer (Base 16)

Floating-Point Literals – Numbers in decimal form

May be fractional numbers or numbers with exponents

EX- 3.12, 3.12E1, 3.12&0

String Literals - Random sequence of zero or more characters in double (""") or single (") quotes.

EX – ‘Happy New Year’

‘Tuesday, May 1, 2001”

“15% off retail”

Use of Special sequence of symbols

Apostrophe (') Horizontal (\t)
Backslash () Double quote ("")
Backspace (\b) Slash (/)
Newline (\n) Form feed (\f)
Carriage returns (\n)
Boolean Literals – constants that store the value true or false.

Invalid Literals – Constants that denote the invalid value

The type returned by any literal of the invalid type is invalid.
UNIT - IV

IMPLEMENTATION AN ENTERPRISE WAP STRATEGY

- Requirements
- Architecture
- Design/Implementation
- Testing

REQUIREMENTS

- Getting functional requirements for a WAP application is difficult than for a typical desktop or web application.
- WAP devices simply have fewer resources than desktop computer – smaller screen, less memory, slower networks and less processing speed.
- While mobile device will become more powerful in the coming years.
- They will never catch their desktop counter parts.
- Therefore it becomes crucial to design for these limitations.
- What doesn’t work on a WAP device?
  - Application that requires substantial horizontal or vertical scrolling does not function will.
  - Applications that need to display several columns of data fall short.

ARCHITECTURE

- When designing WAP solutions it’s critical to separate the content shown on a page from how that page is presented and formatted.
✓ HTML lets developers completely intermix content with the content’s presentation.
✓ Typically, in an HTML file, we fine a piece of data for display and immediately to either side of that data are tag that describe any number of attribute that data should acquire.
✓ Bold, Arial, hotlinks and so on
✓ Example

```html
<html>
<head>
<title> WAP  </title>
</head>
<body text="Red">
<h1> WAP Overview </h1>
<p>This page is <i><b> the </b></i><i>
Definition guides to WAP technology</i>
</p>
</body>
</html>
```

If the information is in different format say in WML. It can be difficult to extract the data and reformat it for a new markup language.
DESIGN/IMPLEMENTATION

Once you gather your requirements and select an architecture, design, development and testing start. Some tips for creating better WAP solution.

Tips:

✓ Determine the user interface and navigation model as early as possible. Will you use option screens, programmed hardware buttons or does the application require a voice recognition interface? UI are limited on WAP devices. Also there is no guarantee that an input method on one device will be available on another.
Wireless Application Protocol

✓ Keep the depth of cards to minimum. Navigation within a traditional web browser is easy.
✓ Include WAP specific features
✓ Specific WAP presentation feature differ among devices.
✓ Data caching is usually fundamental to the speed of your application.
✓ Look at the size of an application’s decks and cards,
✓ Different wireless network perform differently. Circuit switched network require a longer connect time than packet switched network s. A circuit switched network is one where a device has to dial-in before it can transfer data. A packet switched network is similar to a paging service. No connect time is necessary.
✓ Keep in mind that wireless networks typically have data rate between 9600 bits per seconds (bps) and 19,200 bps. This raw data rate is normally much greater than actually data throughput.

TESTING

✓ Test your solution on as many different devices as possible.
✓ Each device has its own particular method of display WML pages.
✓ Some telephone supports graphics, italicized text and on-screen navigation.
✓ Others support bold text, touch screens and hardware button navigation.
✓ Test your application against multiple screen network’s and gateways.
✓ Gateway features sets vary greatly across vendors.
✓ In WAP technology, same application may perform very differently between two gateways.
✓ Application performance may also perform differently depending on the type network. It’s being run on.
UNIT – V

- Application Area of WAP
- Wireless Operator’s Interrelated Service
- Mail box Management
- Searching the Phone Directory
- Managing Personal Information

WAP APPLICATIONS AS A SYSTEM OF WIRELESS OPERATOR’S INTERRELATED SERVICES

Most wireless operators implement the following services within this protected segment of the network.

✓ The company’s mail server.
✓ The company’s external Corporate HTTP server.
  - Open segment intended for company clients.
  - Common WAP services available to subscribers to the wireless network
  - Protected section of personal WAP services for subscribers.
  - Protected section for maintaining the server done by the employees of the marketing department.
  - Protected section for subscribers to the wireless network (information support and self-serving)
  - Protected administrative section.
  - Applications that interact with servers of other companies on the internet using available communication protocols.

The following features are characteristic to WAP applications

✓ Extensive integration capabilities. So used for interoperation.
Wireless Application Protocol

✓ Provides means of billing for new services.
✓ Highly personalized.
✓ Starting point for most services due to the implementation of the self-servicing functions.
✓ Based on the geographical location of the subscriber.
✓ Higher level of security in comparison to the Internet access and therefore can serve and a basis for financial services.
✓ ColdFusion is the software of choice for implementing this integration because of the following reasons.
✓ Functionality provides by ColdFusion studio allows rapid development of software components.
✓ Access validation – implementing enhanced methods of securing information and services.
✓ Simultaneously access different database allows the separation of critical Paris of various application classes.
✓ High service availability.
✓ Integration of all the agents including COM/DCOM, CORBA, Internet Services (POP3, FTP, SMTP, HTTP, Telnet, LDAP, CFXJ and DLL objects.

MAILBOX MANAGEMENT

✓ Wireless operators are constantly providing new method of exchanging messages, including SMS, Voice mailbox and methods of delivering management using DTMF commands.
✓ The process of integration between Internet services and wireless services is currently known as unified message system.
Management of the status and content of an electronic mailbox, along with manipulation of incoming messages, represents a significant interest for several applications.

Working Principles

- The application starts running as soon as the user opens the first WML page of the mailing service from his wireless terminal.
- After access validation, the display of the wireless terminal shows except from the subscriber profile, allowing the user to select the mailbox to user.
- If user selection is correct, the terminal displays a list of mail messages stored in the mailbox on the associated mail servers.
- Access parameter for this service are stored in the subscriber profile, which is in turn stored in the database and become available after successful access validation.
- Start working with incoming messages by viewing mail addresses of sender.
- To start, press the appropriate key.
- Terminal displays the menu containing the list of required actions:
  - Reading message
  - Forwarding
  - Sending
  - Deleting
  - Extracting
APPLICATION STRUCTURE

The Application user the subscriber profile, which include an XML package, consisting of the units describing the login procedure for one of the remote POP3 services.

The Application structure presenting the sequence of calling the application modules.

SOURCE CODE LISTINGS

The source code for this application includes the following CFML documents.

Login.cfm – performs access validation.

Getprofile.cfm – displays the list of available mailboxes.

Mailservices.cfm – netrieve the parameters of the selected mailbox. Perform the call and displays the list of messages the list of messages delivered to this mailbox.

Action.cfm – performs actions on the selected messages.

Deleting .cfm – deletes the message from the mailbox.

Repymsg.cfm – sends a standard reply.

Forwording.cfm – forwords the message to another recipient.

Attachments.cfm – processes the attached files.

Reading.cfm – displays the complete text of the message.
SOURCE CODE

Login.cfm

<do type="accept">
<go method="get"
href="getprofile.cfm?user=$userid&amp;pswd=$pwd">
</go></do><p> User :<br/>
<input name="userid" type="tset"/><br/>
Password : <input name="pwd" type="password"/>
</p>

Getprofile.cfm

<CFQUERY NAME="content-Type" VALUE="text/vnd.wap.wml">
<CFHEADER NAME="Expires" value="Tue, 01 Jan 1980 1:00 GMT">
<WML>
<!—Search the database of the users —>

<CFQUERY NAME="getprofile" DATASOURCE="RUSOFFICE">
SELECT * FROM profile, Email.profiles WHERE
profile.username="#UBL.user#" AND
Profiles.UserID=Email.profiles.UserID
</CFQUERY>
</WML>
Mail.cfm

<CFQUERY NAME="GETmAILPW" datasource="office">
SELECT * FROM Emailprofiles where EProfile.ID=#URL.Userid#
</CFQUERY>

Actions.cfm

<CFQUERY NAME="GETmAILPW" datasource="office">
SELECT * FROM Emailprofiles where EProfile.ID=#URL.Userid#
</CFQUERY>

<cfpop action="gatmail" name="message"
messagenumber="#url.msg#" server="#getmail.pro.popserver#" timeout="120" username="#getmailpro.Eusername#"
Password="#getmailpro.Eusername#">

Replymsg.cfm

<CFQUERY NAME="GETmAILPW" datasource="office">
SELECT * FROM Emailprofiles where EProfile.ID=#URL.Userid#
</CFQUERY>

<cfpop action="gatmail" name="message"
messagenumber="#url.msg#" server="#getmail.pro.popserver#" timeout="120" username="#getmailpro.Eusername#"
Password="#getmailpro.Eusername#">

Forwardmsg.cfm

<CFQUERY NAME="GETmAILPW" datasource="office">
SELECT * FROM Emailprofiles where EProfile.ID=#URL.UserID#
</CFQUERY>

<cfpop action=”gatmail” name=”message”
messagenumber=”#url.msg#” server=”#getmail.pro.popserver#”
timeout=”120” username=”#getmailpro.Eusername#”
Password=”#getmailpro.Eusername#”>

Attachment.cfm

<CFTRY>
<CFDIRECTOR ACTION=’CREATE’ DIRECTORY=”#TempDir#”>
<CFATCH TYPE=”ANY”>
</CFATCH>
</CFTRY>

<!-- If there is no TMP directory, create one -->
.
.

<CFSET Message.Attachments NEQ” “>

<b>Attachment : </b>

<CFWOP FROM”1” To=”#listen (Message.Attachments,’ ‘) #”
“INDEX=”CURRItem”>
<CFSET FileName=""#AttachDir##URLEncoded
Format(getFileFromPath(ListGetAt(Message.AttachmentFiles,
CurrItem,’ ’))))#">

Readmsg.cfm

<CFSET L=#Len(Message.Body)#>
<CFSET End=250>
<CFSET Start=1>

<a href="actions.cfm?Msg=#URL.Msg#&From=#From#">Actions</a><br/>

SEARCHING THE PHOEN DIRECTORY:

✓ Providing access to database via wireless terminal.
✓ Performing content search in the database tables with subsequent transfer of the search results to the terminal.
✓ Especially useful for roaming users trying to find certain information.

WORKING PRINCIPLES

✓ Application starts execution by display a list of searching modes.
✓ Name or Neighborhood.
✓ If Neighborhood select id, complete listing of dealers whose offices are located within the area is displayed.
✓ If Name is chose, the terminal displays the form for specifying the name of the proposed dealer.
✓ Allows to type incomplete data.
Wireless Application Protocol

✓ Application provides the ability to enter any part of the name, in case forgotten the name of company to be searched.
✓ Search engine performs context search in database.
✓ Wireless terminal display the result of the full context search as a list of dealer.
✓ To report the search, it is needed to select the search-home line from the menu.

Source code includes –

1. Main.cfm
2. Regions.cfm
3. Search.cfm
4. Searchresult.cfm
5. Detailresult.cfm
6. Search_result.cfm
7. Info_dealer.cfm

MANAGING PERSONAL INFORMATION

✓ Providing subscribe with the ability to control pre-paid amounts on their user accounts.
✓ To manage available capabilities of delivering the invoice and to select the set of services available within the billing policy of the wireless operator.
✓ Selection of the connection type that a subscriber plans to use for the specified time internal also represents personal information.
WORKING PRINCIPLES

✓ When subscriber selects the service menu item, he or she can see the first card on the display.
✓ Switch to the management mode for managing access channels.
✓ In first case, subscriber switches to the access validation mode and must enter his or her personal code.
✓ If the user input is correct, the terminal display a list of available services.
✓ Availability of this list depends on the status of the current access channel.
✓ Services include
  o SMS services for wireless operator.
  o Voice mail
  o International naming etc.
✓ To enable the disabled service press Enter (OK or Accept).
✓ Name of selected service appear in menu along with status.