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## WAP / WML



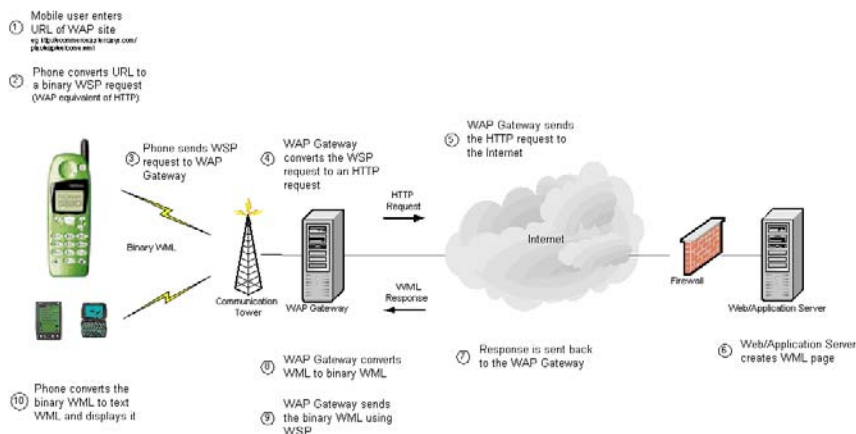
### Introducing WAP

- WAP: Wireless Application Protocol
  - Facilitates communication between a wireless device and a gateway, which in turn allows communication with Internet- or intranet-based resources
- WML: Wireless Markup Language
  - Derivative of XML used to create pages for wireless devices
- WMLScript
  - a light JavaScript language
  - WML pages only contains references to script URLs
  - WML scripts need to be compiled into byte code on a server before they can run in a WAP browser

## What is WAP?

- WAP: Wireless Application Protocol
  - A well-defined and broadly supported standard for sending data to wireless phones and other devices
  - Managed by the wapforum (wapforum.org), supported by hundreds of members:
    - Phone manufacturers
    - Phone service providers
    - Content providers
    - Developers
  - Bottom line: a way to access web content customized for small, mobile devices

## WAP Architecture





## WAP Browsers

- Openwave Mobile Browser (Phone.com browser)
  - Used in most non-Nokia phones
  - Simulator available with Mobile SDK 1.5 from <http://developer.openwave.com>
  - Latest is version 6.2.2
- Nokia browser
  - Used in recent Nokia phones
  - Simulator available with Nokia Mobile Internet Toolkit from <http://www.nokia.com/wap/>
  - Latest is version 4.0



## Thousands of WAP Applications

- M-commerce - shopping, ticket purchases, reservations, comparison shopping
- Finance - statements, funds transfer, shares trading
- M-billing - notification, presentation and payment of bills
- Enterprise access - inventory, shipment/sales updates, email access
- M-care - customer service, payment status, other backroom operations
- Entertainment - games, interactive multi-player events
- Messaging - communication and collaboration
- Travel - scheduling, advisories, reservations
- Location-smart services - traffic reports, parking information, store discounts, event recommendations

## Portals And Directories

***Thousands of sites categorized,  
indexed and viewable through  
emulators***



## Some Major Brand Sites Using WAP Today

- ABCNews.com (abcnews.go.com)
- ESPN (espn.go.com)
- USA Today (usatoday.com)
- Wall Stree Journal (wsj.com)
- Barnes and Noble (mobile.bn.com)
- Weather Channel (weather.com)
- CBS Sportline.com (cbs.sportsline.com)
- Edmunds.com (mobile.edmunds.com)
- Zagat (Zagat.com)
- And more



## Some Major Tech Sites Using WAP Today

- AOL (aol.com/anwywhere)
- Yahoo (yahoo.com)
- eBay (ebay.com)
- Expedia.com, travelocity.com
- Mapquest.com
- E\*Trade (www.etrade.com), Schwab
- ZDnet (zdnet.com)
- And more



## Some Unique Mobile Applications Available

- biztravel (biztravel.com)
  - comprehensive travel information for frequent business travelers
- iQradio (iqradio.com)
  - interactive nationwide radio station directory
- NextBus (nextbus.com)
  - Real-time arrival info for arriving bus or train (in select cities, tracked via satellite)
- TrafficStation (trafficstation.com)
  - Personal Traffic Advisor, area reports, personalized, route-specific traffic reports, Personal Traffic Advisor Telewarning System



## WAP Success Indicators

- DHL Worldwide Express
  - 36,000 web hits in first year
  - WAP: 250,000 hits in first year
  - Web: 9 months to deploy
  - WAP: 6 DAYS to deploy
  - Web: \$350,000 in 1995
  - WAP: \$18,000 in 1999



## Introducing WML

- Features of WML
  - Optimized for low bandwidth (current max bandwidth is 19.2 Kbps)
  - Source files end in `.wml`, WMLScript files in `.wmls`
  - WAP server compiles file “on the fly” prior to transmission



## WML Tag Structure

- Each WML “page” is called a deck, which consists of cards
  - Minimizes # of transmissions between phone and server
- Phone displays cards one at a time
- Developer cannot count on Back, Forward, Home buttons



## A Basic Card

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.1//EN"
  "http://www.wapforum.org/DTD/wml_1.1.xml">
<wml>
  <card id="main" title="An Example">
    <p>
      Hello World!
    </p>
  </card>
</wml>
```

## Two Cards

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-
//WAPFORUM//DTD WML 1.1//EN"
"http://www.wapforum.org/DTD/w
ml_1.1.xml">
<wml>
  <card id="card1" title="Card 1">
    <p>
      Hello World!
    </p>
  </card>
  <card id="card2" title="Card 2">
    <p>
      Hello World!
    </p>
  </card>
</wml>
```



## Text Styles

Tag	Style
<code>&lt;b&gt;&lt;/b&gt;</code>	Bold
<code>&lt;i&gt;&lt;/i&gt;</code>	Italics
<code>&lt;u&gt;&lt;/u&gt;</code>	Underline
<code>&lt;em&gt;&lt;/em&gt;</code>	Emphasis
<code>&lt;strong&gt;&lt;/strong&gt;</code>	Strong
<code>&lt;big&gt;&lt;/big&gt;</code>	Big
<code>&lt;small&gt;&lt;/small&gt;</code>	Small

## Special Characters

Character	Entity Name
Quote	&quot;
Apostrophe	&apos;
Ampersand	&amp;
Less than	&lt;
Greater than	&gt;
Soft hyphen	&shy;
Non-breaking space	&nbsp;

## Links

- `<anchor>`
  - The `<anchor>` tag always has a task ("go", "prev", or "refresh") specified

```
<p>  
<anchor>Next page  
<go href="test.wml"/>  
</anchor>  
</p>
```





## Links

- `<a>`

- always performs a "go" task

```
<p>  
<a href="test.wml">Next page  
</a>  
</p>
```



## Other WML Features

- Tables

- Same as HTML tables, but no `<th></th>` tag – all data inside `<td></td>`

- Images

- Uses same HTML `<img>` tag, but only displays WBMP (wireless bitmaps)
- **ALT** attribute important for phones that don't display images



## Other WML Features

### ■ Templates

- Allow you to add features to every card in a deck. e.g., to add a Go Back button to every page:

```
<template>
```

```
<do type="prev" label="Go Back">
```

```
<prev />
```

```
</do>
```

```
</template>
```



## Other WML Features

### ■ Forms

- Coded very differently than HTML forms
- `<input>` tags (for text and password fields) and `<select>` lists are the only form elements supported
- Input formats allow you to specify basic patterns that entered data must conform to
- Submit data to programs running on the server, which in turn can query databases, generate emails, etc.
  - Server-side programs typically written as ASPs, JSPs, or ColdFusion templates



## Other WML Features

- Variables
  - Allow values to be stored and passed to other cards and decks and to WMLScript
  - `<setvar />` tag sets variable values
  - Variable values are retrieved via `$(varname)`
- Event handling
  - Can handle `onenterforward`, `onenterbackward`, `onpick`, and `ontimer` events
  - Responses can include loading a new URL, setting variable values, or executing WMLScript



## Introducing WMLScript

- WMLScript is used for:
  - Form validations
  - Basic calculations in forms
  - Generating alerts, prompts, confirms
  - Controlling navigation
  - Controlling timers
- WMLScript's syntax is very similar to JavaScript



## Current Limitations of WAP Devices

- Low bandwidth (19.2 Kbps max)
- Tiny, monochrome screen
- Inconsistent browser implementation across phones
  - Content displayed differently
  - Different levels of WML and WMLScript support
- Phone keypad = poor input device



## Future of WAP (WAP 2.0)

- Location-based services
- Higher bandwidth
- WAP Push
- Multimedia Messaging Service
- Voice control
- Tighter integration with phone functionality and remote directory services
- XHTML (with backwards compatibility to WML)
- TCP
- Color graphics
- Animation
- Streaming media
- Data synchronization with desktop PIM
- More successful on the PDA than on the phone?



## Is All Wireless Data Comm. Based on WAP?

- WAP is definitely not the only game
  - Just one of many players in the wireless data communication space
- Others include
  - Palm Computing Platform
  - I-mode (hugely popular in Japan)
  - Java based (J2ME MIDp)
  - Microsoft Mobile Explorer
  - Symbian Epoch
  - And more



## References

- W3School XPath Tutorial
  - <http://www.w3schools.com/xpath/default.asp>
- Open Mobile Alliance
  - <http://www.openmobilealliance.org/>
  - <http://www.wapforum.org>
- WAP Shareware
  - <http://www.wap-shareware.com/>
- Several online presentations



## Reading List

- W3School WAP Tutorial
  - <http://www.w3schools.com/wap/default.asp>