



Converging WAP and the Web

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Outline of talk

- Basics of the Web: content, protocols, references
evolution & future directions
- Basics of WAP: content, protocols
- Ongoing activities to make the web work better for Wireless applications



Basics of the Web

- Content (e.g., HTML)
 - multiple file types for display and interaction
- References (e.g., URLs)
 - how to talk about something not in hand
- Protocols (e.g., HTTP)
 - how do things move around the net



Examples: Web Basics

- Content: the objects that get moved?

```
<html><head><title>My page! </title></head>  
<body><h1>This is my page!</h1>  
Hello there </body></html>
```

- Protocols: how do you get it?

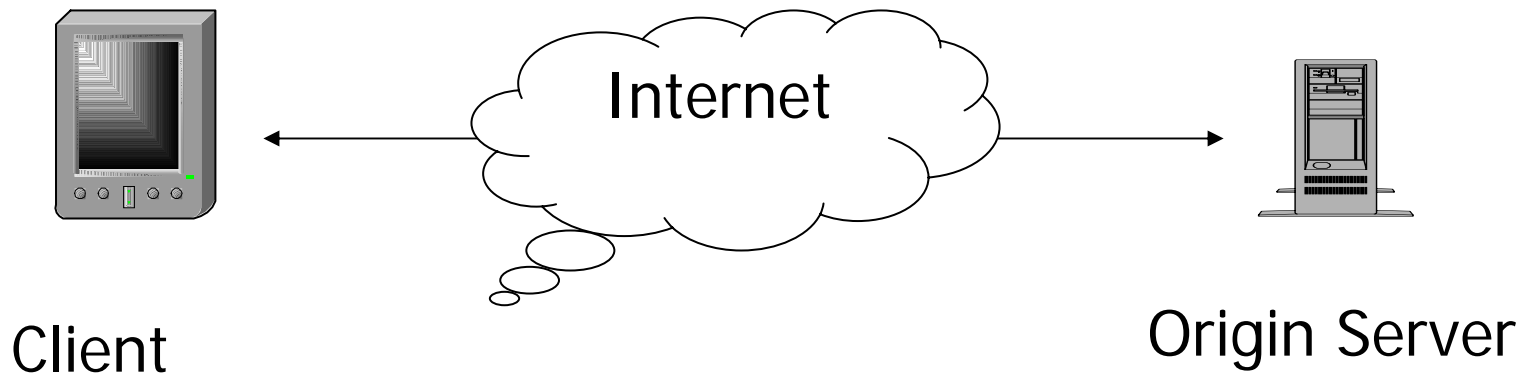
```
-> GET /abc HTTP/1.0  
<- Content-type: text/html
```

... html above ...

- Addresses: how to point to something

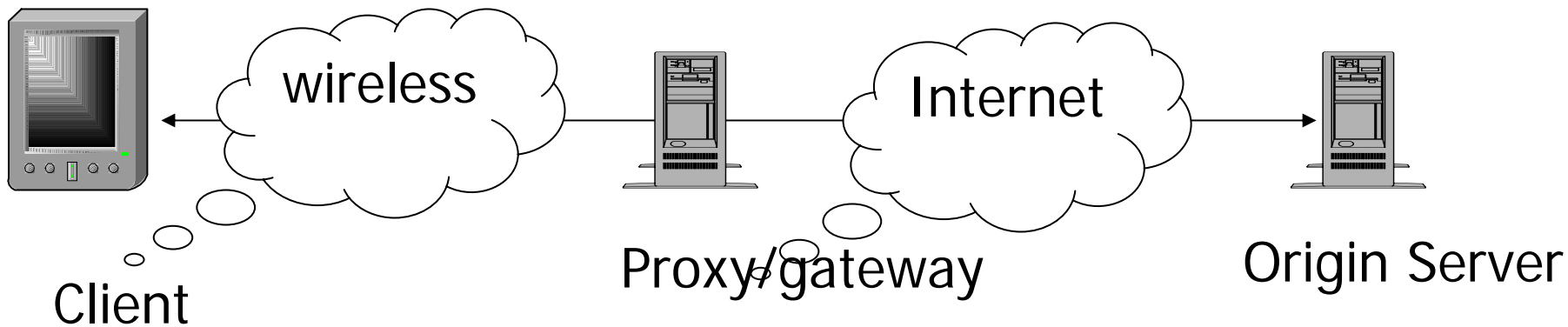
```
http://www.w3.org/Markup
```

Basic web interaction & components



- User selects link (client gets URL)
- Client connects to Origin Server
- Client retrieves content, closes connection

Web Proxies and Gateways



- Intermediary forwards requests
- Translates protocol, content, and/or links
- Translation can reduce performance, reliability, and fidelity



Other Internet applications Use the Same Framework

- Internet mail
 - Documents & content sent to mailboxes
- Instant messaging
 - End-to-end real-time communication
- Internet Fax (T.37)
 - Email with attachments, confirmation, capability matching
- Voice mail (VPIM)
 - Email with audio attachments



Web Content: Evolution

- HTML: Hypertext Markup Language

```
<html><head><title>My page! </title></head>  
<body><h1>This is my page!</h1>  
Hello there </body></html>
```

- Embedded images (GIF, JPEG)

- XML: eXtensible Markup Language

- Framework for writing arbitrary languages
- Defines how <tags> and <tag attributes="value"> interrelate

- XHTML 1.0: HTML cleaned up, defined in XML

- XHTML 1.1: XHTML split into modules



Additional kinds of web content

- Documents (Adobe PDF, Microsoft Word)
- Document images (TIFF for Fax)
- Audio (lots of formats)
- Video (lots of formats)
- Active content: Java applets, JavaScript



Web Protocols: Evolution

- HTTP/1.0: simple design for simple application
- HTTP/1.1: attempt to clean up, deal with wide variety of additional features, improve performance, describe proxy interactions
- Web authentication (are you who you say you are) and security (encrypted traffic for private data)
- Content negotiation (which kinds of data can the browser interpret)



Internet protocols evolution

- E-mail evolution for confirmation, web attachments
- Instant messaging standards being developed for interoperability
- Recent work on content negotiation & capability descriptions



Web References: evolution

■ URL: locations <http://www.sun.com/pr/1999/announce.html>

- *New York Public Library, second floor, third aisle, second shelf, third book from left*

■ URN: location-independent names

- **QP:475.L95; ISBN:0-19-854529-0**

■ URC: descriptions & citations

- *genre: book, title: The Ecology of Vision; author: J.N.Lythgoe; Date: 1979; Publisher: Clarendon Press, Oxford*



Web References: Evolution

- URN deployment slow, uncertain
- URC deployment never happened
- New standards for Common Name Resolution
- Internationalization: URLs for non-English



Wireless Application Protocol overview

- Different devices:
 - Less powerful CPUs, less memory
 - Smaller display, different input
- Different protocol requirements:
 - Less bandwidth, more delay
 - Less connection stability
 - Less predictable availability



WAP content: WAP-specific content

- WML: Wireless Markup Language
 - Minimize round-trip interactions
 - Tune for hand-held device navigation, interaction
- WBML: binary, pre-parsed representation



WAP protocols

- Tuned for wireless environment
 - WSP, WTS



Beyond Web and WAP: Other devices

- Television access for set-top box content
- Voice interaction for hands-free navigation
- “Accessibility” devices
 - Braille, screen reader, screen enlargement, no mouse

Diversity will grow

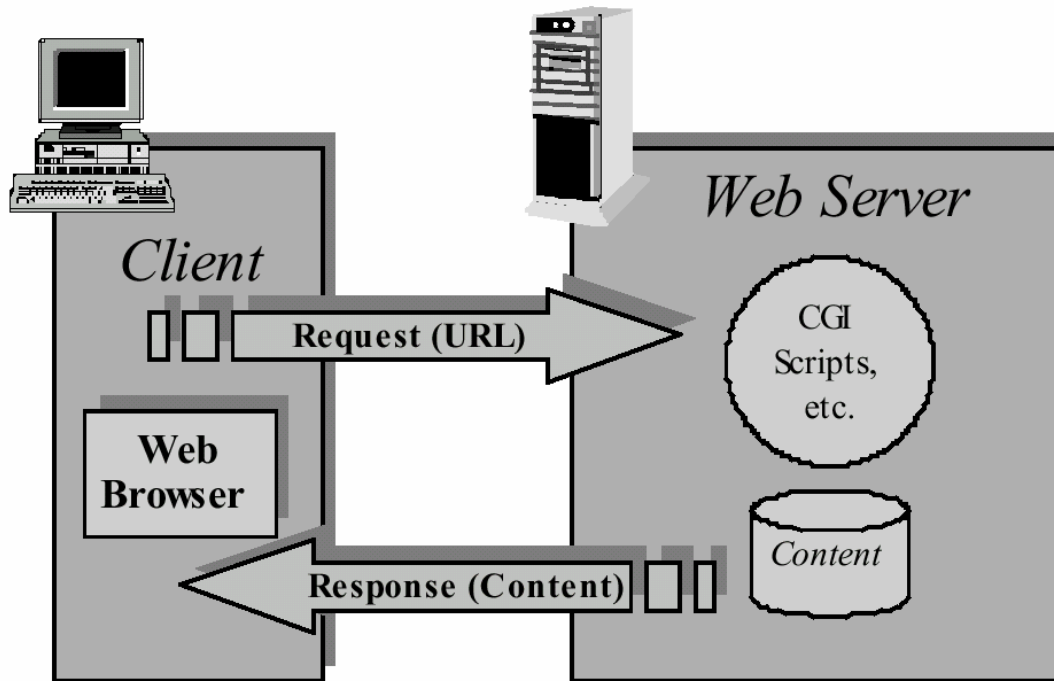
No mode will have 50% “market share”



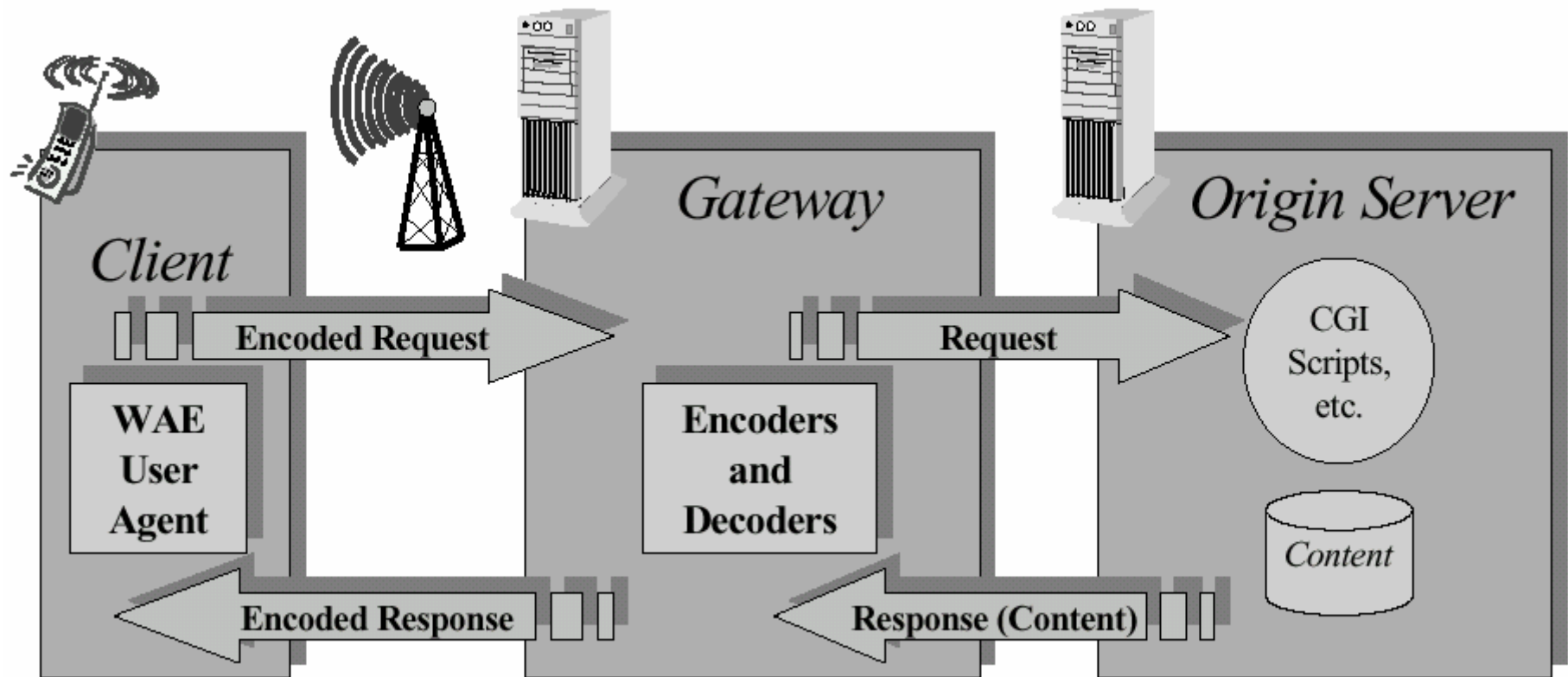
Web usage statistics

- 80% of 'hits' are to 1% of 'sites'
 - Access to top 1% of sites will motivate purchase of wireless data
- 80% of users access sites outside of top 1%
 - Access only to top 1% of sites is not "web access"

Web Programming Model



WAP Programming Model





WAP-to-Web interface via proxy gateways

- Configuration options revolve around number of WAP proxy gateways and their functional specialization
- Core functions of WAP proxy gateways:
 - Content transcoding
 - Translation between WML (WAP) and HTML (Web); between WMLscript (WAP) and Javascript (Web)
 - Secure channel bridging
 - Bridging between WTLS (WAP) and TLS/SSL (Web) secure channels, at a trusted node
 - Protocol conversion
 - Converting between WAP protocols (WSP etc.) and Web protocols (HTTP)



Converging Web and WAP

- Evolve web standards to work for wireless devices
 - Adaptable content
 - Standards evolution
- Evolve mechanisms for creating & supplying specialized content
 - Device profiles
 - Capability negotiations
- More capable devices



More General Content: one case

Web Accessibility Initiative: WAI

- Usability for people with disabilities:
 - Guidelines for Content, Authoring Tools and User AgentsWide variety of disabilities:
 - physical, visual, hearing, and cognitive/neurological disabilities
- Practical approaches to accessibility
 - Alternative text for images and 'image maps'
 - Avoid using of structure for layout
 - Captions for audio
 - Insure that scripts & interaction are not essential
 - Careful use of tables



WAI outreach

- Content guidelines
 - How web pages should be written
- User Agent guidelines
 - How browsers should work
- Authoring tool guidelines
 - editing tools should help authors create accessible pages
- Outreach programs: education, business case



Wireless outreach

- Content guidelines
 - Web pages that can easily translate automatically to WAP
 - WAP pages
- User Agent guidelines
 - Compliance & coordination of Web and WAP browsers
- Authoring tool guidelines
 - Tools should help authors create WAP-viewable applications and pages



Capability/content negotiation

- device characterization:
 - Conneg framework: describe devices by *capabilities*, not *brand/model*
 - Screen size, resolution, color capabilities; interaction device modalities; document size limits
 - Character set, rendered characters
- bandwidth characterization
 - Dynamic calculation
- user preferences



Frameworks for Content Negotiation

- HTTP Accept (on every request)
- Active content (execute to determine)
- Different URLs, web sites
- By proxy



Making the Web support WAP

- Fix HTML
 - “modularize”: define a subsets for different classes of devices
 - “basic”: shared with WAP
 - “forms”: different forms categories
 - Tables:



(X)HTML modularization

- Basic: shared with all HTML applications
- Tables: optional use of tables, not for tiny devices
- Forms: for interaction modes -- multiple forms languages envisioned



Fixing HTTP

- HTTP is inefficient
- HTTP-NG was attempt to design more efficient protocol
- Other contexts need protocol efficiency too
 - Review HTTP-NG for Wireless applicability
 - Eliminate protocol gateways

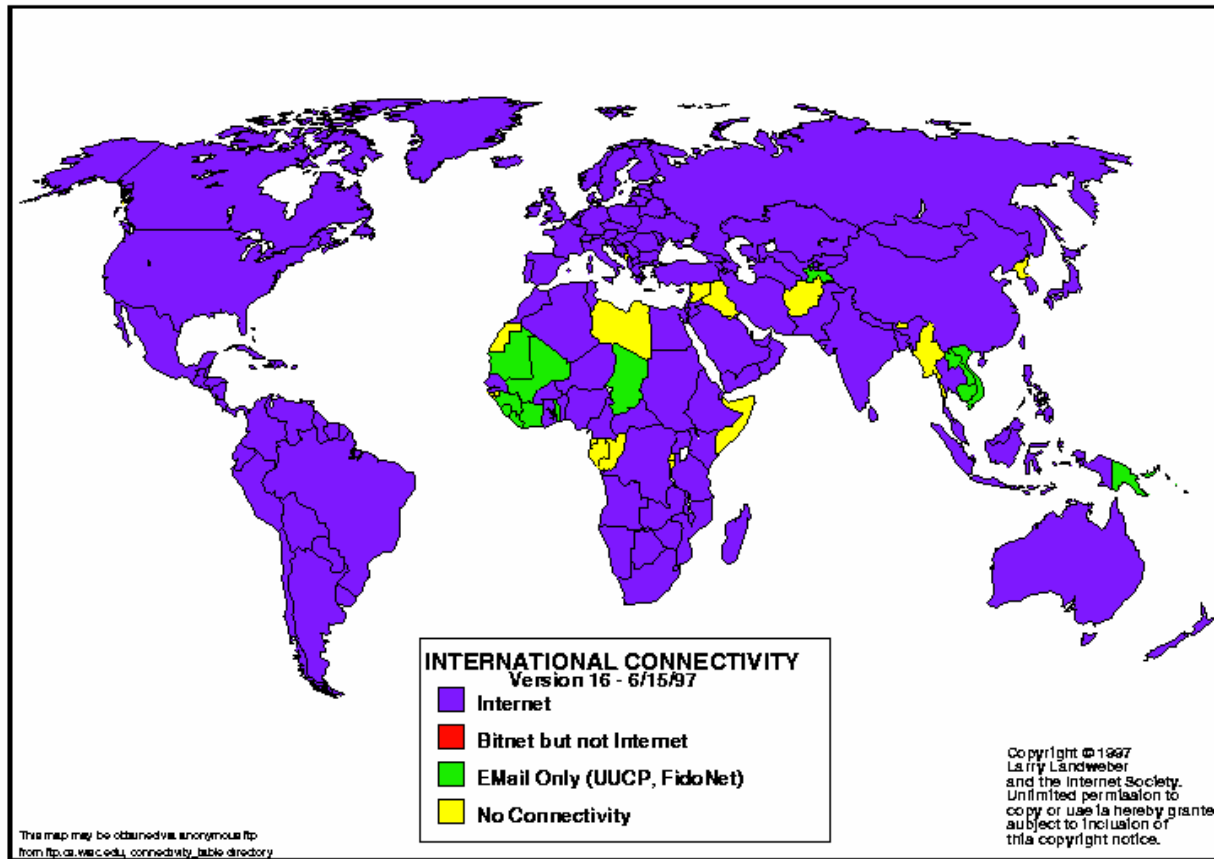


Eliminating gateways

- Goal: allow single source for multiple access

Why did the web succeed?

One Network, Everyone On It



Internet Engineering Task Force

- Defines standards for the Internet
 - Different rules, structure than most other standards organizations
- “Rough Consensus and Running Code”





World Wide Web Consortium

- Members are vendors and user organizations
- Paid (and volunteer) staff
- *Develops* web-related standards
- Hosts workshops, working groups

