WAP: Wireless Application Protocol

Empowers mobile users with wireless devices to easily access and interact with information and services.

 A "standard" created by wireless and Internet companies to enable Internet access from a cellular phone

 wapforum.org:

– co-founded by Ericsson, Motorola, Nokia, Phone.com

– 450 members in 2000, comprise of Handset manufacturers, Wireless service providers, ISPs, Software companies in the wireless industry – Goals

- deliver Internet services to mobile devices
- enable applications to scale across a variety of transport options and device types
- independence from wireless network standards
- GSM, CDMA IS-95, TDMA IS-136, 3G systems (UMTS, W-CDMA)

WAP: Main Features

 Browser – "Micro browser", similar to existing web browsers

 Markup language – Similar to HTML, adapted to mobile devices

 Script language – Similar to Java script, adapted to mobile devices

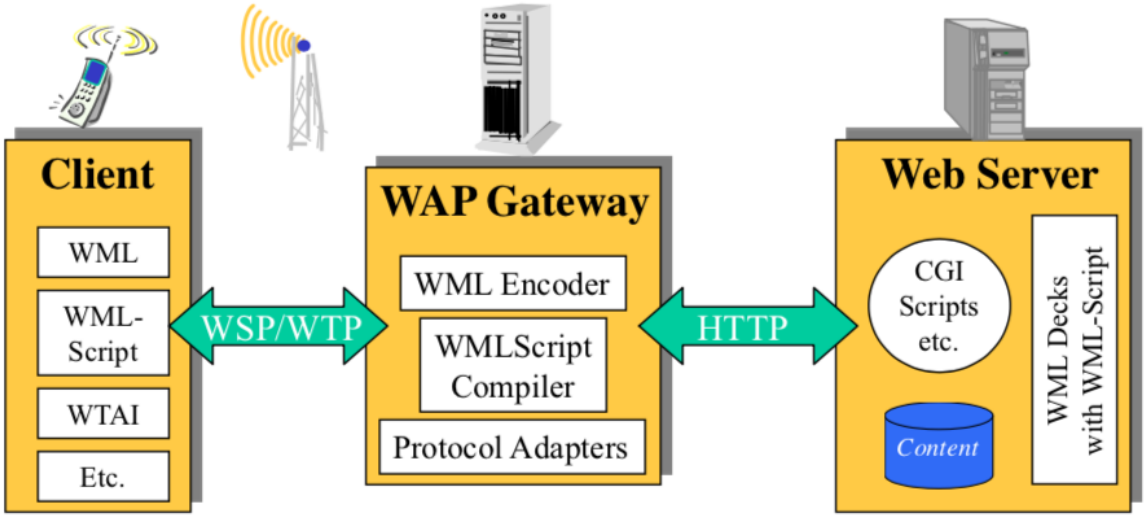
 Gateway – Transition from wireless to wired world

 Server – "WAP / Origin server", similar to existing webservers

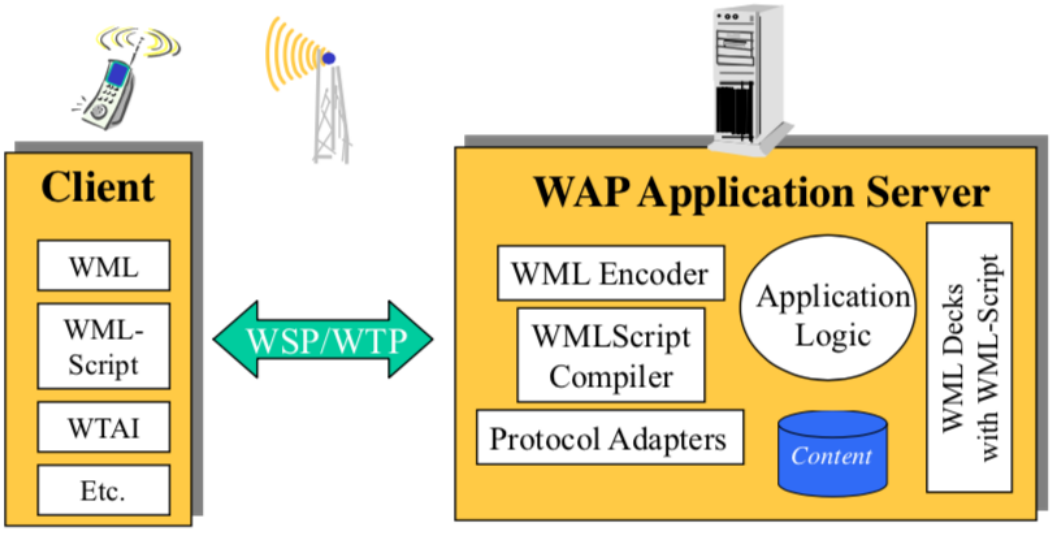
 Protocol layers – Transport layer, security layer, session layer etc.

 Telephony application interface – Access to telephony functions

WAP Architecture



WAP Application Server



WHY WAP?

- Wireless networks and phones
  - have specific needs and requirements (low-BW, small displays, low CPU, low RAM, connection instability, etc)
  - not addressed by existing Internet technologies (??)
- WAP

– Enables any data transport

• TCP/IP, UDP/IP, GUTS (IS-135/6), SMS, or USSD.

- Optimizes the content and air-link protocols
- Utilizes plain Web HTTP 1.1 servers

leverages existing development methodologies

utilizes standard Internet markup language technology (XML)

all WML content is accessed via HTTP 1.1 requests

- WML UI components map well onto existing mobile phone user interfaces

no re-education of the end-users

leveraging market penetration of mobile devices

- Several modular entities together form a fully compliant Internet entity

WDP: Wireless Datagram Protocol

- Goals
  - create a worldwide interoperable transport system by adapting WDP to the different underlying technologies

– transmission services, such as SMS in GSM might change, new services can replace the old ones

- WDP

  – Transport layer protocol within the WAP architecture

  – uses the Service Primitive • T-UnitData.req.ind

  – uses transport mechanisms of different bearer technologies

  – offers a common interface for higher layer protocols

  – allows for transparent communication despite different technologies

  – addressing uses port numbers

  – WDP over IP is UDP/IP

WTP (Wireless Transaction Protocol):

– Provides reliable message transfer mechanisms

– Based on ideas from TCP/RPC

– Provides data integrity, privacy, authentication functions

– Based on ideas from TLS/SSL

WTP: Wireless Transaction Protocol

- Goals

  – different transaction services that enable applications to select reliability, efficiency levels

  – low memory requirements, suited to simple devices (< 10k byte)

  – efficiency for wireless transmission

- WTP
  - supports peer-to-peer, client/server and multicast applications
  - efficient for wireless transmission
  - support for different communication scenarios
  - class 0: unreliable message transfer

unconfirmed Invoke message with no Result message

a datagram that can be sent within the context of an existing Session

  - class 1: reliable message transfer without result message

confirmed Invoke message with no Result message

used for data push, where no response from the destination is expected

  - class 2: reliable message transfer with exactly one reliable result message

confirmed Invoke message with one confirmed Result message

a single request produces a single reply

WTP (Transaction)

  - provides reliable data transfer based on request/reply paradigm

no explicit connection setup or tear down

optimized setup (data carried in first packet of protocol exchange)

seeks to reduce 3-way handshake on initial request

– supports

header compression

segmentation/re-assembly

retransmission of lost packets

selective-retransmission

port number addressing (UDP ports numbers)

flow control

– message oriented (not stream)

– supports an Abort function for outstanding requests

– supports concatenation of PDUs

– supports User acknowledgement or Stack acknowledgement option • acks may be forced from the WTP user (upper layer) • default is stack ack

WSP - Wireless Session Protocol

 Goals

– HTTP 1.1 functionality • Request/reply, content type negotiation, ...

– support of client/server transactions, push technology

– key management, authentication, Internet security services

 WSP Services

– provides shared state between client and server, optimizes content transfer

– session management (establish, release, suspend, resume)

– efficient capability negotiation

– content encoding

– push

 WSP/B (Browsing)

– HTTP/1.1 functionality - but binary encoded

– exchange of session headers

– push and pull data transfer

– asynchronous requests

Wireless Application Environment (WAE)

 Goals

– device and network independent application environment

– for low-bandwidth, wireless devices

– considerations of slow links, limited memory, low computing power, small display, simple user interface (compared to desktops)

– integrated Internet/WWW programming model

– high interoperability

WAE Components

 Architecture – Application model, Micro browser, Gateway, Server

 User Agents – WML/WTA/Others – content formats: vCard, vCalendar, Wireless Bitmap, WML,...

 WML – XML-Syntax, based on card stacks, variables, ...

 WML Script – procedural, loops, conditions, ... (similar to JavaScript)

 WTA – telephone services, such as call control, text messages, phone book, ... (accessible from WML/ WML Script)

 Proxy (Method/Push)