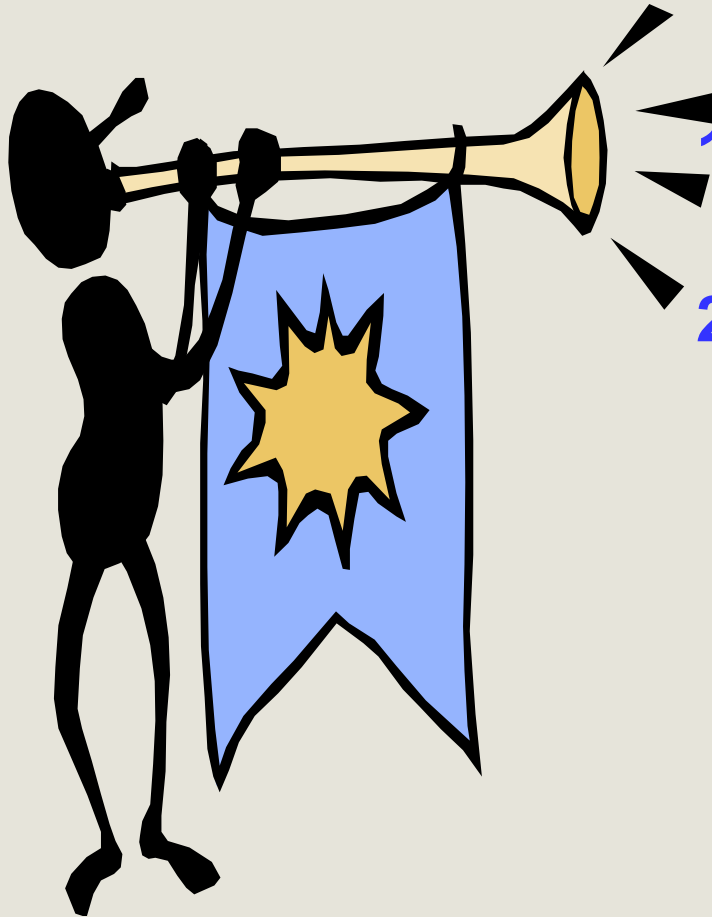


WAP and TINA-C

INSE 7110 – Winter 2004

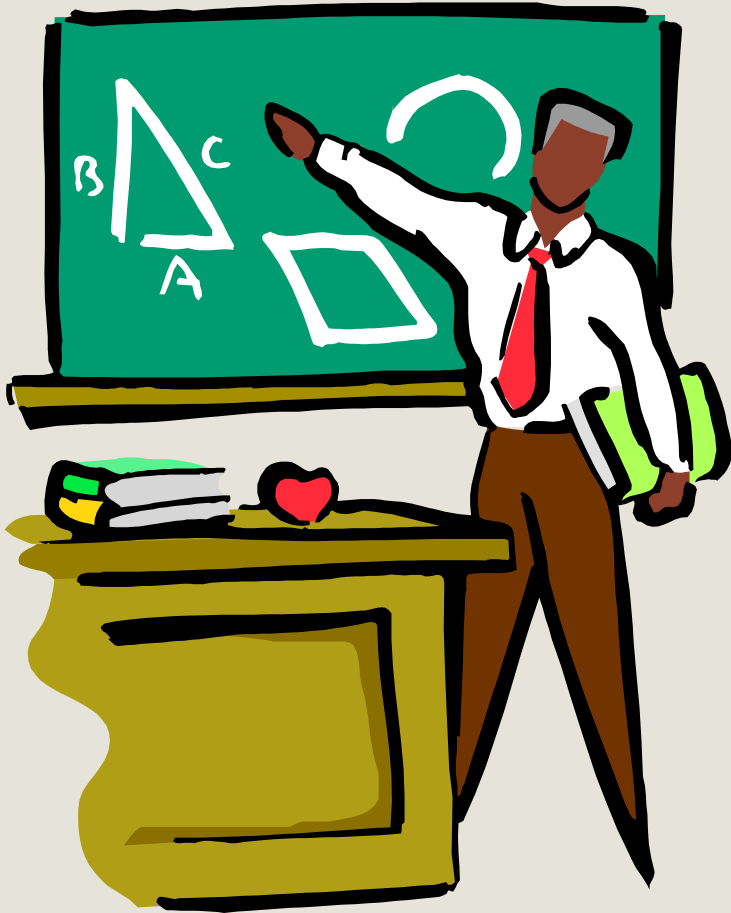
**Value Added Services Engineering in Next Generation Networks
Week #2**

Outline



1. Wireless Application Protocol (WAP)
2. Telecommunications Networks Information Architecture (TINA)

Wireless Access Protocol: The very first architecture for Internet wireless access



1. Introduction
2. Fundamental principles and concepts
3. Architecture
4. Beyond Internet wireless access
5. I-mode
5. A retrospective

Introduction

Product of an industry consortium, the WAP forum

- First release 1998 (WAP 1.0)
- Second release 2002 (WAP 2.0)
- Now transferred to the the Open Mobile Alliance (OMA)

Main objective: bring non telephony services to wireless users ...

- Web browsing
- Email

Raison d'etre

- Limitations of cellular phones(Power, memory, battery)
- Limitations of today's wireless networks (Scarce bandwidth, unreliable links)

Fundamental principles

Optimal usage of “scarce” air interface resources

- Implications
 - Less bandwidth hungry protocols
 - binary encoding instead of text encoding

Optimal usage of “limited” terminal capabilities

- Implications
 - New description language(s)
 - New browser(s)
- Email

Independence of underlying bearer (e.g. GSM, TDMA, PDC)

Fundamental concepts

WAP Micro browser

- Browser adapted to limited terminal capabilities

WAP proxy/gateway

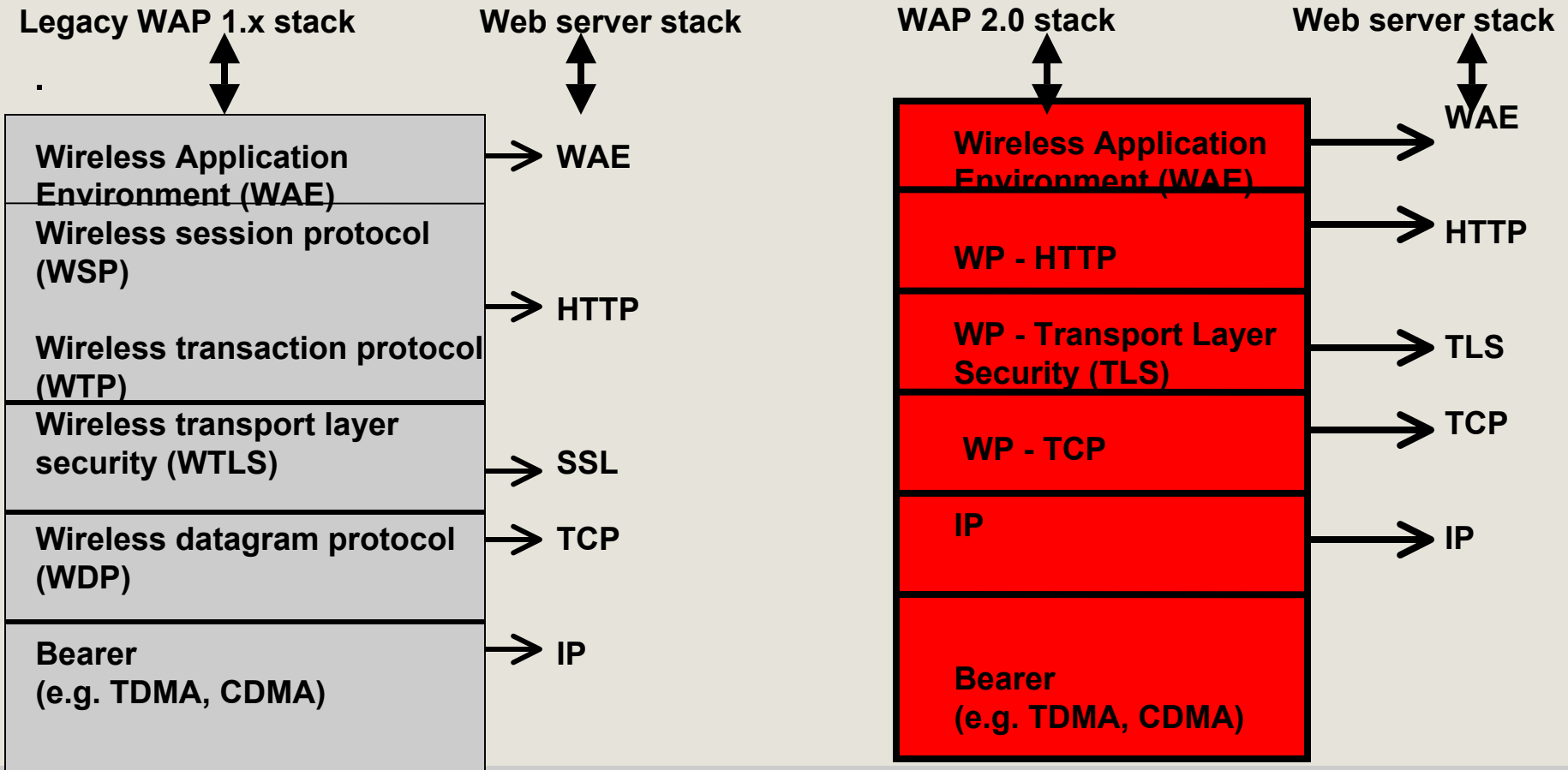
- Gateway between the Internet and operator's domain
 - Protocol gateway
 - Content adaptation
 - New description language(s)
 - New browser(s)

Application framework

- Application development / execution environment
 - APIs
 - Mark ups
 - Scripting

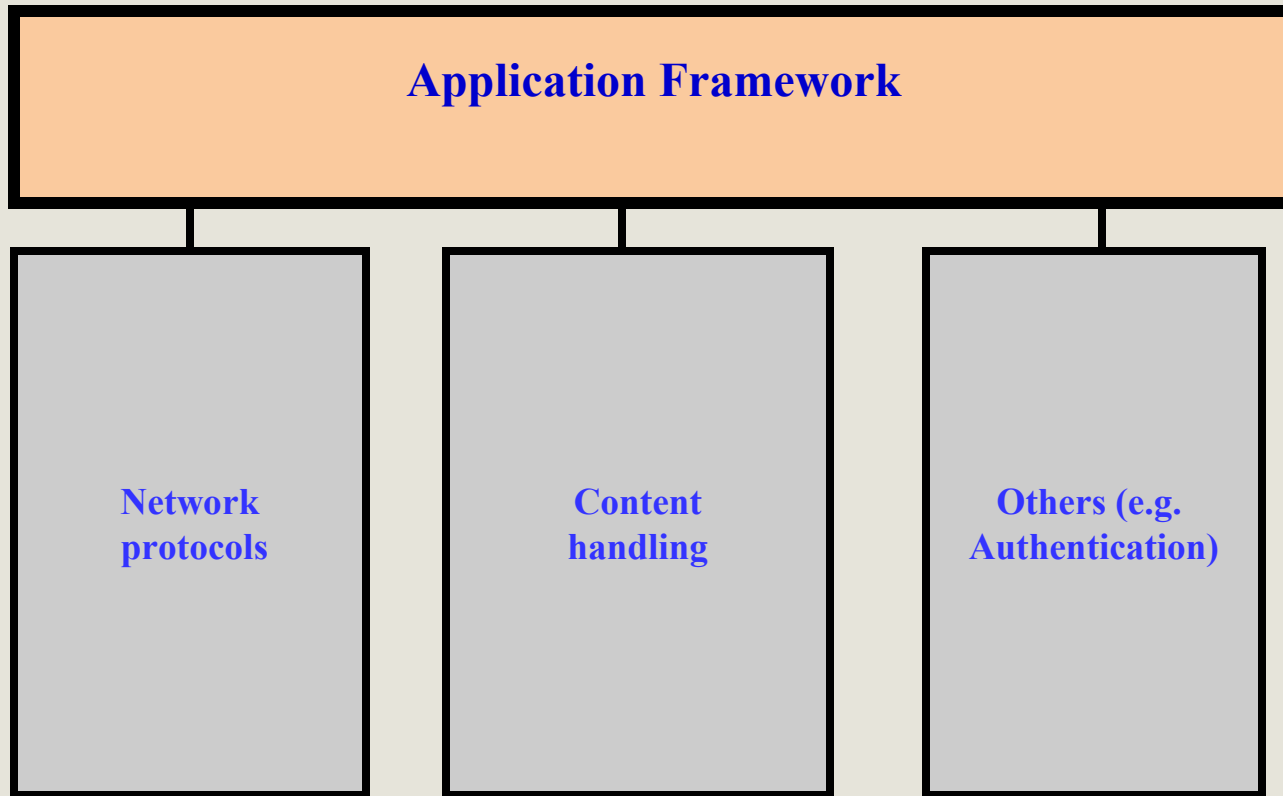
WAP: Basic Architecture

Protocol stacks (Legacy WAP 1.x stack + WAP 2.0 Internet protocol stack) ...



WAP: Basic architecture ...

Device architecture



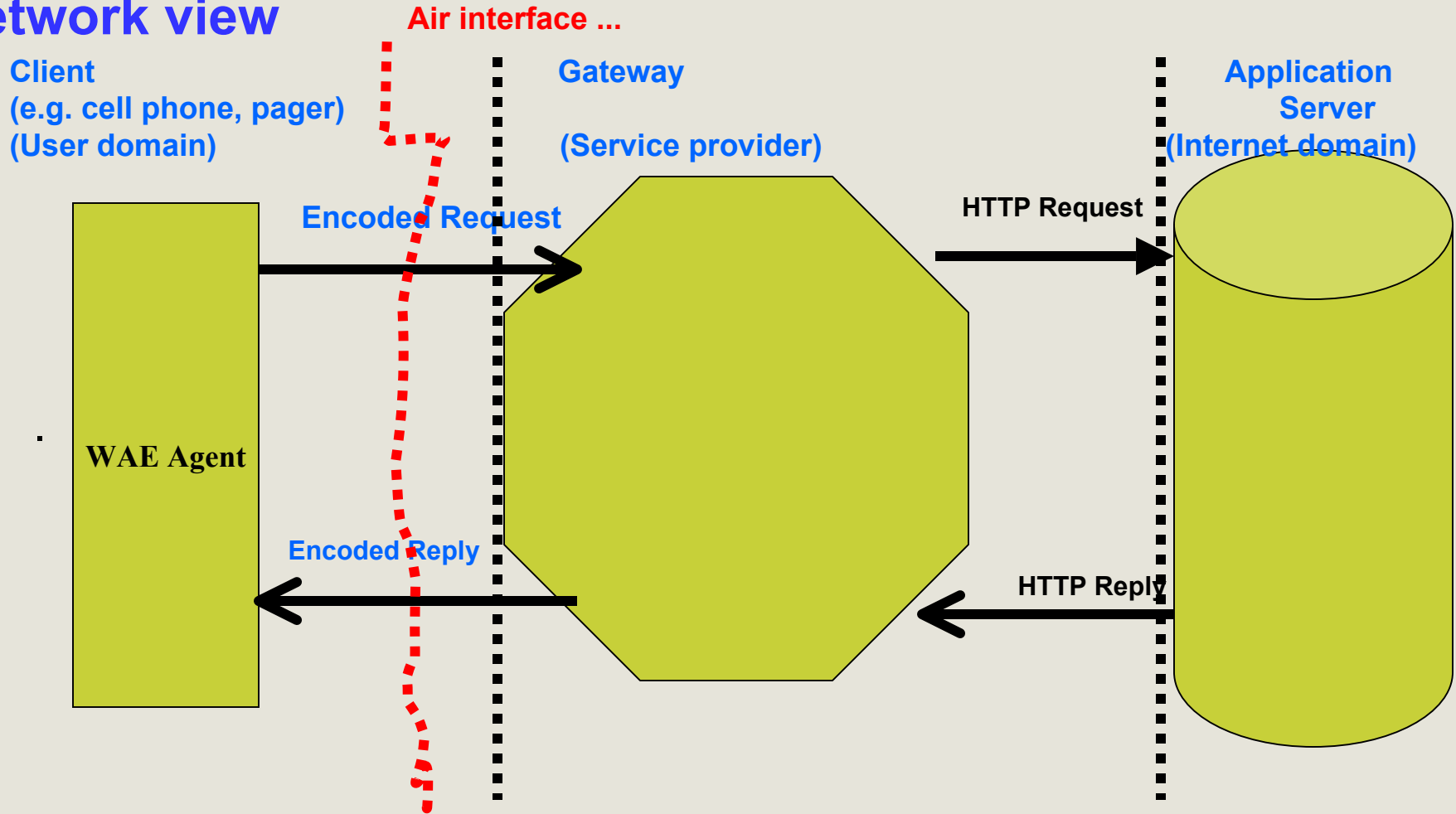
WAP: Application Environment ...

Wireless Application Environment

- Mobile profile of W3C XHTML (XHTMLMP) as mark up language for content description, in addition to:
- Wireless Mark up Language (WML) of WAP 1.x
 - Subset of XML
 - Kept in WAP 2.0 for backwards compatibility reasons
- Other types of content (vCard, vCalendar)

WAP: Basic Architecture

Network view



WAP: Beyond Internet wireless access ...

Push

- Information pushed to wireless device instead of the classical Internet pull model
 - Notifications (e.g. voice messages waiting to be retrieved)
 - News, traffic information

Wireless Telephony Applications

- Enhancements to call control services
 - Call initiation using an electronic agenda
 - On-line selection of how to handle a call (accept, reject, forward)

Multimedia messaging

- Interface between the client and the messaging server

WAP: Push in Internet world ...

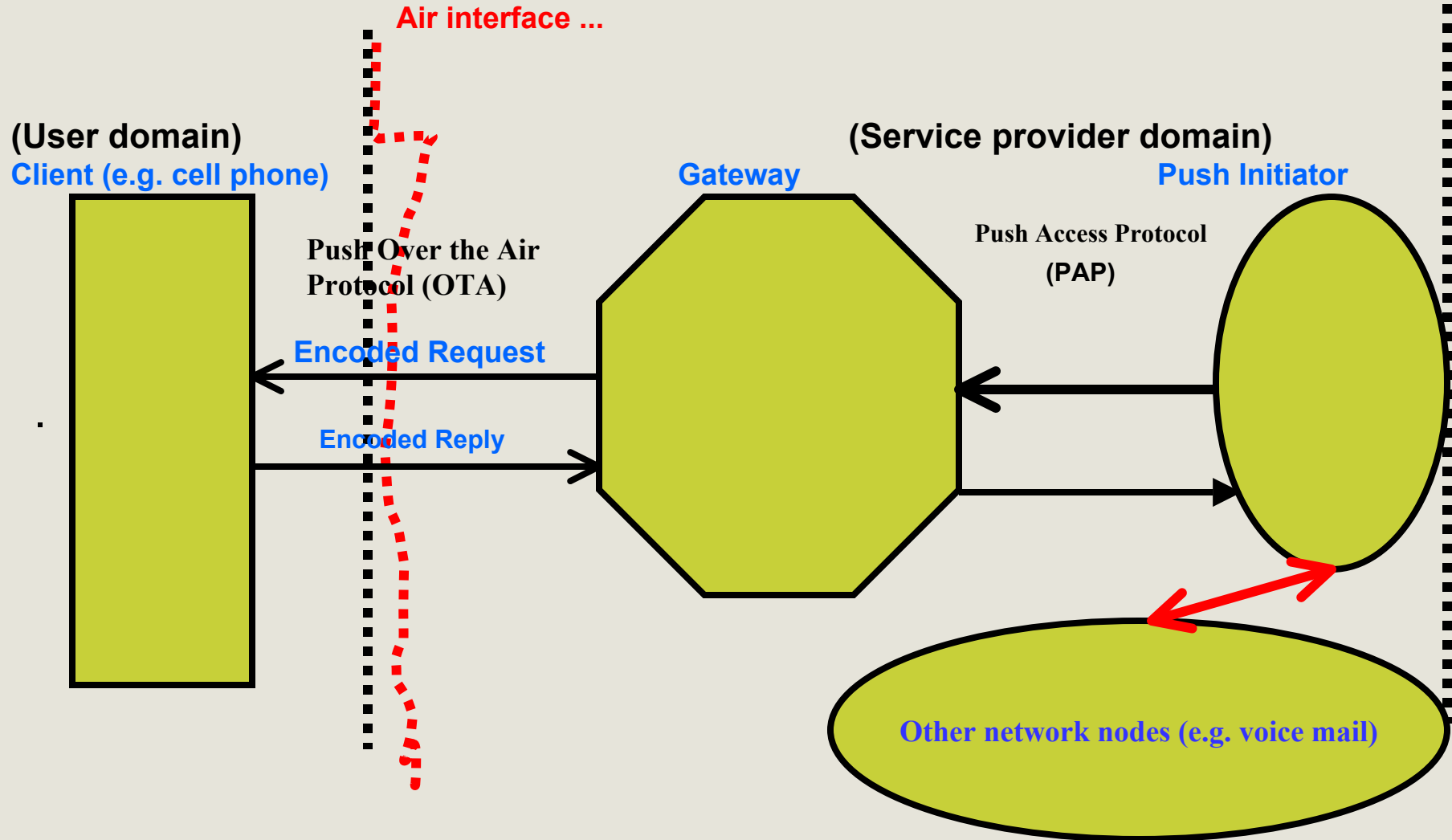
Usually handled as scheduled pull (e.g. Microsoft active channels)

- Subscription
- Channel definition format (CDF)
 - Specified in XML
 - Stored on user's terminal
 - content to pull, periodicity

Not suitable in wireless environment

- Overhead traffic for sites updated in an unpredictable manner

WAP: Simplified Push



Push protocols

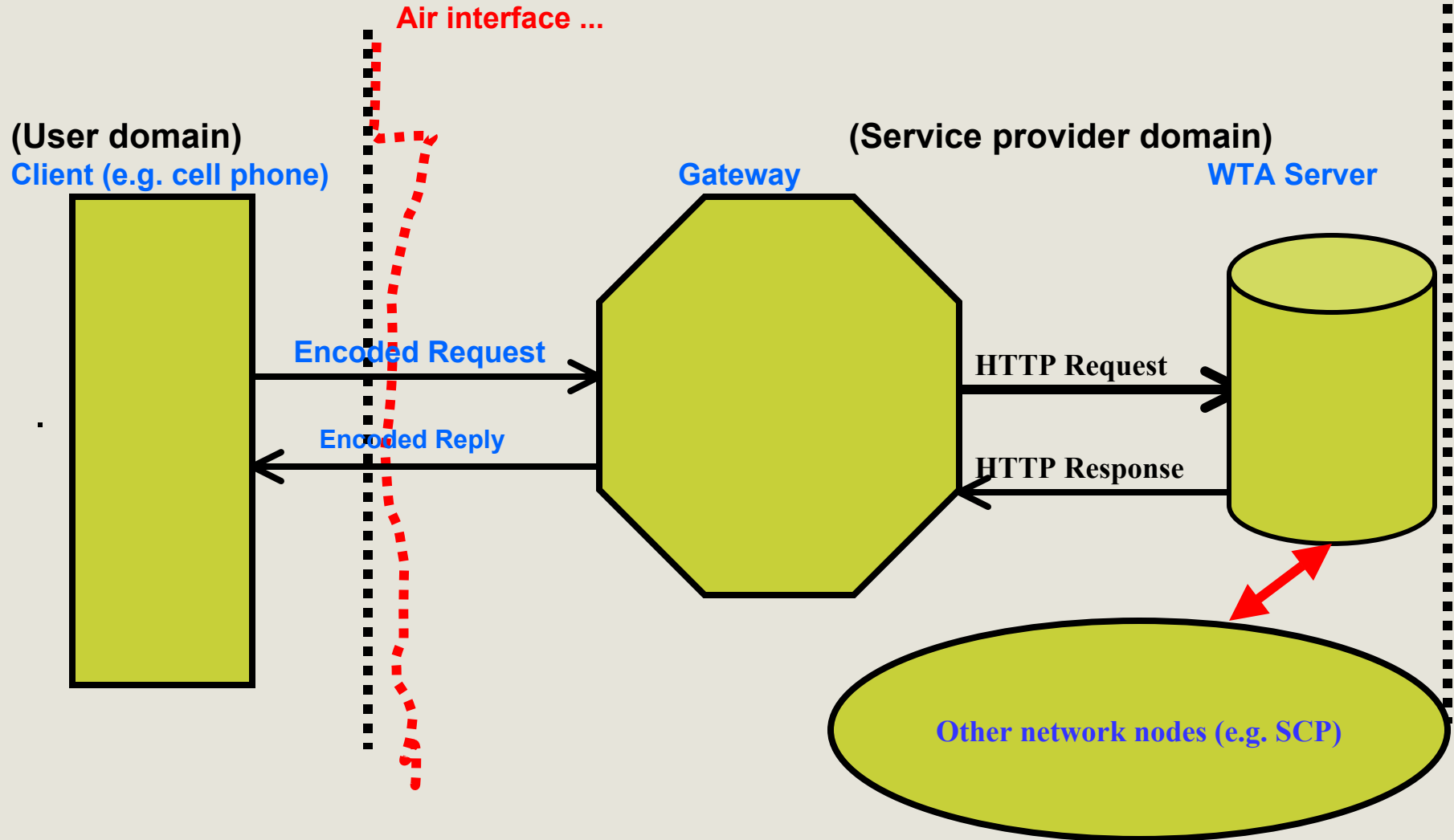
Push Access Protocol (PAP)

- Push content to gateway
- Cancel
- Get status report
- Get information on client capabilities

Push Over the Air Protocol (OTA)

- Connection oriented mode
 - Needed for confirmed push
 - Session initiation application
 - Allow gateway to ask terminal to initiate session
- Connectionless mode
 - Fire and forget

WAP: Simplified WTA



WAP: WTA

Libraries – WTA Interfaces (WTAI)

- **Public**
 - **Send DMTF tones**
- **Network common**
 - Applicable to all cellular networks
 - Voice call control (e.g. set up, accept, release)
 - Network text (e.g. SMS)
 - Phone book library
 - Call logs library
- **Network specific**

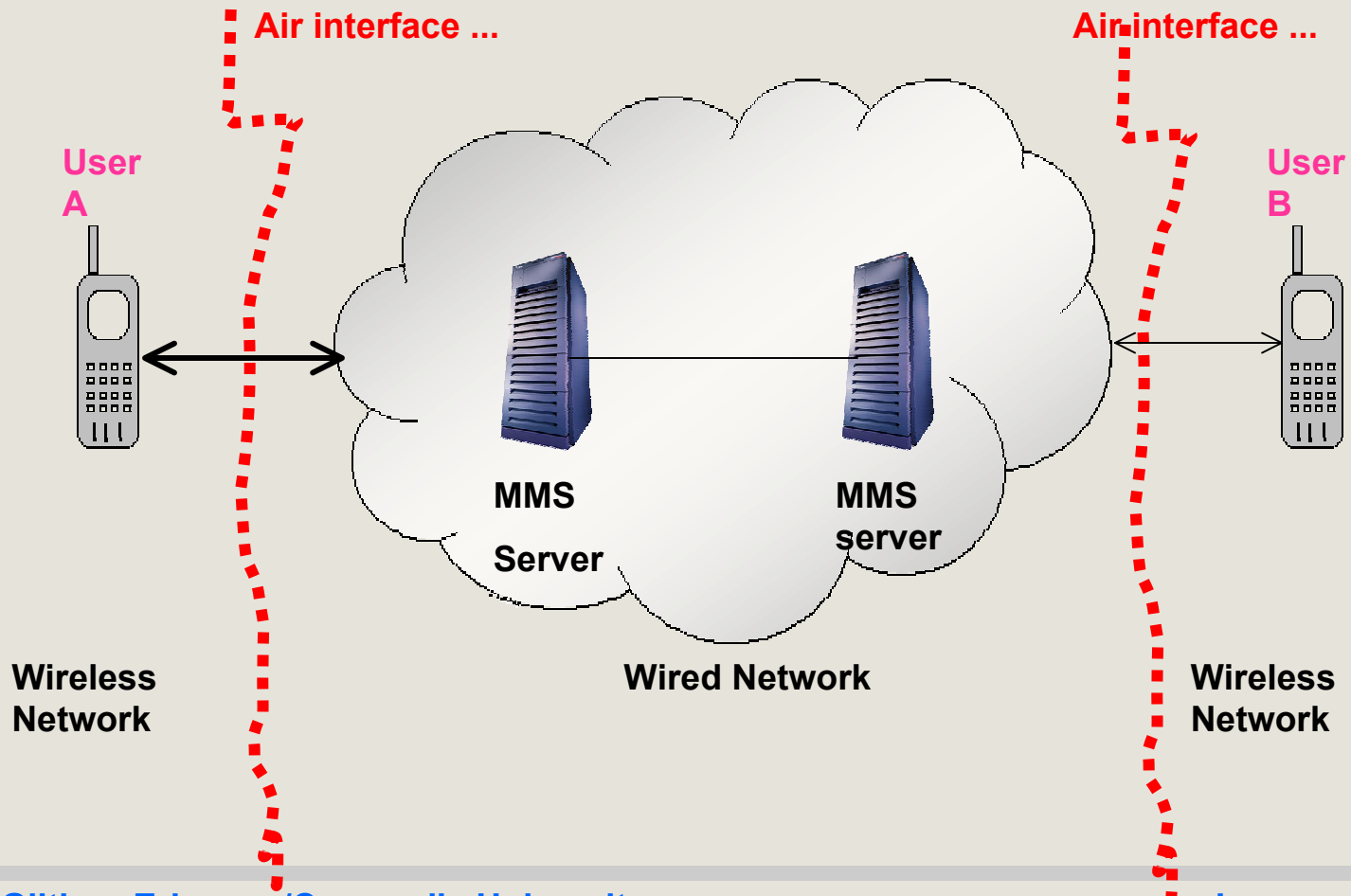
WAP: MMS

Multimedia Messaging Service

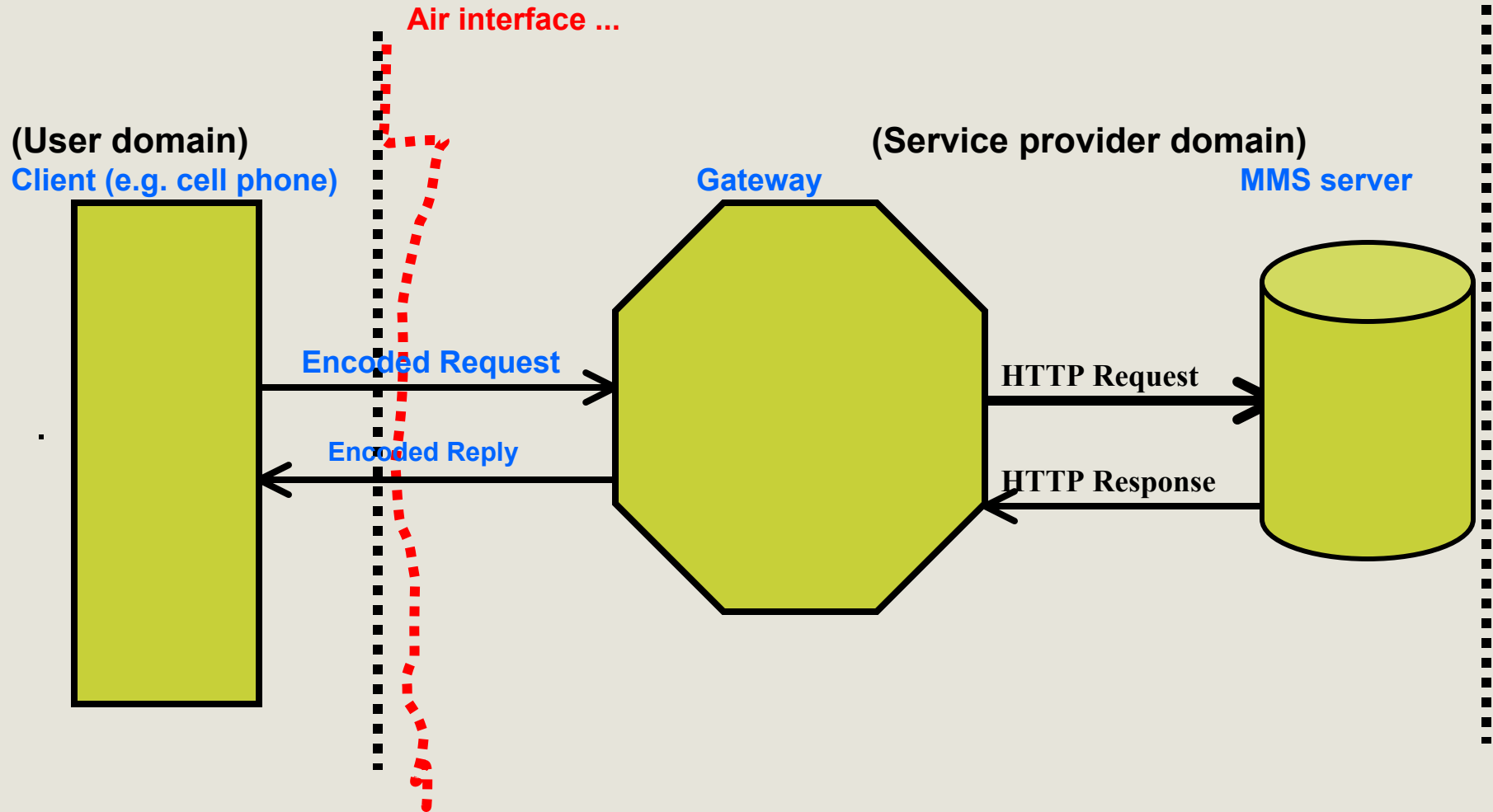
- **Service for sending and receiving multimedia message**
 - Multimedia = Text and/or audio and/or video
 - Being standardized by the third generation partnership project (3GPP)
- **Some of the interfaces**
 - MM1: User agent / MMS server (WAP based)
 - MM7: Third party value added service provider / MMS server (HTTP based)
 - MM4: MMS server / MMS server (SMTP currently)

WAP: MMS

MM1 interface



WAP: MMS



WAP: Imode ...

Imode in a few words:

- Has emerged in Japan in 1999:
 - Product of a specific service provider (DoCoMo)
 - As WAP, aim primarily at Internet wireless access
 - Huge commercial success

-

WAP: Imode ...

Imode vs. WAP: Main differences

- Business model
 - Integrated model (DoComo collects payments)
- Technical differences
 - Relies on DoComo packet network (9.6 Kbps)
 - cHTML (A sub-set of HTML) for content description
 - Protocol stack (transport layer Protocol (TLP) + Application Layer Protocol (ALP))

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WAP: Retrospective ...

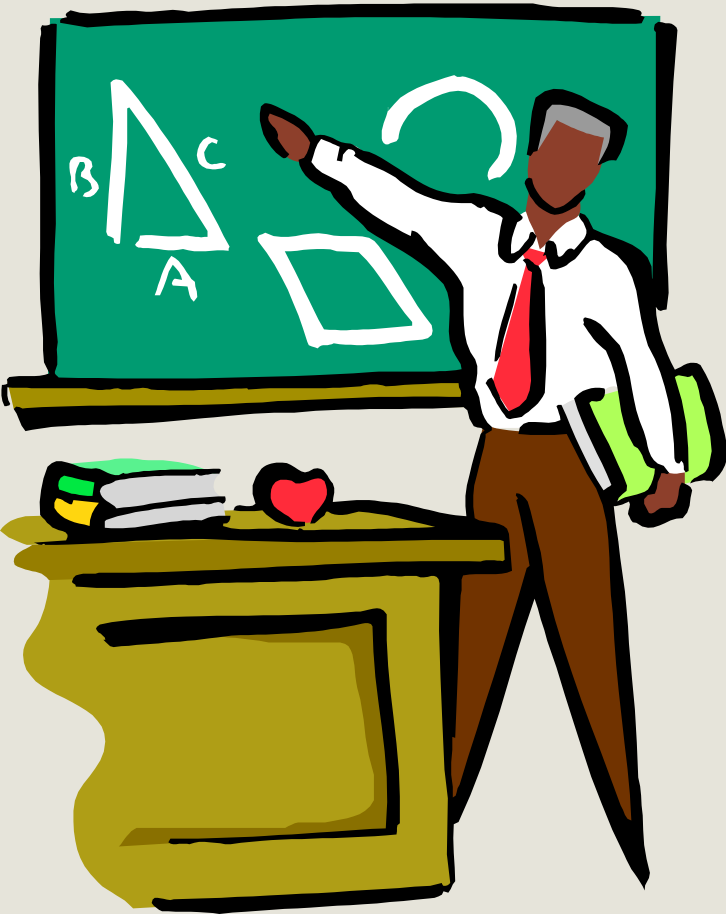
A revolutionary concept

- Bring non telephony services (e.g. browsing) to telephony users

With mixed results

- Slow take off
 - Initial charging model (circuit switched telephony model)
 - Limited range of services due to connection speed
- Less and less critical in the future with more and more bandwidth at the air interface and more and more powerful terminals

Telecommunication Information Network Architecture (TINA): The first architecture for telephony and non telephony services ...



1. Introduction
2. Fundamental principles and concepts
3. Service architecture
4. A retrospective

TINA: Introduction

Product of the TINA consortium (TINA-C)

- **First phase: 1993 - 1998**
 - Production of specifications by a core team based in same location (NJ, USA)
 - Validation (e.g. prototyping) by associated projects

- **Second phase: 1998 - 2000**
 - Special projects
 - Results promotion in various standards bodies

- **2000: Mission considered accomplished and dismantling of consortium**
 - Note: Many of the first phase participants did not join the second phase

TINA: Introduction

The context in the early 90s

- **Emergence of new technologies**
 - Object oriented technology
 - Distributed processing
 - Open Distributed Processing (ODP) specifications
 - **Emergence of standards relying on different principles**
 - Intelligent Networks (IN)
 - Telecommunications Management Network (TMN)
 - Management of telecommunications network
 - » FCAPS

TINA: Introduction

TINA aims at:

- **Integrated set of specifications for:**
 - Network architecture
 - Network management
 - Service architecture
- **That rely on:**
 - Emerging technologies
 - Object orientation
 - Distributed processing (ODP)
- And reconcile:
 - IN
 - TMN

TINA: Introduction

Specifications

- Distributed Processing Environment (DPE)
- Business model
- Network resource architecture
- Service architecture

Many prototypes but very few products ...

TINA: Fundamental principles

The separation principle

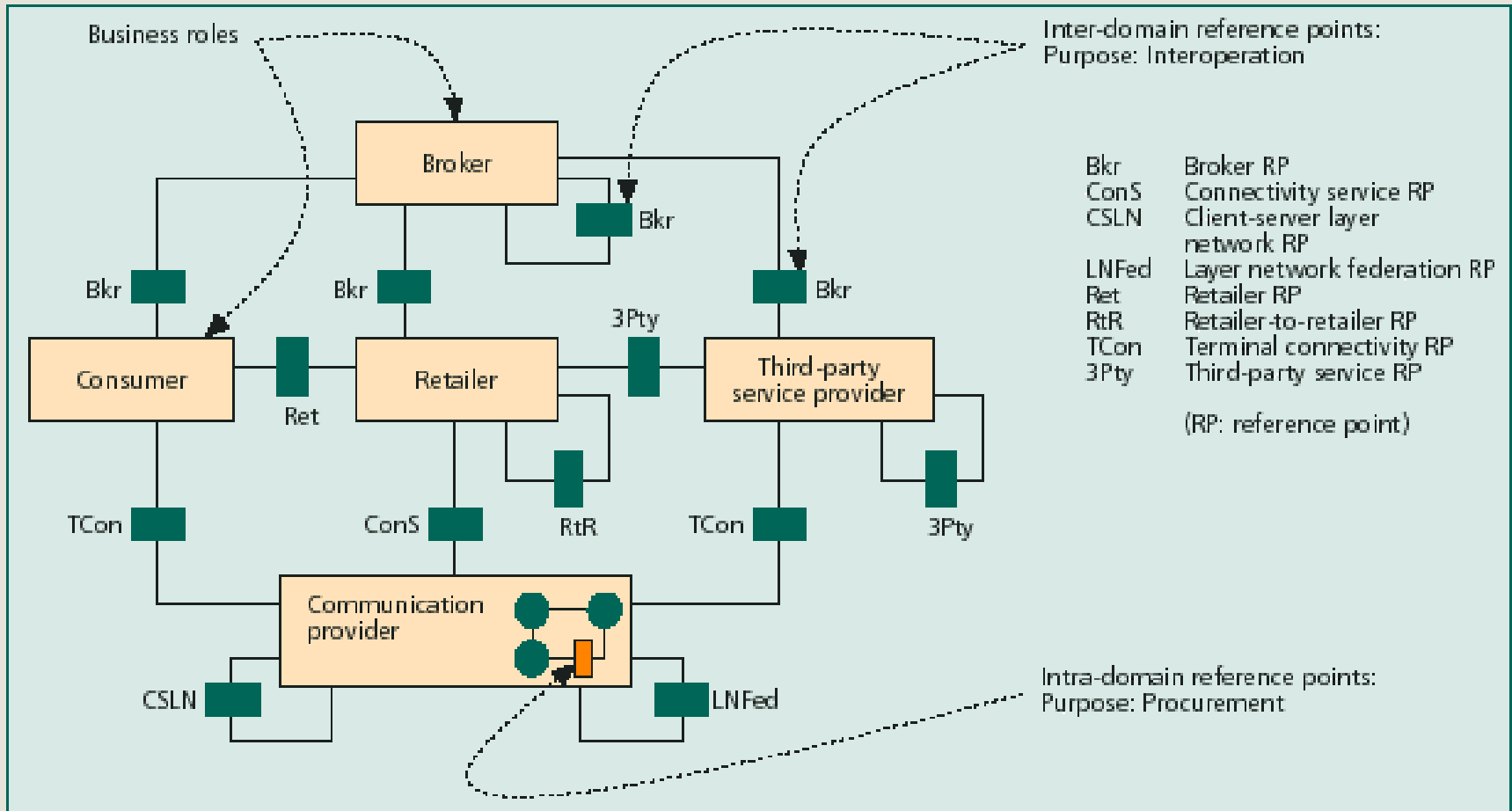
- Infrastructure
 - Service
 - Network
- Service
 - Subscription
 - Access
 - Usage
 - Service usage

Business model as starting point for specifications

- Roles
- Interfaces

TINA: Fundamental principles

Business roles / interfaces



Note: Taken from IEEE Communications Surveys & Tutorials (Reference [x])

TINA: Fundamental principles

Roles

- **Consumer**
 - End-user: Actual user of the service
 - Subscriber: Entity having the business agreement for service usage
- **Retailer**
 - One stop shop
 - Entity which provides the services and which has the business agreement with the subscriber
 - Can provide own services or services subcontracted from third parties
- **Third party service provider**
 - Has business agreement with retailer and no direct business agreement with subscribers
- **Communication/connectivity provider:** “Pipe” provider
- **Broker:** Ensure fair information distribution to all parties

TINA: Fundamental concepts

Service life cycle

- Construction
- Deployment
- Usage
- Withdrawal

Session

- Generalization of the call model concept
- Access session:
 - Activities involving consumer and retailer for selecting, and initiating the use of a service (e.g. subscription, authentication)
- Service session
 - Activities involving consumers and retailer for the actual usage of the service – Keep track of the parties involved in the usage of a service and the connectivity between them (e.g. feature interactions)
- Communication session
 - Activities involving the actual usage of network resources (e.g. QoS)

TINA: Service Architecture

- 1. Support for a wide range of services**
- 2. Rapid service creation and deployment**
- 3. Tailored services**
- 4. Independent evolution of network and service infrastructure**
- 5. Support for multiparty environment**
- 6. Service manageability**
- 7. Universal access**
- 8. Inter-working with legacy**

TINA: Service Architecture

Architecture made of:

- Computational objects accessible via CORBA interfaces
- No protocol

Computational objects in the consumer domain:

- Provider agent (PA): Proxy through which the retailer makes service offer to the consumer
- Service session user application part (ssUAP): Service control interface in the terminal

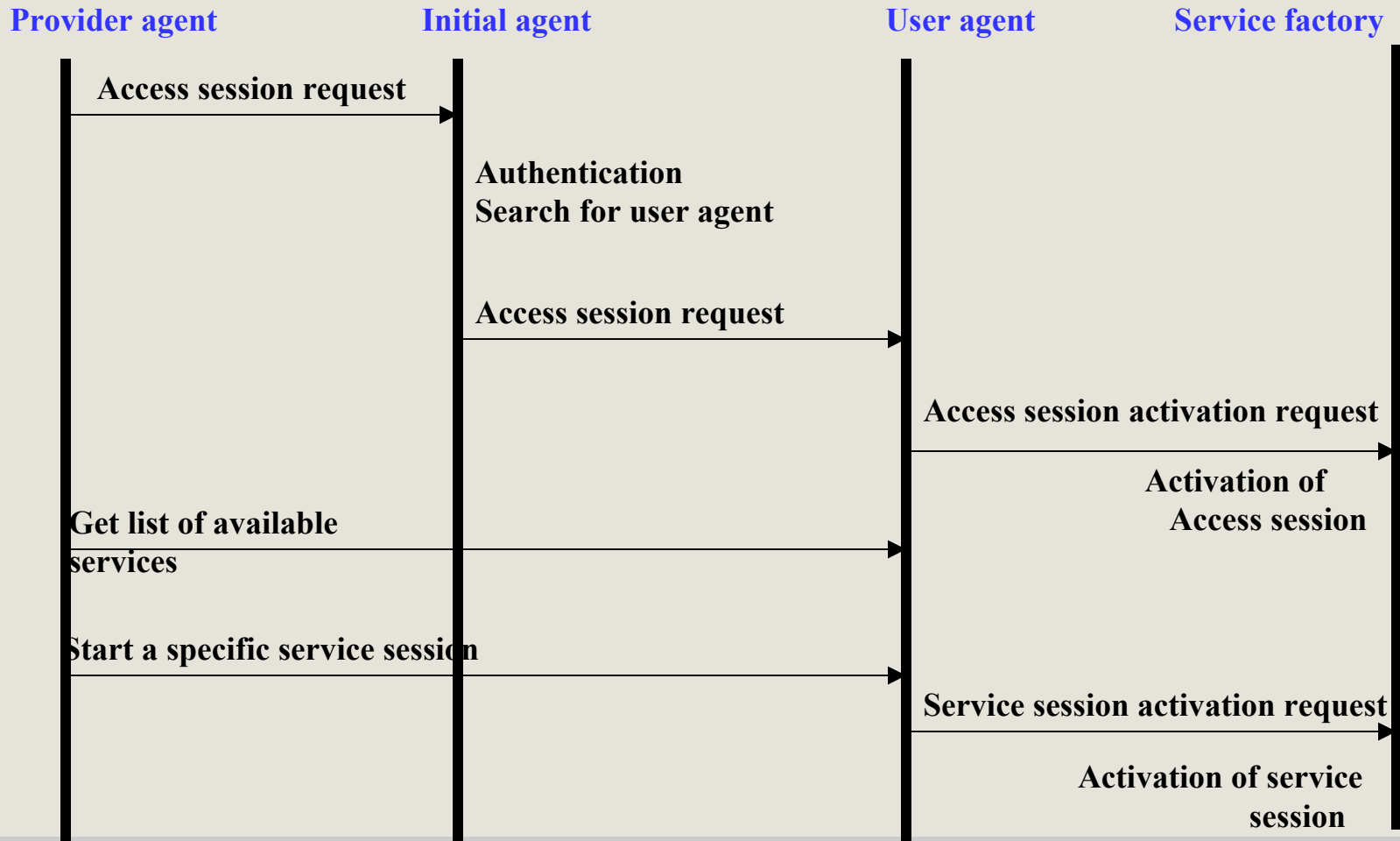
TINA: Service Architecture

Computational objects in the retailer domain:

- User agent (UA): Represents the user in the retailer domain
- Initial agent (IA): First point of contact for a consumer in a foreign network
- Peer agent: Establishes connection between two retailers
- Service factory (SF): Creates services instances
- Service session manager (SSM): runs the actual service

TINA: Service Architecture

Access session:



TINA: Retrospective ...

A seminal service architecture

- Many sound concepts (e.g. service life cycle) and principles (e.g. separation of concerns) widely re-used
- A sound business model widely re-used

But, a commercial failure

- Lots of prototypes and trials, but very very few commercial deployment due to a wide range of factors
 - Too far ahead its time
 - Complexity
 - Too high level of ambition (e.g scope encompasses everything from networking to service engineering)
 - Too little weight to other important technological developments (I.e. Internet)
 - Too little consideration to installed basis

References ...

WAP

1. WAP 2.0 Technical white paper, <http://www.wapforum.org>
2. M. Van Der Heijden and M. Taylor, *Understanding WAP: Wireless Applications, Devices and Services*, Artech House publishers, 2000

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4. H. Berndt, T. Hamada, and, P. Graubmann *TINA: Its Achievements and its Future Directions*, *IEEE Communication & Surveys*, 1Q 2000,
5. TINA Specifications, <http://www.tinac.com/>

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