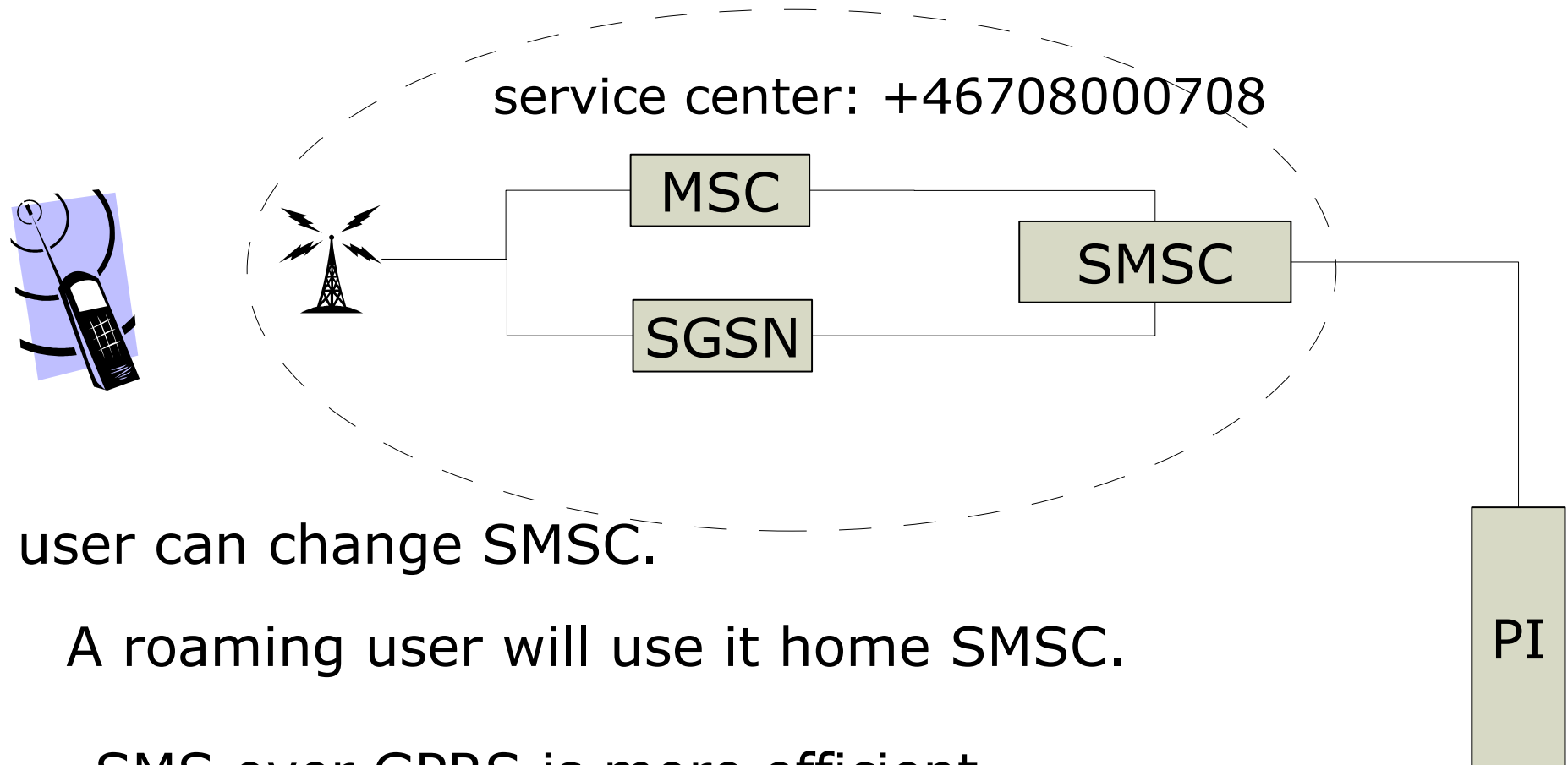


# Developing Mobile Applications



Messaging  
– SMS, WAP Push and MMS

# The SMS architecture



A user can change SMSC.

A roaming user will use it home SMSC.

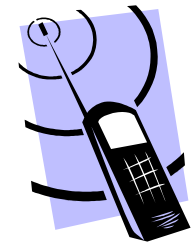
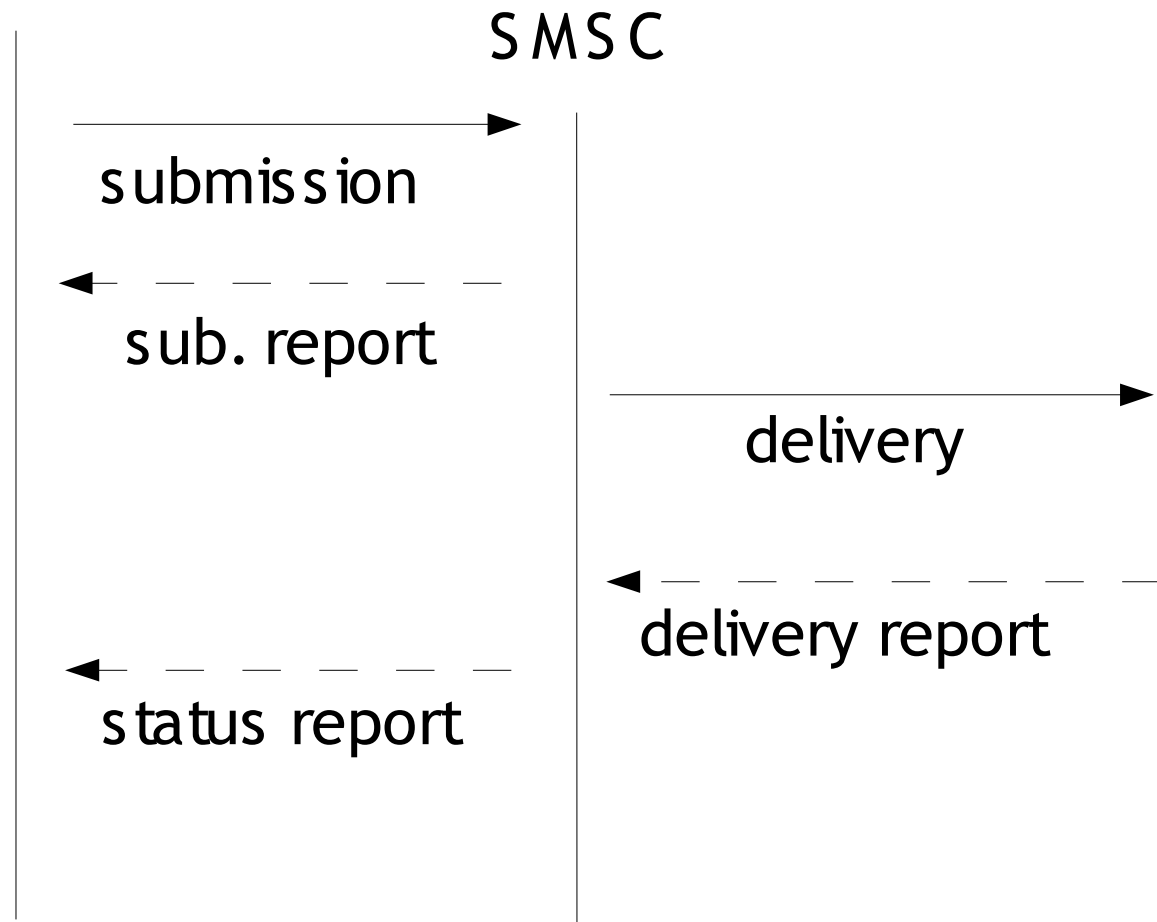
SMS over GPRS is more efficient  
(less setup time) but not always available.



## SMS services

- Mobile Terminating and Mobile Originating SMS is treated as two different services.
- Mobile has the address of a SMS service center (in the home PLMN) to which all messages are sent.
- The SMSC can be reached from external nodes (Short Message Entities) through a number of protocols.

# SMS signaling



# SMS-SUBMIT



- Message Type Indicator
  - 01 submit
- Reject Duplicate
- Validity Period Format
  - *relative, enhanced, absolute, not available*
- Status Report Request
- User Data Header Ind.
- Reply Path Request

7	6	5	4	3	2	1	0
RP	DHI	SRR	VPF		RD	MTI	
message reference							
destination address (2 - 12 octets)							
protocol identifier							
coding scheme							
validity period (0, 1 or 7 octets)							
user data length							
user data (0 - 140 octets)							

# SMS Destination



- Length of address (one byte)
- Format (one byte)
  - Type of number: int, nat, local, ..
  - Numbering plan: E.164, ...
- The number
  - 46 70 91 23 45 6 is coded like
  - 64 07 19 32 54 F6 in hex



## Protocol Identifier

- regular: SME to SMSC
- page: acknowledge but do not notify user
- mobile: handled by the terminal
- SIM: handled by the card
- telematic services: fax, telex, email
- many more .....

# Coding scheme



- Coding group
  - general, message waiting, data
- Character coding
  - GSM 7-bit (3GPP 23.038)
  - Universal Character Set (ISO 10646)
  - 8-bit data
  - Text compression
- Message class
  - immediate display (message)
  - mobile, SIM, terminal equipment (computer)



# SMS Validity period



- Relative received by SMSC (1 octet):
  - 0-143 x 5min
  - 144-167 12h + x 30 min
  - 168-196 x days
  - 197-255 x weeks
- Absolute (7 octets)
  - year (00-99), month, day, time
- Enhanced
  - resending, relative, absolute time



## SMS user data

- Text SMS in 7bit GSM alphabet
  - one escape character that changes character table
- Text SMS in USC2 16-bit for non-latin alphabets
- 8-bit user data
  - possibly containing user data headers
- In total
  - 140 bytes or
  - 160 7-bit characters

# Let's send a SMS



# SMS-DELIVER

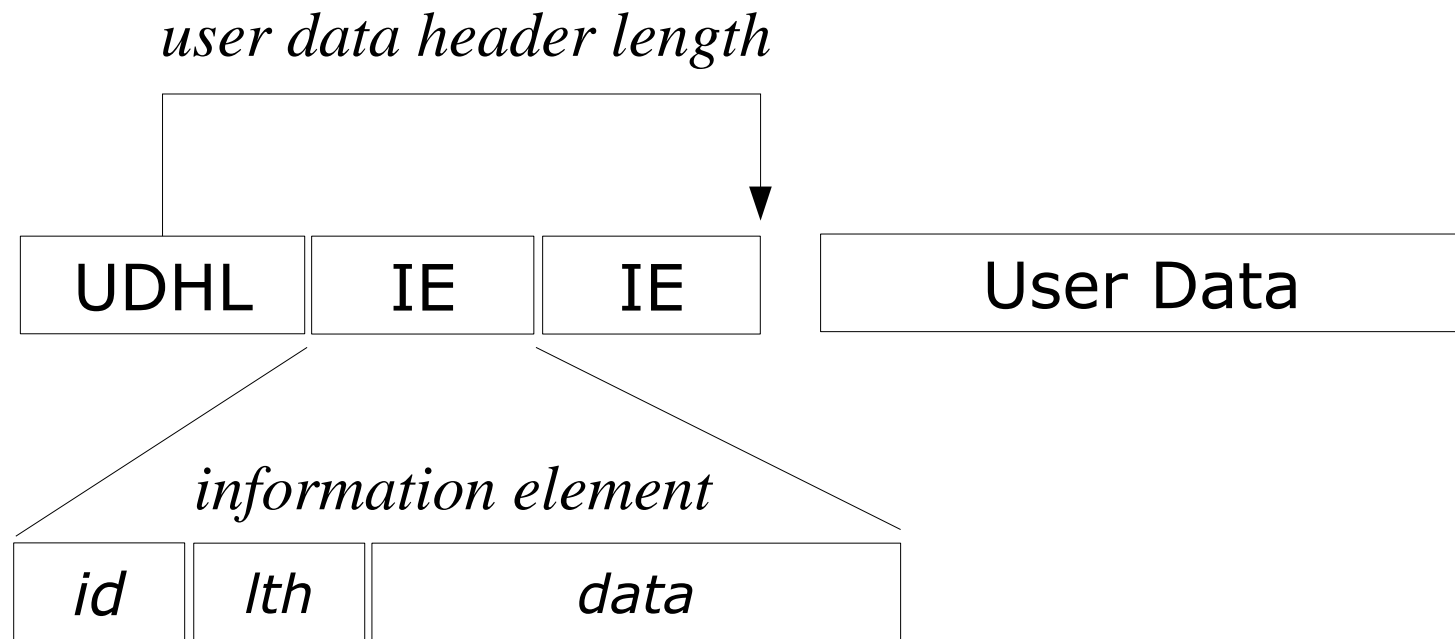
7 6 5 4 3 2 1 0

- Message Type Indicator (00)
- More messages
- Status Report Ind.
  - did the sender request a status report
- UDHI
  - user data header indication
- RP
  - reply path set

7	6	5	4	3	2	1	0
RP	UDHI	SRI			MM		MTI
originator address (2 -12)							
protocol identifier							
coding scheme							
time stamp (7 octets)							
user data length							
user data ( 0 - 140 octets)							



# User data headers



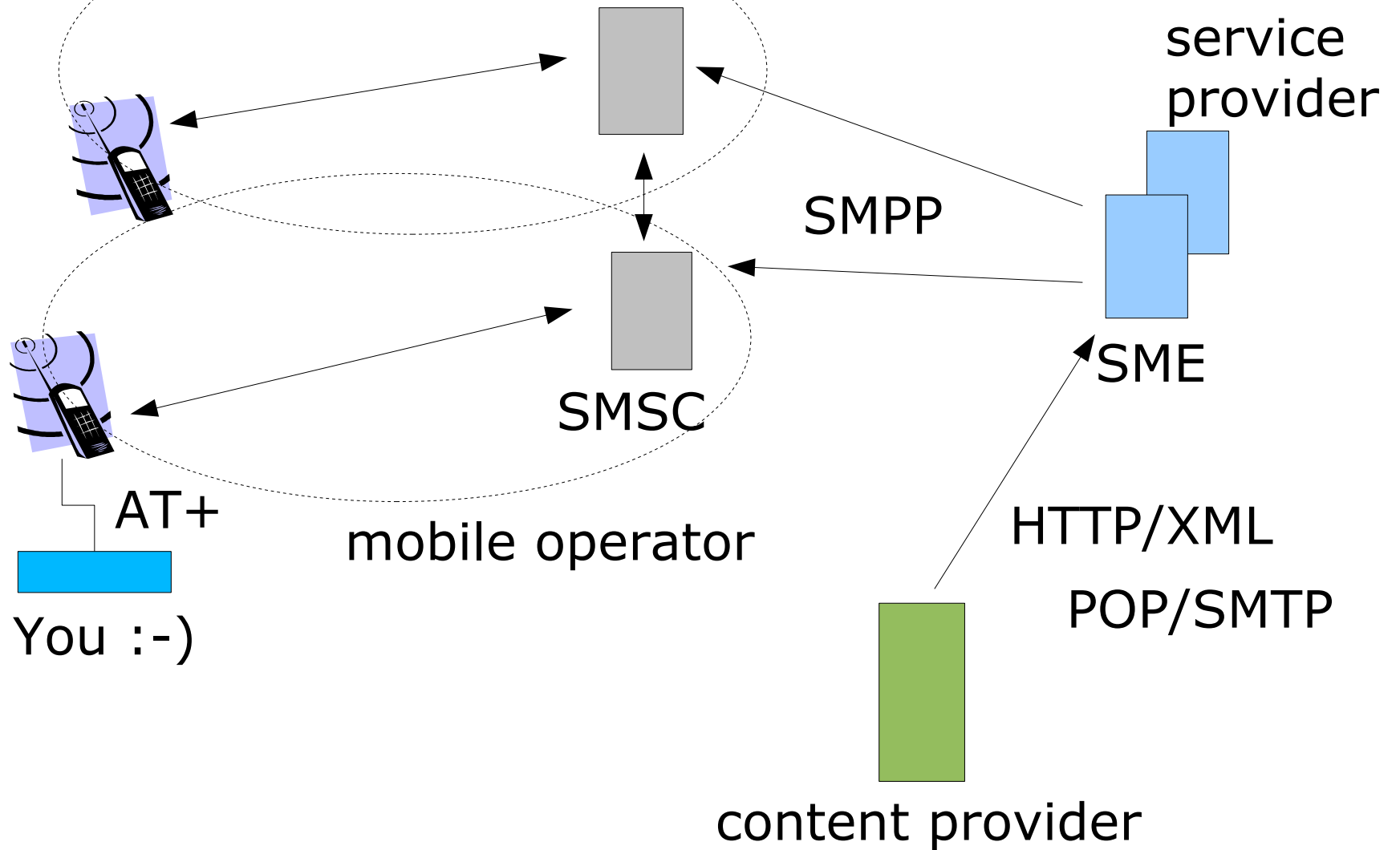
# Information Elements



- Concatenating messages
- Enhanced Message Service
  - each IE is a icon, sound or formatting instruction and a position where this should be visible
  - a set of predefined icons
  - Nokia introduced their own version “smart messaging” that allowed ring tones and backgrounds to be sent over SMS.
- Application addressing
  - this is important
- Much more



# SMS infrastructure



# WAP Push over SMS



- What do we want to send
  - we don't want to surf the web!
- Network initiated
  - the message is a WSP Push
  - delivered over WDP/UDP to the terminal, to a specified port
  - the WDP/UDP packet is sent over SMS
  - the terminal need to have a process listening on the port
- WAP Push Application
  - listening on port 2948

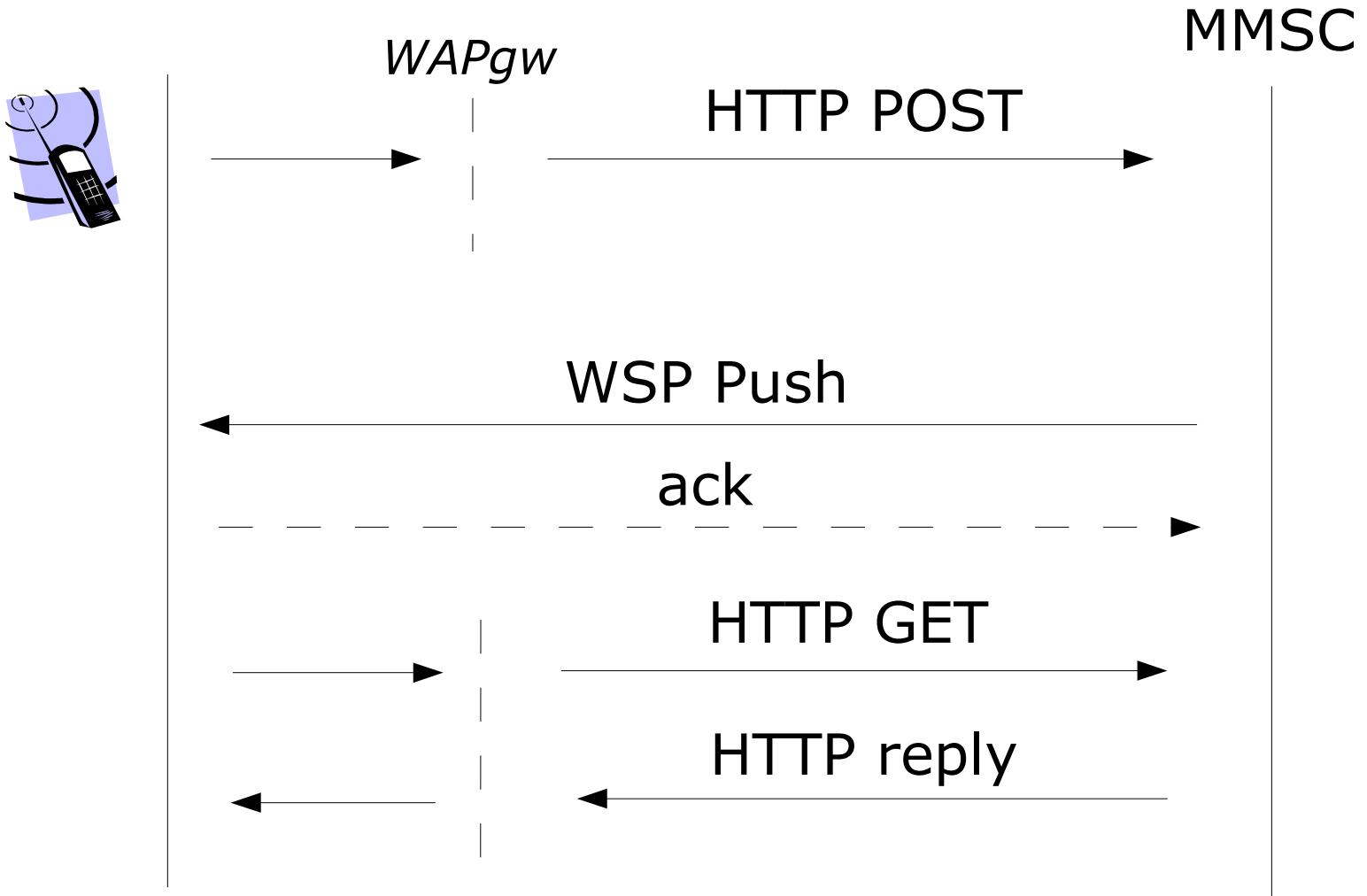


# MMS



- Multimedia Message Service
  - MMS 1.0 uses WAP 1.x stack
  - MMS 1.1-2 uses either WAP 1.x or 2.0
  - **read WAP 205 MMS Architecture Overview**
- Messages submitted using WSP/HTTP.
- Notification delivered using WAP Push (over SMS).
- Message retrieved by terminal using WSP/HTTP

# MMS protocols



# MMS content



- A MMS message is coded using
  - RFC 2822, Internet message
  - RFC 2045,.. Multipart Internet Mail Extensions (MIME)
- Content is often a SMIL message
  - Synchronised Multimedia Integration Language

# MMS - submission



```
:  
Content-type: application/vnd-wap-mms-message  
:  
X-Mms-Message-Type: m-send-req  
X-Mms-Tranaction-ID: 345  
:  
To: +46709123456/TYPE=PLMN  
From: ????  
Subject: this is a test  
Content-type:  
application/vnd.wap.multipart.mixed;  
boundary=foo-bar
```

# MMS - SMIL



```
<smil>
  <head>
    <layout>
      <root-layout/>
      <region id="Image" top="0" left="0" ... />
      <region id="Text" top="50%" left="0".. />
    </layout>
  </head>
  <body>
    <par dur="4000ms">
      <text src="foo.txt" region="Text"/>
      
    </par>
  </body>
</smil>
```

# MMS - notification



```
:  
Content-type: application/vnd-wap-mms-message  
:  
X-Mms-Message-Type: m-notification-ind  
X-Mms-Tranaction-ID: 567  
:  
From: +46709123456/TYPE=PLMN  
Subject: this is a test  
X-Mms-Content-Location:  
http://mmsc.operator.com/msg23
```

# MMS notification



SMS to +46709123456

UDP to port 2948

WSP Push

x-wap-application: mms.ua

content-type: application./vnd.wap.mms-message

X-Mms-Message-Type: m-notification-ind

X-Mms-Tranaction-ID: 567

:

*From: +46709123456/TYPE=PLMN*

Subject: this is a test

*X-Mms-Content-Location: http://mmsc.op...*



## Service Indication/Load

- Instead of pushing a MMS-notification we can push a other messages
- Service Indication
  - contains a URL that is opened by the browser (if the user agrees)
- Service Load
  - The terminal will retrieve the settings automatically (depending on security settings)



# Service Indication



SMS to +46709123456

UDP to port 2948

WSP Push

x-wap-application: **wml.ua**

content-type: application./**vnd.wap.sic**

```
<?xml version="1.0"?>
<!DOCTYPE si PUBLIC "-//WAPFORUM//DTD SI 1.0//EN"
                "http://www.wapforum.org/DTD/si.dtd">
<si>
  <indication href="http://www.foo.com/test.wml" >
    This is a test.
  </indication>
</si>
```



## J2ME

- Using J2ME and JSR-120 WMA you can register a *midlet* on a port.
- The messages can be sent using SMS port addressing.
- Cool
  - P2P games over SMS
  - initiate communication from the network
  - wake up on SMS